

**Safety data sheet**

According to Regulation (EC) 1907/2006, annex II

Printing date 09.05.2016

Version number 6

Revision: 09.05.2016

SECTION 1: Identification of the substance/mixture and of the company/undertaking**1.1 Product identifier**

Trade name:	Xylene
CAS Number:	1330-20-7
EC number:	215-535-7
Index number:	601-022-00-9
Registration number	01-2119488216-32-0023

(e-)SDS Code	1764
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1.2 Relevant identified uses of the substance or mixture and uses advised against

Application of the substance / the mixture	. Raw material for industrial use. Intermediate Lacquer solvent/ Varnish thinner Solvent Other registered uses: See exposure scenario attached
Uses advised against	No further relevant information available.

1.3 Details of the supplier of the safety data sheet

Manufacturer/Supplier:	versalis S.p.A. Piazza Boldrini, 1 I-20097 San Donato Milanese (MI) N° telefono: +39 02 520 1
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E-mail address of the competent person responsible for the SDS:	e-mail: SDS.versalis@versalis.eni.com
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1.4 Emergency telephone number:	CNIT - Centro Nazionale di Informazione Tossicologica (24h): (+39) 0382 24444
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SECTION 2: Hazards identification**2.1 Classification of the substance or mixture**

Classification according to Regulation (EC) No 1272/2008

Flam. Liq. 3	H226 Flammable liquid and vapour.
Acute Tox. 4	H312 Harmful in contact with skin.
Acute Tox. 4	H332 Harmful if inhaled.
Skin Irrit. 2	H315 Causes skin irritation.
Eye Irrit. 2	H319 Causes serious eye irritation.
STOT SE 3	H335 May cause respiratory irritation.

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STOT RE 2 H373 May cause damage to the hearing organs through prolonged or repeated exposure.
 Asp. Tox. 1 H304 May be fatal if swallowed and enters airways.
 Aquatic Chronic 3 H412 Harmful to aquatic life with long lasting effects.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008

The substance is classified and labelled according to the CLP regulation.

Hazard pictograms



Signal word

Danger

Hazard-determining components of labelling:

xylene
 Ethylbenzene

Hazard statements

H226 Flammable liquid and vapour.
 H312+H332 Harmful in contact with skin or if inhaled.
 H315 Causes skin irritation.
 H319 Causes serious eye irritation.
 H335 May cause respiratory irritation.
 H373 May cause damage to the hearing organs through prolonged or repeated exposure.

Precautionary statements

H304 May be fatal if swallowed and enters airways.
 H412 Harmful to aquatic life with long lasting effects.
 P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
 P243 Take precautionary measures against static discharge.
 P280 Wear protective gloves/protective clothing/eye protection/face protection.
 P301+P310 IF SWALLOWED: Immediately call a POISON CENTER/doctor/.
 P303+P361+P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
 P405 Store locked up.
 P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

2.3 Other hazards

PBT:

The substance/mixture doesn't meet the PBT Annex XIII criteria of REACH Regulation

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vPvB:

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The substance/mixture doesn't meet the vPvB Annex XIII criteria of REACH Regulation**SECTION 3: Composition/information on ingredients****3.1 Substances**

CAS No. Description	1330-20-7 xylene
EC number:	215-535-7
Index number:	601-022-00-9

Dangerous components:

CAS: 1330-20-7 EINECS: 215-535-7 Index number: 601-022-00-9	xylene Flam. Liq. 3, H226; Asp. Tox. 1, H304; Acute Tox. 4, H312; Acute Tox. 4, H332; Skin Irrit. 2, H315; Eye Irrit. 2, H319; STOT SE 3, H335; Aquatic Chronic 3, H412	82-93%
CAS: 100-41-4 EINECS: 202-849-4 Index number: 601-023-00-4	Ethylbenzene Flam. Liq. 2, H225; STOT RE 2, H373; Asp. Tox. 1, H304; Acute Tox. 4, H332; Skin Irrit. 2, H315; Eye Irrit. 2, H319; STOT SE 3, H335; Aquatic Chronic 3, H412	7-15%
CAS: 108-88-3 EINECS: 203-625-9 Index number: 601-021-00-3	toluene Flam. Liq. 2, H225; Repr. 2, H361; STOT RE 2, H373; Asp. Tox. 1, H304; Skin Irrit. 2, H315; STOT SE 3, H336	<0.3%

SECTION 4: First aid measures**4.1 Description of first aid measures**

General information:

Take appropriate precautions to avoid being exposed
Take affected persons out of danger area and lay down.

