

APPENDIX 2 TO THE eSDS OF STYRENE MONOMER (CAS  
100-42-5; EINECS 202-851-5)

Exposure scenarios for Styrene

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## Summary of exposure scenarios for styrene

ES n°	ES nam	Manufacture	Formulation	Identified uses			Life cycle stage		Linked to Identified Use	Sector of Use (SU) <sup>1</sup>	Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental Release Category (ERC)
				Industrial End use	Professional End use	Consumer End use	ervice life (articles)	Waste stage						

ES n°	ES nam	Manufacture	Formulation	Identified uses			Life cycle stage		Linked to Identified Use	Sector of Use (SU) <sup>1</sup>	Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental Release Category (ERC)
				Industrial End use	Professional End use	Consumer End use	ervice life (articles)	Waste stage						
ES1	Manufacturing of styrene	X							M 1	3, 8	n.a.	1, 2, 8a, 8b, 15	n.a.	1
ES2	Continuous mass polymerisation of Polystyrene (HIPS and GPPS)			X					IU 2	3, 12	n.a.	2, 8a, 8b, 9, 14, 15	n.a.	6c
ES3	Batch suspension polymerisation of Polystyrene (HIPS and GPPS)			X					IU 3	3, 12	n.a.	2, 3, 8a, 8b, 9, 14, 15	n.a.	6c
ES4	Production of Expandable Polystyrene			X					IU 4	3, 12	n.a.	2, 3, 8a, 8b, 9, 14, 15	n.a.	6c
ES5	Production of Styrenic Copolymers			X					IU 5	3, 12	n.a.	2, 3, 8a, 8b, 9, 15	n.a.	6c
ES6	Manufacturing of UP/VE resins and formulated resins		X						IU 6	3, 12	n.a.	1, 3, 4, 5, 8a, 8b, 9, 15	n.a.	2
ES7a	FRP manufacturing in an industrial setting			X					IU 7a	3, 12	n.a.	3, 5, 7, 8a, 10, 13, 14, 15	n.a.	6d

ES n°	ES nam	Manufacture	Formulation	Identified uses			Life cycle stage		Linked to Identified Use	Sector of Use (SU) <sup>1</sup>	Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental Release Category (ERC)
				Industrial End use	Professional End use	Consumer End use	ervice life (articles)	Waste stage						
ES7b	- FRP manufacturing in a professional setting				X				IU 7b	22, 12	n.a.	3, 4, 5, 8a, 10, 11	n.a.	6c
ES8	Production of Styrene Butadiene Rubber (SBR)			X					IU 8	3, 11	n.a.	2, 3, 8a, 8b, 9, 15	n.a.	6c
ES9	Production of Styrene Butadiene Latex (SBL)			X					IU 9	3, 11	n.a.	2, 3, 8a, 8b, 9, 15	n.a.	6c
ES10	Production of Styrene Isoprene Copolymers			X					IU 10	3, 12	n.a.	2, 3, 8a, 8b, 9, 15	n.a.	6c
ES11	Production of other Styrene based polymeric dispersions			X					IU 11	3, 12	n.a.	2, 3, 8a, 8b, 9, 15	n.a.	6c
ES12	Production of filled Polyols			X					IU 12	3, 12	n.a.	2, 3, 8a, 8b, 9, 15	n.a.	6c
ES13	Consumer use of Liquid UP resin for repair purposes					X			IU 13	21	9a	n.a.	n.a.	6c
ES14	Consumer use					X			IU 14	21	9b	n.a.	n.a.	6c

ES n°	ES nam	Manufacture	Formulation	Identified uses			Life cycle stage		Linked to Identified Use	Sector of Use (SU) <sup>1</sup>	Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental Release Category (ERC)
				Industrial End use	Professional End use	Consumer End use	ervice life (articles)	Waste stage						
	of Resin paste used as fillers/putties													

## ES1 – Manufacturing of styrene

### Exposure Scenario: Manufacturing of styrene

Section 1		Exposure Scenario Title
Title	Manufacturing of styrene CAS: 100-42-5	
Use Descriptor	Sector of Use: SU 3 Industrial Manufacturing (all) , SU 8 Manufacture of bulk, large scale chemicals (including petroleum products)	
	Process Categories: PROC1, PROC2, PROC8a, PROC8b, PROC15	
	Environmental Release Categories: ERC1	
Processes, tasks, activities covered	Manufacture of the substance. Includes recycling/ recovery, material transfers, storage, maintenance and loading (including marine vessel/barge, road/rail car and bulk container), sampling and associated laboratory activities	
Section 2		Operational conditions and risk management measures
Section 2.1		Control of worker exposure
Product characteristics		
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].	
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].	
Amounts used	No Limit	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2].	
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1].	
Contributing Scenarios		Risk Management Measures
Number of contributing Scenario		12
Use in contained systems [CS38]. Dehydrogenation Reactor PROC 2	Handle substance within a closed system [E47].	
Use in contained systems [CS38]. Condensation of crude styrene - water separation PROC 2	Handle substance within a closed system [E47].	
Use in contained systems [CS38]. Vacuum Distillation PROC 2	Handle substance within a closed system [E47].	
Additivation and stabilisation [CS69]. Addition of inhibitors or retardants in distillators PROC 8b	Ensure material transfers are under containment or extract ventilation [E66].	
Process sampling [CS2]. Sampling from reactors/condensers/distillators PROC 8a	Use a sampling system designed to control exposure [E89].	
Laboratory activities [CS36]. Laboratory - Quality Control PROC 15	No specific measures identified [E118].	
Material transfers [CS3]. Transfert from distillator to storage tanks via pipelines. PROC 1	Transfer via enclosed lines [E52].No other specific measures identified [E120].	
Additivation and stabilisation [CS69]. Stabiliser addition for storage and transport PROC 8b	Ensure material transfers are under containment or extract ventilation [E66].	

Material transfers [CS3]. Unloading storage tanks for road, rail or boat transport PROC 8b	Clear transfer lines prior to de-coupling [E39]. Ensure operation is undertaken outdoors [E69]. Avoid carrying out activities involving exposure for more than 1 hour [OC27]
Equipment maintenance [CS5]. Manufacturing equipment maintenance: opening and cleaning manufacturing equipment for maintenance purposes PROC 8b	Avoid carrying out activities involving exposure for more than 1 hour [OC27]
Material transfers [CS3]. Waste management : recovery using condensation or adsorption/ desorption processes PROC 2	Handle substance within a closed system [E47].
Material transfers [CS3]. Waste management : transfer of process wastes to storage containers: off-line in workplace PROC 8b	Avoid carrying out activities involving exposure for more than 1 hour [OC27]
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>3.1. Health</b>	Used of ECETOC TRA Version 2 with modifications
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>4.1. Health</b>	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].



## Continuous mass polymerisation of Polystyrene (HIPS and GPPS)

### Exposure Scenario: Continuous mass polymerisation of Polystyrene (HIPS and GPPS)

<b>Section 1</b>		<b>Exposure Scenario Title</b>
Title	Continuous mass polymerisation of Polystyrene (HIPS and GPPS) CAS: 100-42-5	
Use Descriptor	Sector of Use: SU 3 Industrial Manufacturing (all) , SU 12 Manufacture of plastics products, including compounding and conversion	
	Process Categories: PROC2, PROC8a, PROC8b, PROC9, PROC14, PROC15	
	Environmental Release Categories: ERC6c	
Processes, tasks, activities covered	Manufacture of polymers from monomers in continuous and batch processes, include sparging, discharging, and reactor maintenance and immediate polymer product formation.	
<b>Section 2</b>		<b>Operational conditions and risk management measures</b>
<b>Section 2.1</b>		<b>Control of worker exposure</b>
<b>Product characteristics</b>		
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].	
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].	
Amounts used	No Limit	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2].	
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1].	
<b>Contributing Scenarios</b>		<b>Risk Management Measures</b>
<b>Number of contributing Scenario</b>		<b>14</b>
Material transfers [CS3]. Loading tank storage from road, rail or boat transport PROC 8b	Clear transfer lines prior to de-coupling [E39]. Avoid carrying out activities involving exposure for more than 1 hour [OC27]	
Continuous process [CS54]. Styrene Storage in tanks PROC 2	Handle substance within a closed system [E47].	
Continuous process [CS54]. Charging reactor via pipeline PROC 2	Handle substance within a closed system [E47].	
Material transfers [CS3]. Heat exchange and agitator in reactor PROC 2	Handle substance within a closed system [E47].	
Continuous process [CS54]. Devolatilisation tower PROC 2	Handle substance within a closed system [E47].	
Continuous process [CS54]. Recycling styrene from tower to reactor via pipeline PROC 2	Handle substance within a closed system [E47].	
Process sampling [CS2]. Sampling from reactors/devolatilisation tower PROC 8a	Use a sampling system designed to control exposure [E89].	
Laboratory activities [CS36]. Laboratory - Quality Control PROC 15	No specific measures identified [E118].	
Extrusion and masterbatching [CS88]. Extruder - Pelletizing	Limit the substance content in the product to 5% [OC17].	

PROC 14	
Small package filling [CS7]. Small package filling - Packaging of product PROC 9	Limit the substance content in the product to 5% [OC17].
Equipment maintenance [CS5]. Manufacturing equipment maintenance: opening and cleaning manufacturing equipment for maintenance purposes PROC 8b	Avoid carrying out activities involving exposure for more than 1 hour [OC27]
Bulk transfers [CS14]. Finished product Loading of road tanker, railcar, container PROC	Limit the substance content in the product to 5% [OC17].
Material transfers [CS3]. Waste management : recovery using condensation or adsorption/ desorption processes PROC 2	Handle substance within a closed system [E47].
Material transfers [CS3]. Waste management : transfer of process wastes to storage containers: off-line in workplace PROC 8b	Avoid carrying out activities involving exposure for more than 1 hour [OC27]
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>3.1. Health</b>	Used of ECETOC TRA Version 2 with modifications
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>4.1. Health</b>	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].

## Batch suspension polymerisation of Polystyrene (HIPS and GPPS)

### Exposure Scenario: Batch suspension polymerisation of Polystyrene (HIPS and GPPS)

Section 1		Exposure Scenario Title
Title	Batch suspension polymerisation of Polystyrene (HIPS and GPPS) CAS: 100-42-5	
Use Descriptor	Sector of Use: SU 3 Industrial Manufacturing (all) , SU 12 Manufacture of plastics products, including compounding and conversion	
	Process Categories: PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC14, PROC15	
	Environmental Release Categories: ERC6c	
Processes, tasks, activities covered	Manufacture of polymers from monomers in continuous and batch processes, include sparging, discharging, and reactor maintenance and immediate polymer product formation.	
Section 2		Operational conditions and risk management measures
Section 2.1		Control of worker exposure
Product characteristics		
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].	
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].	
Amounts used	No Limit	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2].	
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1].	
Contributing Scenarios		Risk Management Measures
Number of contributing Scenario		13
Material transfers [CS3]. Loading tank storage from road, rail or boat transport PROC 8b	Clear transfer lines prior to de-coupling [E39]. Avoid carrying out activities involving exposure for more than 1 hour [OC27]	
Material transfers [CS3]. Styrene Storage in tanks PROC 2	Handle substance within a closed system [E47].	
Material transfers [CS3]. Charging reactors via pipeline PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Batch process [CS55]. Dispersing and heat in reactor PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Batch process [CS55]. Washed and dried tanks PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Process sampling [CS2]. Sampling from reactors/tanks PROC 8a	Use a sampling system designed to control exposure [E89].	
Laboratory activities [CS36]. Laboratory - Quality Control PROC 15	No specific measures identified [E118].	
Operation of solids filtering equipment [CS117]. Pelletizing PROC 14	Limit the substance content in the product to 5% [OC17].	
Small package filling [CS7]. Small package filling - Packaging of product PROC 9	Limit the substance content in the product to 5% [OC17].	

Equipment maintenance [CS5]. Manufacturing equipment maintenance: opening and cleaning manufacturing equipment for maintenance purposes PROC 8b	Avoid carrying out activities involving exposure for more than 1 hour [OC27]
Bulk transfers [CS14]. Finished product Loading of road tanker, railcar, container PROC	Limit the substance content in the product to 5% [OC17].
Material transfers [CS3]. Waste management : recovery using condensation or adsorption/ desorption processes PROC 2	Handle substance within a closed system [E47].
Material transfers [CS3]. Waste management : transfer of process wastes to storage containers: off-line in workplace PROC 8b	Avoid carrying out activities involving exposure for more than 1 hour [OC27]
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>3.1. Health</b>	Used of ECETOC TRA Version 2 with modifications
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>4.1. Health</b>	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].