After inhalation:

Supply fresh air; consult doctor in case of complaints.
If breathing has stopped, perform artificial respiration.
In case of unconsciousness place patient stably in side position for transportation.

After skin contact:

Immediately rinse with water.
Seek immediate medical advice.

After eye contact:

Irrigate eyes with copious amounts of water for at least 10-15 min, holding eyelids apart to ensure thorough rinsing
Call a doctor immediately.
In case of irritation, blurred vision or swelling persist, consult a doctor..

After swallowing:

Do not induce vomit. Wash the mouth with clean water. Call a doctor and/or carry immediately to first aid.

4.2 Most important symptoms and effects, both acute and delayedDisziness
Irritation of respiratory tract.
Skin irritations and dermatitis.
Eyes reddening.

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Nervous system effects, headache, nausea, vomiting, drowsiness, narcosis.

4.3 Indication of any immediate medical attention and special treatment needed

Involve doctor immediately.
Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.
If swallowed, always think that it is possible the passage of the substance in the respiratory tract.

*** SECTION 5: Firefighting measures****5.1 Extinguishing media**

Suitable extinguishing agents:

Water, water spray, foam, dry chemicals, carbon dioxide.

For safety reasons unsuitable extinguishing agents: Water with full jet

Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam

5.2 Special hazards arising from the substance or mixture

The product, when involved in a fire, burns with a sooty flame and release fumes made up of water, carbon dioxide, carbon monoxide (when starved of oxygen) and other combustion products.

on combustion it can emit irritating and toxic fumes

The gases / vapors are heavier than air and may flow at ground level.

5.3 Advice for firefighters

Protective equipment:

Mouth respiratory protective device.

Wear suitable protective clothing (helmet, goggles, fire resistant gloves, boots) and protect respiratory organs (self contained breathing apparatus).

Additional information

Cool endangered receptacles with water spray.

Danger of explosion if fluid enters the sewage system.

This substance will float and can be reignited on surface water.

*** SECTION 6: Accidental release measures****6.1 Personal precautions, protective equipment and emergency procedures**

Wear protective equipment. Keep unprotected persons away.

Remove ignition sources. Avoid sparks. Extinguish naked flames. Take precautionary measures against static discharge. Prevent the spilled product coming into contact with sources of flame.

Remove the personnel not essential.

Ensure adequate ventilation

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Delimit the contaminated area until the risk of contamination has been removed.

Spillage of liquid product may create a fire hazard and an explosive atmosphere

6.2 Environmental precautions:

Stop the spillage if the operation is not dangerous.

Do not allow product to reach sewage system or any water course.

Inform respective authorities in case of seepage into water course or sewage system.

Do not allow to penetrate the ground/soil.

In case of seepage into the ground inform responsible authorities.

6.3 Methods and material for containment and cleaning up:

Reduce and dilute the vapours by spraying with nebulized water.

Absorb liquid components with liquid-binding material.

Do not use dispersants

Do not flush with water or aqueous cleansing agents

6.4 Reference to other sections

See Section 7 for information on safe handling.

See Section 8 for information on personal protection equipment.

See Section 13 for disposal information.

*** SECTION 7: Handling and storage****7.1 Precautions for safe handling**

The usual precautionary measures are to be adhered to when handling chemicals.

Prevent formation of aerosols.

Do not inhale gases / fumes / aerosols.

Use only in well ventilated areas.

Ensure good interior ventilation, especially at floor level. (Fumes are heavier than air).