## Production of Expandable Polystyrene

### Exposure Scenario: Production of Expandable Polystyrene

Section 1		Exposure Scenario Title
Title	Production of Expandable Polystyrene CAS: 100-42-5	
Use Descriptor	Sector of Use: SU 3 Industrial Manufacturing (all) , SU 12 Manufacture of plastics products, including compounding and conversion	
	Process Categories: PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC14, PROC15	
	Environmental Release Categories: ERC6c	
Processes, tasks, activities covered	Manufacture of polymers from monomers in continuous and batch processes, include sparging, discharging, and reactor maintenance and immediate polymer product formation.	
Section 2		Operational conditions and risk management measures
Section 2.1		Control of worker exposure
Product characteristics		
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].	
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].	
Amounts used	No Limit	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2].	
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1].	
Contributing Scenarios		Risk Management Measures
Number of contributing Scenario		13
Material transfers [CS3]. Loading tank storage from road, rail or boat transport PROC 8b	Clear transfer lines prior to de-coupling [E39]. Avoid carrying out activities involving exposure for more than 1 hour [OC27]	
Material transfers [CS3]. Styrene Storage in tanks PROC 2	Handle substance within a closed system [E47]. 0	
Material transfers [CS3]. Charging reactors via pipeline PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Batch process [CS55]. Dispersing and heat in reactor PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Batch process [CS55]. Washed and dried tanks PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Process sampling [CS2]. Sampling from reactors/tanks PROC 8a	Use a sampling system designed to control exposure [E89].	
Laboratory activities [CS36]. Laboratory - Quality Control PROC 15	No specific measures identified [E118].	
Operation of solids filtering equipment [CS117]. Pelletizing PROC 14	Limit the substance content in the product to 5% [OC17].	
Small package filling [CS7]. Small package filling - Packaging of product PROC 9	Limit the substance content in the product to 5% [OC17].	

Equipment maintenance [CS5]. Manufacturing equipment maintenance: opening and cleaning manufacturing equipment for maintenance purposes PROC 8b	Avoid carrying out activities involving exposure for more than 1 hour [OC27]
Bulk transfers [CS14]. Finished product Loading of road tanker, railcar, container PROC	Limit the substance content in the product to 5% [OC17].
Material transfers [CS3]. Waste management : recovery using condensation or adsorption/ desorption processes PROC 2	Handle substance within a closed system [E47].
Material transfers [CS3]. Waste management : transfer of process wastes to storage containers: off-line in workplace PROC 8b	Avoid carrying out activities involving exposure for more than 1 hour [OC27]
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>3.1. Health</b>	Used of ECETOC TRA Version 2 with modifications
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>4.1. Health</b>	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].

## Production of Styrenic Copolymers

### Exposure Scenario: Production of Styrenic Copolymers

<b>Section 1</b>	<b>Exposure Scenario Title</b>
Title	Production of Styrenic Copolymers CAS: 100-42-5
Use Descriptor	Sector of Use: SU 3 Industrial Manufacturing (all) , SU 12 Manufacture of plastics products, including compounding and conversion
	Process Categories: PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15
	Environmental Release Categories: ERC6c
Processes, tasks, activities covered	Manufacture of polymers from monomers in continuous and batch processes, include sparging, discharging, and reactor maintenance and immediate polymer product formation.
<b>Section 2</b>	<b>Operational conditions and risk management measures</b>
<b>Section 2.1</b>	<b>Control of worker exposure</b>
<b>Product characteristics</b>	
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used	No Limit
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2].
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1].
<b>Contributing Scenarios</b>	<b>Risk Management Measures</b>
<b>Number of contributing Scenario</b>	<b>13</b>
Material transfers [CS3]. Loading tank storage from road, rail or boat transport PROC 8b	Clear transfer lines prior to de-coupling [E39]. Avoid carrying out activities involving exposure for more than 1 hour [OC27]
Material transfers [CS3]. Styrene Storage in tanks PROC 2	Handle substance within a closed system [E47].
Material transfers [CS3]. Charging reactors via pipeline PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]
Batch process [CS55]. Dissolving and polymerisation reactor PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]
Batch process [CS55]. Suspension reactor PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]
Batch process [CS55]. Washed and dried tanks PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]
Process sampling [CS2]. Sampling from reactors/tanks PROC 8a	Use a sampling system designed to control exposure [E89].
Laboratory activities [CS36]. Laboratory - Quality Control PROC 15	No specific measures identified [E118].
Small package filling [CS7]. Small package filling - Packaging of product PROC 9	Limit the substance content in the product to 5% [OC17].

Equipment maintenance [CS5]. Manufacturing equipment maintenance: opening and cleaning manufacturing equipment for maintenance purposes PROC 8b	Avoid carrying out activities involving exposure for more than 1 hour [OC27]
Bulk transfers [CS14]. Finished product Loading of road tanker, railcar, container PROC	Limit the substance content in the product to 5% [OC17].
Material transfers [CS3]. Waste management : recovery using condensation or adsorption/ desorption processes PROC 2	Handle substance within a closed system [E47].
Material transfers [CS3]. Waste management : transfer of process wastes to storage containers: off-line in workplace PROC 8b	Avoid carrying out activities involving exposure for more than 1 hour [OC27]
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>3.1. Health</b>	Used of ECETOC TRA Version 2 with modifications
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>4.1. Health</b>	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].



## Manufacturing of UP/VE resins and formulated resins (Gelcoat, Colour Paste, Putty, Bonding paste / Adhesive, etc.)

**Exposure Scenario: Manufacturing of UP/VE resins and formulated resins (Gelcoat, Colour Paste, Putty, Bonding paste / Adhesive, etc.)**

<b>Section 1</b>		<b>Exposure Scenario Title</b>
Title	Manufacturing of UP/VE resins and formulated resins (Gelcoat, Colour Paste, Putty, Bonding paste / Adhesive, etc.) CAS: 100-42-5	
Use Descriptor	Sector of Use: SU 3 Industrial Manufacturing (all) , SU 12 Manufacture of plastics products, including compounding and conversion	
	Process Categories: PROC1, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC15	
	Environmental Release Categories: ERC2	
Processes, tasks, activities covered	Processing of formulated polymers including material transfers, additives handling, moulding, curing and forming activities, material re-works, storage and associated maintenance.	
<b>Section 2</b>		<b>Operational conditions and risk management measures</b>
<b>Section 2.1</b>		<b>Control of worker exposure</b>
<b>Product characteristics</b>		
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].	
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].	
Amounts used	No Limit	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2].	
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1]. , Operation is carried out at elevated temperature (> 20°C above ambient temperature) [OC7].	
<b>Contributing Scenarios</b>		<b>Risk Management Measures</b>
<b>Number of contributing Scenario</b>		<b>12</b>
General exposures [CS1]. Use in contained batch processes [CS37]. PROC 1	Use in semi-automated and predominantly enclosed filling lines [E41]. Provide a good standard of general ventilation. Natural ventilation is from windows and doors etc. Controlled ventilation means air is supplied or removed by a powered fan. [E1]. Ensure operatives are trained to minimise exposures [E11 19]. Wear suitable gloves tested to EN374 [PPE15].	
Bulk transfers [CS14]. Receipt and storage of raw materials in bulk or as packed goods, indoor and outdoor; Raw material assembly and charging; dispensing of liquids and solids via pipeline; PROC 3	Use in semi-automated and predominantly enclosed filling lines [E41]. Use bulk or semi-bulk handling systems [E43]. Provide extract ventilation to points where emissions occur [E54]. Ensure operatives are trained to minimise exposures [E11 19]. Wear suitable gloves tested to EN374 [PPE15].	
General exposures (closed systems) [CS15]. Dissolving linear UP/VE polymer into styrene in blending vessel (or dissolver) PROC 3	Use in semi-automated and predominantly enclosed filling lines [E41]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]. Wear suitable gloves tested to EN374 [PPE15].	
Material transfers [CS3]. All internal transport Raw material assembly and charging / raw material dispensing of liquids and solids manually from bulk storage or packed goods into blending tank PROC 4	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]. Provide extract ventilation to points where emissions occur [E54]. Wear suitable gloves tested to EN374 [PPE15].	

Drum/batch transfers [CS8]; Pouring from small containers [CS9]; Transfer from/pouring from containers [CS22]; Mixing operations (open systems) [CS30]. Mixing liquid and solid components / into final formulated resin in blending vessel; Examples are gelcoat blending and compounding PROC 5	Provide extract ventilation to points where emissions occur [E54]. Keep lids of containers closed during blending Wear suitable gloves tested to EN374 [PPE15].
Process sampling [CS2]. Sampling from blender PROC 4	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]. Avoid dip sampling. [E42]. Wear suitable gloves tested to EN374 [PPE15].
Laboratory activities [CS36]. All laboratory activities Quality control work of samples from reactor and blending vessel; R&D work including handling of samples from 1 kg to 1 drum PROC 15	Carry out in a vented booth or extracted enclosure [E57]. Wear suitable gloves tested to EN374 [PPE15].
Bulk transfers [CS14]. All activities related to transport finished product to customer Dispensing final UP/VE resin (linear UP/VE polymer + styrene + additives) / into storage tank, IBC, drum or pail  PROC 9	Fill containers/cans at dedicated fill points supplied with local extract ventilation [E51]. Wear suitable gloves tested to EN374 [PPE15].
Bulk transfers [CS14]. All activities related to transport finished product to customer Dispensing final UP/VE resin (linear UP/VE polymer + styrene + additives) into roadtanker . Tier2 assessment has been done to prove safe use of styrene PROC 8b	Use bulk or semi-bulk handling systems [E43]. Wear suitable gloves tested to EN374 [PPE15].
Equipment cleaning and maintenance [CS39]. Cleaning and maintenance of blending vessel, roadtankers etc. PROC 3	Drain down and flush system prior to equipment break-in or maintenance [E55]. Apply vessel entry procedures including use of forced supplied air [AP15]. Wear suitable gloves tested to EN374 [PPE15].
Equipment cleaning and maintenance [CS39]. Cleaning and maintenance of pipes, pumps, filters, etc. PROC 8a	Drain down system prior to equipment break-in or maintenance [E65]. Drain or remove substance from equipment prior to break-in or maintenance [E81]. Wear suitable gloves tested to EN374 [PPE15].
Disposal of wastes [CS28]. Waste management / handling and storage of waste for removal for off-site treatment or for on-site treatment like incineration and/or biological waste water treatment PROC 8a	Provide a good standard of general ventilation. Natural ventilation is from windows and doors etc. Controlled ventilation means air is supplied or removed by a powered fan. [E1]. Dispose of empty containers and wastes safely [C&H8]. Dispose of waste in accordance with environmental legislation [C&H11]. Avoid carrying out activities involving exposure for more than 1 hour [OC27]. Wear suitable gloves tested to EN374 [PPE15]. Wear a respirator conforming to EN140 with Type A filter or better [PPE22].
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>3.1. Health</b>	Use of ECETOC TRA Version 2 with modifications
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>4.1. Health</b>	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].

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

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

Section 1		Exposure Scenario Title
Title	FRP manufacturing in an industrial setting, using UP/VE resins and/or formulated resins (gelcoat, bonding paste, putty etc.) CAS: 100-42-5	
Use Descriptor	Sector of Use: SU 3 Industrial Manufacturing (all), SU 12 Manufacture of plastics products, including compounding and conversion	
	Process Categories: Proc : 3, 5, 7, 8a, 10, 13, 14, 15	
	Environmental Release Categories: ERC6d	
Processes, tasks, activities covered	Processing of formulated polymers including material transfers, moulding and forming activities, material re-works and associated maintenance.	
Section 2		Operational conditions and risk management measures
Section 2.1		Control of worker exposure
<b>Product characteristics</b>		
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].	
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].	
Amounts used	No Limit	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2].	
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1]. , Assumes activities are at ambient temperature (unless stated differently) [G17].	
Contributing Scenarios		Risk Management Measures
Number of contributing Scenario		14
Rolling, Brushing [CS51]; Roller, spreader, flow application [CS98] All open mould applications where resins is applied by brushing, rolling and other low energy spreading operations; Examples are handlamination, gelcoatbrushing, filament winding PROC 10	Provide a good standard of general ventilation (10 to 15 air changes per hour) [E40]. Use long handled brushes and rollers where possible [E58]. Ensure the ventilation system is regularly maintained and tested [E74]. Dispose of empty containers and wastes safely [C&H8]. Wear suitable gloves tested to EN374 [PPE15]. Wear suitable coveralls to prevent exposure to the skin [PPE27].	
Spraying [CS10]; Spraying (automatic/robotic) [CS97] All open mould applications where resins is applied by spraying, either manually or automated or by robot. Examples are spray lamination, gelcoat spraying and "chop-hoop" filament winding PROC 7	Carry out in a vented booth or extracted enclosure [E57]. Ensure the ventilation system is regularly maintained and tested [E74]. Dispose of empty containers and wastes safely [C&H8]. Wear suitable gloves tested to EN374 [PPE15]. Wear suitable coveralls to prevent exposure to the skin [PPE27].	