Avoid contact with the eyes and skin.

Information about fire - and explosion protection:

Avoid naked flames. Remove ignition sources. Avoid sparks. Do not smoke.

Take precautionary measures against static discharges. Earth all equipment.

Fumes can combine with air to form an explosive mixture.

The gases / vapors are heavier than air and may flow at ground level.

Protect against electrostatic charges.

Use explosion-proof apparatus / fittings and spark-proof tools.

Keep ignition sources away - Do not smoke.

General occupational hygiene:

Comply with personal hygiene measures and use the personal protective equipment (see chapter 8). Do not smoke, eat or drink in the workplace.

Keep away from foodstuffs, beverages and feed.

Wash hands before breaks and at the end of work.

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7.2 Conditions for safe storage, including any incompatibilities

Storage:

Requirements to be met by storerooms and receptacles: Keep the product in ventilated and fresh storage areas. Do not store in the open under direct sunlight. Keep away from sources of heat and ignition (no smoking, naked flames, welding, sparks from tools). Protect against electrostatic charges.

Information about storage in one common storage facility:

Store away from oxidising agents.

Further information about storage conditions:

Keep container tightly sealed.

Store receptacle in a well ventilated area.

7.3 Specific end use(s)

There are no specific uses other than those listed in section. 1.2.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with limit values that require monitoring at the workplace:

1330-20-7 xylene

WEL Short-term value: 441 mg/m³, 100 ppm
Long-term value: 220 mg/m³, 50 ppm
Sk; BMGV

100-41-4 Ethylbenzene

WEL Short-term value: 552 mg/m³, 125 ppm
Long-term value: 441 mg/m³, 100 ppm
Sk

108-88-3 toluene

WEL Short-term value: 384 mg/m³, 100 ppm
Long-term value: 191 mg/m³, 50 ppm
Sk

DNELs

Table with 3 columns: Exposure route, Population/term, and DNEL value. Rows include Oral, Dermal, and Inhalative routes for General population and Workers.

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PNECs	
fresh water	0.327 mg/l (-)
marine water	0.327 mg/l (-)
water-interm. release	0.327 mg/l (-)
sediment-fresh water	12.46 mg/l (-)
soil	2.31 mg/kg (-)

Ingredients with biological limit values:	
1330-20-7 xylene	
BMGV	650 mmol/mol creatinine Medium: urine Sampling time: post shift Parameter: methyl hippuric acid

Additional information:

The lists valid during the making were used as basis.

8.2 Exposure controls

Appropriate engineering controls:

Ensure good ventilation / exhaustion at the workplace.

Personal protective equipment:

Working protective equipments may change according to the possible exposure and dangerousness of working conditions.
The final choice of protective equipment will depend upon a risk assessment
Your supplier of personal protective equipment should be consulted for advice on selection and appropriate standards
For further details, see Exposure Scenarios

Respiratory protection:

Wear a EN 136 certified full face mask equipped with a EN 14387 certified gas filter of type A (Colour code: brown)
Filter A (conforming to EN 14378)
If the situation cannot be completely assessed, or if an oxygen deficiency is possible, only SCBA's should be used

Skin protection:

Hand protection:

Wear chemically resistant gloves (tested to EN374)
Aromatic hydrocarbon (code letter F)
The following materials may provide suitable chemical protection:
Fluorocarbon rubber (Recommended thickness of the material: ≥ 0.3 mm;
Permeation time: > 480 min)
PVA gloves (Recommended thickness of the material: ≥ 0.3 mm; Permeation time: > 480 min)
Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.

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The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.

Other

Wear suitable coveralls to prevent exposure to the skin.

Boots
antistatic.

As protection from splashes gloves made of the following materials are suitable:

Butyl rubber (Recommended thickness of the material: ≥ 0.70 mm;
Permeation time: > 10 min)Neoprene gloves (Recommended thickness of the material: ≥ 0.75 mm;
Permeation time: > 10-20 min)

Not suitable are gloves made of the following materials:

PVC gloves

Natural rubber, NR

gloves made of PVA are not water-resistant, and are not suitable for emergency use

Eye/face protection:

Face protection

Thermal hazards:

No further relevant information available.