<p>Spraying [CS10]; Spraying (automatic/robotic) [CS97] All open mould applications where resins is applied by spraying, either manually or automated or by robot. Examples are spray lamination, gelcoat spraying and "chop-hoop" filament winding PROC 7</p>	<p>Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]. Use long handled tools where possible [E50]. Carefully pour from containers [E62]. Wear suitable gloves tested to EN374 [PPE15]. Wear suitable coveralls to prevent exposure to the skin [PPE27]. Wear a respirator conforming to EN140 with Type A filter or better [PPE22].</p>
<p>Dipping, immersion and pouring [CS4]; Rolling, Brushing [CS51]; Roller, spreader, flow application [CS98] Application of repair putties; Application of bonding pastes / adhesives.  PROC 10</p>	<p>Limit the substance content in the product to 25% [OC18]. Provide a good standard of general ventilation (10 to 15 air changes per hour) [E40]. Wear suitable gloves (tested to EN374) and eye protection [RPE19].</p>
<p>Dipping, immersion and pouring [CS4]; Continuous process [CS54]. Continuous processes with open impregnation steps, such as pultrusion with open impregnation baths and (semi-) continuous production of flat laminates PROC 13</p>	<p>Provide extract ventilation to points where emissions occur [E54].</p>
<p>Casting operations [CS32]; Mixing operations (open systems) [CS30]. Casting and mixing operations in (semi-) open containers. Examples are centrifugal casting, casting of polymer concrete and artificial marble and the manufacturing of SMC / BMC/ TMC, etc PROC 5</p>	<p>Limit the substance content in the product to 25% [OC18]. Provide extract ventilation to points where emissions occur [E54]. Wear suitable gloves tested to EN374 [PPE15].</p>
<p>General exposures (closed systems) [CS15]. Mixing liquid and solid components / into final formulated resin in blending vessel; Examples are gelcoat blending and compounding, formulation of repair putties, bonding pastes, chemical anchoring, etc PROC 5</p>	<p>Handle substance within a predominantly closed system provided with extract ventilation [E49]. Provide a good standard of general ventilation (10 to 15 air changes per hour) [E40]. Put lids on containers immediately after use [E9]. Wear suitable gloves tested to EN374 [PPE15].</p>
<p>Material transfers [CS3]; Automated process with (semi) closed systems [CS93]; Use in contained batch processes [CS37]. Resin injection and transfer processes, such as vacuum infusion, RTM, impregnation of sewer relining sleeves PROC 3</p>	<p>Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]. Put lids on containers immediately after use [E9]. Wear suitable gloves tested to EN374 [PPE15].</p>

Material transfers [CS3]; Production or preparation of articles by tableting, compression, extrusion or pelletisation [CS100]; Treatment by heating [CS129]; Batch processes at elevated temperatures [CS136]. Processes where curing of UP / VE resins takes place at high temperature. Examples are pultrusion with injection dies and processing of SMC / BMC / TMC, etc PROC 14	Limit the substance content in the product to 25% [OC18]. Provide a good standard of general or controlled ventilation (3 to 5 air changes per hour) [E40] or:[G9] Provide the operation with a properly sited receiving hood [E71]. Wear suitable gloves tested to EN374 [PPE15].
Material transfers [CS3]. Product delivery/storage - delivery of bulk and packaged products - outdoor / indoor  PROC 3	Transfer via enclosed lines [E52]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].
Drum/batch transfers [CS8]; Pouring from small containers [CS9]; Transfer from/pouring from containers [CS22]; Mixing operations (open systems) [CS30]. Loading of mixing equipment; Preparation of material for application; (liquid products) - batch, indoor  PROC 5	Provide extract ventilation to points where emissions occur [E54]. Put lids on containers immediately after use [E9]. Wear suitable gloves tested to EN374 [PPE15].
Equipment maintenance [CS5]; Maintenance of small items [CS18]. Equipment cleaning and maintenance, open indoor  PROC 8a	Provide extract ventilation to points where emissions occur [E54]. Wear suitable gloves tested to EN374 [PPE15].
Laboratory activities [CS36]. Quality control work of samples from blending vessel; R&D work including handling of samples from 1 kg to 1 drum PROC 15	No specific measures identified [E118].
Disposal of wastes [CS28]. Handling of non cured waste; Waste management / handling and storage of waste for removal for off-site treatment or for on-site treatment like incineration and/or biological waste water treatment  PROC 8a	Provide extract ventilation to points where emissions occur [E54]. Contain and dispose of waste according to local regulations [C&H14]. Put lids on containers immediately after use [E9]. Wear suitable gloves tested to EN374 [PPE15].
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>3.1. Health</b>	Use of ECETOC TRA Version 2 with modifications
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>4.1. Health</b>	Predicted exposures are not expected to exceed the DN(M)EL when the

	Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].

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

<b>Section 1</b>	<b>Exposure Scenario Title</b>
Title	FRP manufacturing in a professional setting, using UP/VE resins and/or formulated resins (gelcoat, bonding paste, putty etc.) CAS: 100-42-5
Use Descriptor	Sector of Use: SU 22 Public domain (administration, education, entertainment, services, craftsmen), SU 12 Manufacture of plastics products, including compounding and conversion
	Process Categories: Proc : 3, 4, 5, 8a, 10, 11
	Environmental Release Categories: ERC6c
Processes, tasks, activities covered	Processing of formulated polymers including material transfers, moulding and forming activities, material re-works and associated maintenance.
<b>Section 2</b>	<b>Operational conditions and risk management measures</b>
<b>Section 2.1</b>	<b>Control of worker exposure</b>
<b>Product characteristics</b>	
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used	No Limit
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2].
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1]. , Assumes activities are at ambient temperature (unless stated differently) [G17].
<b>Contributing Scenarios</b>	<b>Risk Management Measures</b>
<b>Number of contributing Scenario</b>	<b>9</b>
Rolling, Brushing [CS51]; Roller, spreader, flow application [CS98] All open mould applications where resins is applied by brushing, rolling and other low energy spreading operations; Examples are handlamination, gelcoatbrushing, semi-continuous production of flat panels and laminates PROC 10	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]. Use long handled brushes and rollers where possible. [E58]. Wear suitable gloves tested to EN374 [PPE15]. Wear a respirator conforming to EN140 with Type A filter or better [PPE22].
Spraying [CS10]. All open mould applications where resins is applied by spraying. Examples are spray lamination and gelcoat spraying PROC 11	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]. Keep people not involved in the activity, away from the operation. Avoid carrying out activities involving exposure for more than 4 hours [OC28]. Wear suitable gloves tested to EN374 [PPE15]. Wear a full face respirator conforming to EN140 with Type A filter or better [RPE24].

Dipping, immersion and pouring [CS4]; Rolling, Brushing [CS51]; Roller, spreader, flow application [CS98] Application of repair putties; Application of bonding pastes / adhesives.  PROC 10	Limit the substance content in the product to 25% [OC18]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]. Wear suitable gloves tested to EN374 [PPE15]. Wear a respirator conforming to EN140 with Type A filter or better [PPE22].
Dipping, immersion and pouring [CS4]; Rolling, Brushing [CS51]; Roller, spreader, flow application [CS98] Application of floorings, mastics, coatings, castings  PROC 10	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]. Wear suitable gloves tested to EN374 [PPE15]. Wear a respirator conforming to EN140 with Type A filter or better [PPE22].
Material transfers [CS3]; Pouring from small containers [CS9]. Preparation of material for application (liquids) - transfer of material from one container to another; Formulating / blending resins, gelcoats, bonding pastes, putties etc. in blending vessels PROC 5	Use drum pumps or carefully pour from container [E64]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]. Put lids on containers immediately after use [E9]. Wear suitable gloves tested to EN374 [PPE15]. Wear a respirator conforming to EN140 with Type A filter or better [PPE22].
Use in contained batch processes [CS37]. Sewer relining operation  PROC 4	Wear suitable gloves tested to EN374 [PPE15]. Wear a respirator conforming to EN140 with Type A filter or better [PPE22].
Use in contained batch processes [CS37]. Application of chemical anchoring  PROC 3	Wear suitable gloves tested to EN374 [PPE15].
Equipment maintenance [CS5]; Maintenance of small items [CS18]. Equipment cleaning and maintenance, open indoor  PROC 8a	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]. Avoid carrying out activities involving exposure for more than 1 hour [OC27]. Wear suitable gloves tested to EN374 [PPE15].
Disposal of wastes [CS28]. Handling of non cured waste; Waste management / handling and storage of waste for removal for off-site treatment or for on-site treatment like incineration and/or biological waste water treatment  PROC 8a	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]. Dispose of empty containers and wastes safely [C&H8]. Avoid carrying out activities involving exposure for more than 1 hour [OC27]. Wear suitable gloves tested to EN374 [PPE15].
<b>Section 3</b>	<b>Exposure Estimation</b>



<b>3.1. Health</b>	Use of ECETOC TRA Version 2 with modifications as documented in CSA.
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>4.1. Health</b>	<p>Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22].</p> <p>Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].</p>

## Production of Styrene Butadiene Rubber (SBR)

### Exposure Scenario: Production of Styrene Butadiene Rubber (SBR)

<b>Section 1</b>		<b>Exposure Scenario Title</b>
Title	Production of Styrene Butadiene Rubber (SBR) CAS: 100-42-5	
Use Descriptor	Sector of Use: SU 3 Industrial Manufacturing (all) , SU 11 Manufacture of rubber products	
	Process Categories: PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15	
	Environmental Release Categories: ERC6c	
Processes, tasks, activities covered	Manufacture of polymers from monomers in continuous and batch processes, include sparging, discharging, and reactor maintenance and immediate polymer product formation.	
<b>Section 2</b>		<b>Operational conditions and risk management measures</b>
<b>Section 2.1</b>		<b>Control of worker exposure</b>
<b>Product characteristics</b>		
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].	
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].	
Amounts used	No Limit	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2].	
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1].	
<b>Contributing Scenarios</b>		<b>Risk Management Measures</b>
<b>Number of contributing Scenario</b>		<b>15</b>
Material transfers [CS3]. Loading tank storage from road, rail or boat transport PROC 8b	Clear transfer lines prior to de-coupling [E39]. Avoid carrying out activities involving exposure for more than 1 hour [OC27]	
Material transfers [CS3]. Styrene Storage in tanks PROC 2	Handle substance within a closed system [E47].	
Material transfers [CS3]. Charging reactors via pipeline PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Batch process [CS55]. Polymerisation reactor PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Batch process [CS55]. Vacuum steam distillation PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Batch process [CS55]. Coagulation reactor PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Batch process [CS55]. Drying tank PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Material transfers [CS3]. Recycling styrene from distillator to reactor via pipeline PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Process sampling [CS2]. Sampling from reactors PROC 8a	Use a sampling system designed to control exposure [E89].0	

Laboratory activities [CS36]. Laboratory - Quality Control PROC 15	No specific measures identified [E118].
Small package filling [CS7]. Small package filling - Packaging of product PROC 9	Limit the substance content in the product to 5% [OC17].0
Equipment maintenance [CS5]. Manufacturing equipment maintenance: opening and cleaning manufacturing equipment for maintenance purposes PROC 8b	Avoid carrying out activities involving exposure for more than 1 hour [OC27]
Bulk transfers [CS14]. Finished product Loading of road tanker, railcar, container PROC	Limit the substance content in the product to 5% [OC17].
Material transfers [CS3]. Waste management : recovery using condensation or adsorption/ desorption processes PROC 2	Handle substance within a closed system [E47].
Material transfers [CS3]. Waste management : transfer of process wastes to storage containers: off-line in workplace PROC 8b	Avoid carrying out activities involving exposure for more than 1 hour [OC27]
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>3.1. Health</b>	Use of ECETOC TRA Version 2 with modifications
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>4.1. Health</b>	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].

## Production of Styrene Butadiene Latex (SBL)

### Exposure Scenario: Production of Styrene Butadiene Latex (SBL)

Section 1		Exposure Scenario Title
Title	Production of Styrene Butadiene Latex (SBL) CAS: 100-42-5	
Use Descriptor	Sector of Use: SU 3 Industrial Manufacturing (all) , SU 11 Manufacture of rubber products	
	Process Categories: PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15	
	Environmental Release Categories: ERC6c	
Processes, tasks, activities covered	Manufacture of polymers from monomers in continuous and batch processes, include sparging, discharging, and reactor maintenance and immediate polymer product formation.	
Section 2		Operational conditions and risk management measures
Section 2.1		Control of worker exposure
Product characteristics		
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].	
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].	
Amounts used	No Limit	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2].	
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1].	
Contributing Scenarios		Risk Management Measures
Number of contributing Scenario		13
Material transfers [CS3]. Loading tank storage from road, rail or boat transport PROC 8b	Clear transfer lines prior to de-coupling [E39]. Avoid carrying out activities involving exposure for more than 1 hour [OC27]	
Material transfers [CS3]. Styrene Storage in tanks PROC 2	Handle substance within a closed system [E47].	
Material transfers [CS3]. Charging reactors via pipeline PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Batch process [CS55]. Polymerisation reactor PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Batch process [CS55]. Vacuum Steam distillation PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Material transfers [CS3]. Recycling styrene from distillator to reactor via pipeline PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Process sampling [CS2]. Sampling from reactors PROC 8a	Use a sampling system designed to control exposure [E89].	
Laboratory activities [CS36]. Laboratory - Quality Control PROC 15	No specific measures identified [E118].	
Small package filling [CS7]. Small package filling - Packaging of product PROC 9	Limit the substance content in the product to 5% [OC17].	

Equipment maintenance [CS5]. Manufacturing equipment maintenance: opening and cleaning manufacturing equipment for maintenance purposes PROC 8b	Avoid carrying out activities involving exposure for more than 1 hour [OC27]
Bulk transfers [CS14]. Finished product Loading of road tanker, railcar, container PROC	Limit the substance content in the product to 5% [OC17].
Material transfers [CS3]. Waste management : recovery using condensation or adsorption/ desorption processes PROC 2	Handle substance within a closed system [E47].
Material transfers [CS3]. Waste management : transfer of process wastes to storage containers: off-line in workplace PROC 8b	Avoid carrying out activities involving exposure for more than 1 hour [OC27]
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>3.1. Health</b>	Use of ECETOC TRA Version 2 with modifications
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>4.1. Health</b>	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].