Limitation and supervision of exposure into the environment:

Take all the technical precautions necessary to prevent the diffusion of the product in the environment

For further details, see Exposure Scenarios

SECTION 9: Physical and chemical properties**9.1 Information on basic physical and chemical properties****General Information****Appearance:**

Form:

Fluid

Colour:

Not determined.

Odour:

Characteristic

Odour threshold:

Not determined.

pH-value:

Not applicable.

Change in condition

Melting point/Melting range:

< -69 °C (ISO 3016 - pour point)

Boiling point/Boiling range:

137.6 -141.1 °C (ASTM D 850)

Flash point:

27.3-32.7 °C (ASTM D93)

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Flammability (solid, gaseous):	Based on physical-chemical property this test is not required Not applicable.
Ignition temperature:	465-530 °C
Decomposition temperature:	Not determined.
Danger of explosion:	Based on physical-chemical property this test is not required Product is not explosive. However, formation of explosive air/vapour mixtures are possible.
Explosion limits:	
Lower:	1.1 Vol %
Upper:	7.1 Vol %
Oxidising properties	Based on physical-chemical property this test is not required
Vapour pressure at 20 °C:	< 70 hPa (ASTM D 5191)
Density at 15 °C:	865.5-871.5 Kg/m ³ (ASTM D 4052)
Relative density	Not determined.
Vapour density	Not determined.
Evaporation rate	Not determined.
Solubility in / Miscibility with water at 25 °C:	60 mg/l (ASTM E1148)
Partition coefficient (n-octanol/water):	3.16 log POW
Viscosity:	
Kinematic at 20 °C:	0.7630 mm ² /s (ISO 3104)

9.2 Other information

No further relevant information available.

*** SECTION 10: Stability and reactivity****10.1 Reactivity**

The substance / mixture does not present additional hazards related to reactivity compared to those reported in the following subtitles

10.2 Chemical stabilityNo decomposition if used and stored according to specifications.
Stable in the normal storage conditions.**10.3 Possibility of hazardous reactions**

Reacts with oxidising agents.

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10.4 Conditions to avoid

Avoid sources of ignition. Avoid extreme heat.

10.5 Incompatible materials:

Avoid the contact with oxidising substances.

10.6 Hazardous decomposition products:

No dangerous decomposition products known.

SECTION 11: Toxicological information**11.1 Information on toxicological effects**

Acute toxicity

Harmful in contact with skin or if inhaled.

LD/LC50 values relevant for classification:

For harmonized classification and / or based on available data the substance / mixture is classified in accordance with the current regulations:

Acute Tox. 4; H312

Acute Tox. 4; H332

Oral	LD50	3523 mg/kg (rat)
Dermal	LD50	>2000 mg/kg (rabbit)
Inhalative	LC50 (4h)	27.571 mg/l (rat)

Primary irritant effect:

Skin corrosion/irritation

in vivo testing:

Causes skin irritation.

Serious eye damage/irritation

in vivo testing:

Causes serious eye irritation.

Respiratory or skin sensitisation

Based on available data, classification criteria are not met.

CMR effects (carcinogenicity, mutagenicity and toxicity for reproduction)

Germ cell mutagenicity

Based on available data, the classification criteria are not met.

Carcinogenicity

Based on available data, classification criteria are not met.

Reproductive toxicity

Based on available data, the classification criteria are not met.

STOT-single exposure

May cause respiratory irritation.

STOT-repeated exposure

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

100-41-4 Ethylbenzene

Inhalative NOAEC 0.5 mg/l (rat)

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

Aspiration hazard

May be fatal if swallowed and enters airways.