## Production of Styrene Isoprene Copolymers

### Exposure Scenario: Production of Styrene Isoprene Copolymers

<b>Section 1</b>		<b>Exposure Scenario Title</b>
Title	Production of Styrene Isoprene Copolymers CAS: 100-42-5	
Use Descriptor	Sector of Use: SU 3 Industrial Manufacturing (all) , SU 12 Manufacture of plastics products, including compounding and conversion	
	Process Categories: PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15	
	Environmental Release Categories: ERC6c	
Processes, tasks, activities covered	Manufacture of polymers from monomers in continuous and batch processes, include sparging, discharging, and reactor maintenance and immediate polymer product formation.	
<b>Section 2</b>		<b>Operational conditions and risk management measures</b>
<b>Section 2.1</b>		<b>Control of worker exposure</b>
<b>Product characteristics</b>		
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].	
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].	
Amounts used	No Limit	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2].	
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1].	
<b>Contributing Scenarios</b>		<b>Risk Management Measures</b>
<b>Number of contributing Scenario</b>		<b>13</b>
Material transfers [CS3]. Loading tank storage from road, rail or boat transport PROC 8b	Clear transfer lines prior to de-coupling [E39]. Avoid carrying out activities involving exposure for more than 1 hour [OC27]	
Material transfers [CS3]. Styrene Storage in tanks PROC 2	Handle substance within a closed system [E47].	
Material transfers [CS3]. Charging reactors via pipeline PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Batch process [CS55]. Dissolving and polymerisation reactor PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Batch process [CS55]. Suspension reactor PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Batch process [CS55]. Washed and dried tanks PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Process sampling [CS2]. Sampling from reactors/tanks PROC 8a	Use a sampling system designed to control exposure [E89].	
Laboratory activities [CS36]. Laboratory - Quality Control PROC 15	No specific measures identified [E118].	
Small package filling [CS7]. Small package filling - Packaging of product PROC 9	Limit the substance content in the product to 5% [OC17].	

Equipment maintenance [CS5]. Manufacturing equipment maintenance: opening and cleaning manufacturing equipment for maintenance purposes PROC 8b	Avoid carrying out activities involving exposure for more than 1 hour [OC27]
Bulk transfers [CS14]. Finished product Loading of road tanker, railcar, container PROC	Limit the substance content in the product to 5% [OC17].
Material transfers [CS3]. Waste management : recovery using condensation or adsorption/ desorption processes PROC 2	Handle substance within a closed system [E47].
Material transfers [CS3]. Waste management : transfer of process wastes to storage containers: off-line in workplace PROC 8b	Avoid carrying out activities involving exposure for more than 1 hour [OC27]
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>3.1. Health</b>	Use of ECETOC TRA Version 2 with modifications
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>4.1. Health</b>	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].

## Production of other Styrene based polymeric dispersions

### Exposure Scenario: Production of other Styrene based polymeric dispersions

Section 1		Exposure Scenario Title
Title	Production of other Styrene based polymeric dispersions CAS: 100-42-5	
Use Descriptor	Sector of Use: SU 3 Industrial Manufacturing (all) , SU 12 Manufacture of plastics products, including compounding and conversion	
	Process Categories: PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15	
	Environmental Release Categories: ERC6c	
Processes, tasks, activities covered	Manufacture of polymers from monomers in continuous and batch processes, include sparging, discharging, and reactor maintenance and immediate polymer product formation.	
Section 2		Operational conditions and risk management measures
Section 2.1		Control of worker exposure
Product characteristics		
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].	
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].	
Amounts used	No Limit	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2].	
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1].	
Contributing Scenarios		Risk Management Measures
Number of contributing Scenario		13
Material transfers [CS3]. Loading tank storage from road, rail or boat transport PROC 8b	Clear transfer lines prior to de-coupling [E39]. Avoid carrying out activities involving exposure for more than 1 hour [OC27]	
Material transfers [CS3]. Styrene Storage in tanks PROC 2	Handle substance within a closed system [E47].	
Material transfers [CS3]. Charging reactors via pipeline PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Batch process [CS55]. Dissolving and polymerisation reactor PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Batch process [CS55]. Suspension reactor PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Batch process [CS55]. Washed and dried tanks PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Process sampling [CS2]. Sampling from reactors/tanks PROC 8a	Use a sampling system designed to control exposure [E89].	
Laboratory activities [CS36]. Laboratory - Quality Control PROC 15	No specific measures identified [E118].	
Small package filling [CS7]. Small package filling - Packaging of product PROC 9	Limit the substance content in the product to 5% [OC17].	



Equipment maintenance [CS5]. Manufacturing equipment maintenance: opening and cleaning manufacturing equipment for maintenance purposes PROC 8b	Avoid carrying out activities involving exposure for more than 1 hour [OC27]
Bulk transfers [CS14]. Finished product Loading of road tanker, railcar, container PROC	Limit the substance content in the product to 5% [OC17].
Material transfers [CS3]. Waste management : recovery using condensation or adsorption/ desorption processes PROC 2	Handle substance within a closed system [E47].
Material transfers [CS3]. Waste management : transfer of process wastes to storage containers: off-line in workplace PROC 8b	Avoid carrying out activities involving exposure for more than 1 hour [OC27]
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>3.1. Health</b>	Use of ECETOC TRA Version 2 with modifications
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>4.1. Health</b>	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].

## Production of filled Polyols

### Exposure Scenario: Production of filled Polyols

Section 1		Exposure Scenario Title
Title	Production of filled Polyols CAS: 100-42-5	
Use Descriptor	Sector of Use: SU 3 Industrial Manufacturing (all) , SU 12 Manufacture of plastics products, including compounding and conversion	
	Process Categories: PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15	
	Environmental Release Categories: ERC6c	
Processes, tasks, activities covered	Manufacture of polymers from monomers in continuous and batch processes, include sparging, discharging, and reactor maintenance and immediate polymer product formation.	
Section 2		Operational conditions and risk management measures
Section 2.1		Control of worker exposure
Product characteristics		
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].	
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].	
Amounts used	No Limit	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2].	
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1].	
Contributing Scenarios		Risk Management Measures
Number of contributing Scenario		13
Material transfers [CS3]. Loading tank storage from road, rail or boat transport PROC 8b	Clear transfer lines prior to de-coupling [E39]. Avoid carrying out activities involving exposure for more than 1 hour [OC27].	
Material transfers [CS3]. Styrene Storage in tanks PROC 2	Handle substance within a closed system [E47]. 0	
Material transfers [CS3]. Charging reactors via pipeline PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Batch process [CS55]. Dissolving and polymerisation reactor PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Batch process [CS55]. Suspension reactor PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Batch process [CS55]. Washed and dried tanks PROC 3	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	
Process sampling [CS2]. Sampling from reactors/tanks PROC 8a	Use a sampling system designed to control exposure [E89].00	
Laboratory activities [CS36]. Laboratory - Quality Control PROC 15	0No specific measures identified [E118].	
Small package filling [CS7]. Small package filling - Packaging of product PROC 9	Limit the substance content in the product to 5% [OC17].0	