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SECTION 12: Ecological information

12.1 Toxicity

Aquatic toxicity:

For harmonized classification and / or based on available data the substance / mixture is classified in accordance with the current regulations:
Aquatic Chronic 3; H412

NOEC - 72h	0.44 mg/l (algae)
100-41-4 Ethylbenzene	
EC50/96h	4.2 mg/l (Oncorhynchus mykiss)
EC50/48h	1.8 mg/l (Daphnia)
LC50 /96h	3.6 mg/l (Algae - Selenastrum Capricornutum) 2.6 mg/l (Mysidopsis bahia)
NOEC	3.4 mg/l (Algae - Selenastrum Capricornutum) 1 mg/l (Shellfish - Ceriodaphnia dubia)
108-88-3 toluene	
EC50/96h	134 mg/l (Algae - Chlamydomonas angulosa)
EC50/48h	3.78 mg/l (Shellfish - Ceriodaphnia dubia)
LC50 /96h	5.5 mg/l (Fish - Oncorhynchus kisutch)
NOEC - 72h	10 mg/l (Algae - Skeletonema costatum)
NOEC - 7 d	0.74 mg/l (Shellfish - Ceriodaphnia dubia)
NOEC - 40 d	1.39 mg/l (Fish - Oncorhynchus kisutch)

12.2 Persistence and degradability

Readily biodegradable

12.3 Bioaccumulative potential

Due to the distribution coefficient n-octanol/water a worth-mentioning accumulation in organisms is not expected.
According to the BCF is presumed low potential for bioaccumulation
BCF: 29 (Fish)

12.4 Mobility in soil

Based on the distribution coefficient octanol / water it is expected a low potential for absorption and high mobility in soil
Log Koc: < 3 (Log Koc =2.73)

12.5 Results of PBT and vPvB assessment

PBT:

The substance/mixture doesn't meet the PBT Annex XIII criteria of REACH Regulation

vPvB:

The substance/mixture doesn't meet the vPvB Annex XIII criteria of REACH Regulation

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12.6 Other adverse effects

Do not allow product to reach ground water, water course or sewage system, even in small quantities.

Use according to good working practice, and avoid releasing the product into the environment.

Danger to drinking water if even small quantities leak into the ground.

SECTION 13: Disposal considerations**13.1 Waste treatment methods**

Product surplus or wastes resulting from the normal use, must be handled according to the precautions and individual protective measures, as indicated under Sections 7 and 8.

Must not be disposed together with household garbage.

Residues should be disposed of as required by national and local regulations. Do not allow product to reach ground water, water course or sewage system.

*** SECTION 14: Transport information****14.1 UN-Number**

ADR, RID, ADN, ADN, IMDG, IATA

UN1307

14.2 UN proper shipping name

ADR/RID/ADN

1307 XYLENES

ADN

Xylenes (mixture with melting point ≤ 0 °C)

IMDG, IATA

XYLENES

14.3 Transport hazard class(es)

ADR/RID/ADN

Class
Label

3 (F1) Flammable liquids.

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ADN

ADN/R Class: 3+N2

IMDG, IATA

Class 3 Flammable liquids.
Label 3**14.4 Packing group**

ADR,RID,ADN, IMDG, IATA III

14.5 Environmental hazards:

Marine pollutant: No

14.6 Special precautions for userWarning: Flammable liquids.
Danger code (Kemler): 30
EMS Number: F-E,S-D
Stowage Category: A**14.7 Transport in bulk according to Annex II of Marpol and the IBC Code**ANNEX II: Y
ship type:2

Transport/Additional information:

ADR/RID/ADN

Limited quantities (LQ) 5L
Excepted quantities (EQ) Code: E1
Maximum net quantity per inner packaging: 30 ml
Maximum net quantity per outer packaging: 1000 ml
Transport category 3
Tunnel restriction code D/E

IMDG

Limited quantities (LQ) 5L
Excepted quantities (EQ) Code: E1
Maximum net quantity per inner packaging: 30 ml
Maximum net quantity per outer packaging: 1000 ml

IATA

MARPOL: ANNEX II: Y

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UN "Model Regulation":

UN 1307 XYLENES, 3, III

SECTION 15: Regulatory information**15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**

REGULATION (EC) No 1907/2006 ANNEX XVII

Conditions of restriction: 3,40,48

National regulations:
European RegulationsNational implementations of European Community Directives listed below
Directive EC) No. 2010/75 of 29 November 2010 and subsequent amendments (industrial emissions).
Directive (EC) No. 2008/98 of 16 November 2008 and s.m.i (waste).
Directive (EC) No. 2000/60 of 23 October 2000 and subsequent amendments (water).
Directive 98/24/EC and subsequent amendments (Chemical agents)
Directive 2012/18/CE and subsequent amendments (Seveso)**15.2 Chemical safety assessment:**

A Chemical Safety Assessment has been carried out.

SECTION 16: Other information

Relevant phrases

H225 Highly flammable liquid and vapour.
H226 Flammable liquid and vapour.
H304 May be fatal if swallowed and enters airways.
H312 Harmful in contact with skin.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H332 Harmful if inhaled.
H335 May cause respiratory irritation.
H336 May cause drowsiness or dizziness.
H361 Suspected of damaging fertility or the unborn child.
H373 May cause damage to the hearing organs through prolonged or repeated exposure.
H412 Harmful to aquatic life with long lasting effects.Department issuing SDS:
Abbreviations and acronyms:QHSE/IIPS
EC50: effective concentration, 50 percent
IBE: Biological Exposure Indices (BEI)
TWA: Valori limite ACGIH
VL: Limit Values D.Lgs 81/08 e s.m.i. (Allegato XXXVIII)
IOELV: Industrial Occupational Exposure Limit Value Directive 2000/39/CE, 2006/15/CE, 2009/161/UE
MARPOL: The International Convention for the Prevention of Pollution from Ships
IBC: International Bulk Chemical Code (IBC Code)
ADN: Accord européen relatif au transport international des marchandises dangereuses par voies de navigation intérieures (International Carriage of Dangerous Goods by Inland Waterways)

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ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
RID: Règlement international concernant le transport des marchandises dangereuses par chemin de fer (Regulations Concerning the International Transport of Dangerous Goods by Rail)
IMDG: International Maritime Code for Dangerous Goods
IATA: International Air Transport Association
GHS: Globally Harmonised System of Classification and Labelling of Chemicals
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
DNEL: Derived No-Effect Level (REACH)
PNEC: Predicted No-Effect Concentration (REACH)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
PBT: Persistent, Bioaccumulative and Toxic
vPvB: very Persistent and very Bioaccumulative
SVHC: Substances of Very High Concern
Flam. Liq. 2: Flammable liquids – Category 2
Flam. Liq. 3: Flammable liquids – Category 3
Acute Tox. 4: Acute toxicity – Category 4
Skin Irrit. 2: Skin corrosion/irritation – Category 2
Eye Irrit. 2: Serious eye damage/eye irritation – Category 2
Repr. 2: Reproductive toxicity – Category 2
STOT SE 3: Specific target organ toxicity (single exposure) – Category 3
STOT RE 2: Specific target organ toxicity (repeated exposure) – Category 2
Asp. Tox. 1: Aspiration hazard – Category 1
Aquatic Chronic 3: Hazardous to the aquatic environment - long-term aquatic hazard – Category 3

* Data compared to the previous version altered.

Data and information contained in this Safety Data Sheet are based on our available knowledge at the last revision date. No guarantee can be given as to the sufficiency of any safety measures contained in this Safety Data Sheet, nor can it be assumed that other or additional measures may not be required under particular or exceptional circumstances. The user must make sure of the fitness and completeness of the information, according to the specific use they want to do.