Equipment maintenance [CS5]. Manufacturing equipment maintenance: opening and cleaning manufacturing equipment for maintenance purposes PROC 8b	Avoid carrying out activities involving exposure for more than 1 hour [OC27]
Bulk transfers [CS14]. Finished product Loading of road tanker, railcar, container PROC	Limit the substance content in the product to 5% [OC17].
Material transfers [CS3]. Waste management : recovery using condensation or adsorption/ desorption processes PROC 2	Handle substance within a closed system [E47].
Material transfers [CS3]. Waste management : transfer of process wastes to storage containers: off-line in workplace PROC 8b	Avoid carrying out activities involving exposure for more than 1 hour [OC27]
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>3.1. Health</b>	Use of ECETOC TRA Version 2 with modifications
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>4.1. Health</b>	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].

## Consumer use of Liquid UP resin for repair purposes

### Exposure scenario: Consumer use of Liquid UP resin for repair purposes

Section 1		Exposure Scenario Title
Title	Consumer use of Liquid UP resin for repair purposes CAS: 100-42-5	
Sector of Use (SU code)	SU 21 Private households (= general public = consumers)	
Use Descriptor (PC codes)	PC9a:Coatings and paints, fillers putties, thinners	
Processes, tasks, activities covered	Covers consumer uses in liquid resins	
Section 2		Operational conditions and risk management measures
Section 2.1		Control of consumer exposure
Product characteristics		
Physical form of product	Liquid, vapour pressure > 10 Pa [OC15].	
Concentration of substance in product	Unless otherwise stated, cover concentrations up to 35% [ConsOC1].	
Amounts used	Unless otherwise stated, covers use amounts up to 1000 g [ConsOC2].	
Frequency and duration of use / exposure	Unless otherwise stated, covers use frequency up to 5 times per day [ConsOC4]; covers exposure up to 0.5 hours per event [ConsOC14].	
Other Operational Conditions affecting consumer exposure	Unless otherwise stated, covers skin contact area up to 108 cm <sup>2</sup> [ConsOC5].	
Section 2.1.1		Product categories
Number of consumer uses		1
PC9a:Coatings and paints, fillers putties, thinners--	<p>OC: Unless otherwise stated, covers concentrations up to 35% [ConsOC1]. Covers use up to 365 days/year[ConsOC3]. Covers use up to 5 times/day of use[ConsOC4]. Covers skin contact area up to 108,00 cm<sup>2</sup> [ConsOC5]. For each use event, covers use amounts up to 1000g [ConsOC2]. Covers use in a one car garage (34m<sup>3</sup>) under typical ventilation [ConsOC10]. Covers use in room size of 34m<sup>3</sup>[ConsOC11]. For each use event, covers exposure up to 0,50hr/event[ConsOC14].</p> <p>RMM: No specific RMMs identified beyond those OCs stated</p>	

## Consumer use of Resin paste used as fillers/putties

### Exposure Scenario: Consumer use of Resin paste used as fillers/putties

<b>Section 1</b>	<b>Exposure Scenario Title</b>
Title	Consumer use of Resin paste used as fillers/putties CAS: 100-42-5
Sector of Use (SU code)	SU 21 Private households (= general public = consumers)
Use Descriptor (PC codes)	PC9b:Fillers, putties, plasters, modeling clay
Processes, tasks, activities covered	Covers consumer uses in resin pastes
<b>Section 2</b>	<b>Operational conditions and risk management measures</b>
<b>Section 2.1</b>	<b>Control of consumer exposure</b>
<b>Product characteristics</b>	
Physical form of product	Liquid, vapour pressure > 10 Pa [OC15].
Concentration of substance in product	Unless otherwise stated, cover concentrations up to 35% [ConsOC1].
Amounts used	Unless otherwise stated, covers use amounts up to 100 g [ConsOC2].
Frequency and duration of use / exposure	Unless otherwise stated, covers use frequency up to 5 times per day [ConsOC4]; covers exposure up to 10 minutes per event [ConsOC14].
Other Operational Conditions affecting worker exposure	Unless otherwise stated, covers skin contact area up to 22 cm <sup>2</sup> [ConsOC5].
<b>Section 2.1.1</b>	<b>Product categories</b>
<b>Number of consumer uses</b>	<b>1</b>
PC9b:Fillers, putties, plasters, modelling clay--	<p>OC: Unless otherwise stated, covers concentrations up to 5,5% [ConsOC1]. covers use up to 365 days/year[ConsOC3]. covers use up to 5 times/day of use[ConsOC4]. covers skin contact area up to 22,00 cm<sup>2</sup> [ConsOC5]. for each use event, covers use amounts up to 100g [ConsOC2]. Covers use in a one car garage (34m<sup>3</sup>) under typical ventilation [ConsOC10]. covers use in room size of 34m<sup>3</sup>[ConsOC11]. for each use event, covers exposure up to 0,17hr/event[ConsOC14].</p> <p>RMM: No specific RMMs identified beyond those OCs stated</p>

## **Environmental Exposure Assessment**

In the chemical safety assessment performed according to Article 14(3) in connection with Annex I section 3 (Environmental Hazard Assessment) and section 4 (PBT/ vPvB Assessment) no hazard was identified. Therefore according to REACH Annex I (5.0) an exposure estimation is not necessary. Consequently all identified uses of the substance are considered as safe for the environment.

In addition, styrene was subject of a comprehensive Risk Assessment carried out according to the European regulation on existing chemicals. The environmental part of the risk assessment was finalized und published 2002 by the European Chemicals Bureau.

An extensive environmental exposure assessment was conducted using generic assumptions and specific information from facilities manufacturing and using styrene.

A risk characterization at local and regional scale was carried out for all relevant environmental compartments.

The conclusion of the environmental risk assessment was that styrene does not pose concern for the environment and that there is no need for risk reduction measures beyond those which are being applied already.

This conclusion applies to all steps in the production and use of styrene and the use of styrene containing products, for the aquatic compartment (including sediment), to microorganisms in wastewater treatment plants, to the terrestrial compartment and to the air compartment.

An environmental exposure assessment has not therefore been performed.