versalis – Exposure scenario - Xylenes

EC number: 215-535-7, CAS number: 1330-20-7

Xylenes

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1 Guidance for the reader

1.1 List of abbreviations

Abbreviation	Meaning
CSR	Chemical Safety Report
DMEL	Derived Minimum Effect Level
DNEL	Derived No Effect Level
DU	Downstream User
ECT	Exposure Calculation Tool
ERC	Environmental Release Category
ES	Exposure Scenario
EUSES	European Union System for Evaluation of Substances
LEV	Local Exhaust Ventilation
OC	Operational Condition
PC	Product Category
PEC	Predicted Environmental Concentration
PNEC	Predicted No Effect Concentration
PPE	Personal Protection Equipment
PROC	Process Category
RCR	Risk Characterization Ratio
RMM	Risk Management Measure
RPE	Respiratory Protection Equipment
SOP	Standard Operating Procedure
SPERCs	Specific Environmental Release Categories
STP	Sewage Treatment Plant
SU	Sector of use
TRA (ECETOC)	Targeted Risk Assessment (ECETOC Tool)
WWTP	Waste Water Treatment Plant

1.2 How to check on Risk Management Measures for REACH Compliance

In this extended Safety Data Sheet the exposure scenarios and associated required Risk Management Measures (RMMs) are given for each intended use of Xylenes or Xylenes containing compounds. For some uses no specific RMMs are required as those uses do not pose a risk when they are carried out according to a general good basic standard of occupational hygiene.

Overview table

Within the uses a distinction is made between industrial uses (section 2), professional uses (section 3) and consumer uses (section 4) where applicable. Each section starts with a table containing the identified contributing exposure scenarios that were taken from the Chemical Safety Report (CSR). This table is for overview purposes; the exposure scenarios are further detailed in the subsequent paragraphs.

Exposure scenarios

Each section (industrial, professional and consumer) is divided into the following subsections:

- x.1- With general information on exposure and use
- x.2- In this section operational conditions (OCs) and necessary risk management measures (RMMs) for environmental release (section x.2.1) and worker exposure (section x.2.2) are listed.
- x.3- In this section the exposures for environment and the exposures and risk characterisation for workers are presented.
- x.4- Finally a guidance to DUs to evaluate whether they work inside the boundaries set by the ES.

How to check the exposure scenarios

Downstream users verify their compliance with the REACH requirements by checking the detailed exposure scenarios.

Firstly, the downstream user (DU) have to recognize their own Sector of use- SU (industrial, professional or consumer), their Process Category- PROC (industrial and professional use), or the Product Category- PC (consumer use). Next, for each PROC or PC recognized the DU have to find out his specific scenario described by OCs and check if the necessary RMMs, general and advised, are in place.

An overview of all the Use Descriptors identified by REACH can be found at:

http://guidance.echa.europa.eu/docs/guidance_document/information_requirements_r12_en.pdf.

Note:

- 1) Each process categories (or product categories for consumer use) could be listed more than once in the same scenario, but different OCs and/or RMMs can be used to achieve safe use.
- 2) For each of the contributing scenarios described in detail, certain assumptions are made regarding operational conditions, which may not necessarily apply to all sites. It could therefore be required to do scaling (appropriate adaptation to the real conditions in place) in order to identify compliance with the conditions set out in the exposure scenarios.

2 Xylenes Industrial Uses

Identified Xylenes industrial uses and generic exposure scenario

In Table 1, the identified industrial uses of the substance are presented.

If the DUs want to check compliance they have to start with the overview table 1 and, based on the textual description of the different exposure scenarios, recognize their identified use, PROCs and ERCs associated with the specific activity done.

DUs can identify the detailed contributing scenarios that are relevant to them in section 2.2.1 for environment, 2.2.2 for workers and 2.2.3 for consumer.

DUs can check in section 2.3 the exposure and risk characterization for environment and for workers.

For each of the exposure scenarios described, certain assumptions are made regarding operational conditions, which may not necessarily apply to all sites. It could therefore be required to do scaling in order to check compliance with the conditions set out in the exposure scenarios.

Table 1. Identified industrial contributing Exposure Scenarios for Xylenes

Identified use	Description	Sector of use (SU)	Process Category (PROC)	Environmental Release category (ERC)
ES1 Manufacture	Manufacture of this substance or use as an intermediate or process chemical or extraction agent. Includes recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container).	3	1, 2, 3, 4, 8a, 8b, 15	1, 4
ES2 Distribution	Loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums and small packs) of substance, including its distribution and associated laboratory activities	3, 8, 9	1, 2, 3, 4, 8a, 8b, 9, 15	1-7
ES3 Use as Intermediate	See ES1	3, 8, 9	1, 2, 3, 4, 8a, 8b, 15	6a
ES4 Formulation	Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, large and small scale packing, maintenance and associated laboratory activities	3, 10	1, 2, 3, 4, 5, 8a, 8b, 9, 14, 15	2
ES5 Coatings	Covers the use in coatings (paints, inks, adhesives, etc) including exposures during use (including materials receipt, storage, preparation and transfer from bulk and semi-bulk, application by spray, roller, spreader, dip, flow, fluidised bed on production lines and film formation) and equipment cleaning, maintenance and associated laboratory activities.	3	1, 2, 3, 4, 5, 7, 8a, 8b, 10, 13, 15	4
ES8 Cleaning agents	Covers the use as a component of cleaning products including transfer from storage, pouring/unloading from drums or containers. Exposures during mixing/diluting in the preparatory phase and cleaning activities (including spraying, brushing, dipping, wiping, automated and by hand), related equipment cleaning and maintenance.	3	1, 4, 2, 3, 4, 7, 8a, 8b, 10, 13	4
ES11 Lubricants	Covers the use of formulated lubricants in closed and open systems including transfer operations, operation of machinery/engines and similar articles, reworking on reject articles, equipment maintenance and disposal of wastes.	3	1, 2, 3, 4, 7, 8a, 8b, 9, 10, 13, 17, 18	7, 4
ES14 Binders	Covers the use as binders and release agents including material transfers, mixing, application (including spraying and brushing), mould forming and casting, and handling of waste.	3	1, 2, 3, 4, 6, 7, 8b, 10, 13, 14	4
ES18 Fuels	Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste	3	1, 2, 3, 4, 8a, 8b, 16	7
ES21 Polymer Production	Manufacture of polymers from monomers in continuous and batch processes, include sparging, discharging, and reactor maintenance and immediate polymer product formation (i.e. compounding, pelletisation, product off-gassing)	3, 10	1, 2, 3, 4, 5, 6, 8a, 8b, 9, 14, 21	4, 6c
ES22 Polymer Processing	Processing of formulated polymers including material transfers, additives handling (e.g. pigments, stabilisers, fillers, plasticisers, etc.), moulding, curing and forming activities, material re-works, storage and associated maintenance.	3, 10	1, 2, 3, 4, 5, 6, 8a, 8b, 9, 13, 14	4
ES24 Functional Fluids	Use as functional fluids e.g. cable oils, transfer oils, coolants, insulators, refrigerants, hydraulic fluids in industrial equipment including maintenance and related material transfers.	3	1, 2, 3, 4, 8a, 8b, 9	7
ES27 Oil Fields	Oil field well drilling and production operations (including drilling muds and well cleaning) including material transfers, on-site formulation, well head operations, shaker room activities and related maintenance.	3	1, 2, 3, 4, 8a, 8b	4
ES30 Laboratory Applications	Use of the substance within laboratory settings, including material transfers and equipment cleaning.	3	10, 15	2, 4
ES32 Explosives	Covers exposures arising from the manufacture and use of slurry explosives (including materials transfer, mixing and charging) and equipment cleaning.	3	1, 2, 3, 4, 5, 8a, 8b, 15	2
ES33 Rubber Production	Manufacture of tyres and general rubber articles, including processing of raw (uncured) rubber, handling and mixing of rubber additives, vulcanising, cooling and finishing.	3, 10	1, 2, 3, 4, 5, 6, 7, 8a, 8b, 9, 13, 14, 15, 21	1, 4, 6d
ES34 Mining Chemicals	Covers the use of the substance in extraction processes at mining operations, including material transfers, winning and separation activities, and substance recovery and disposal.	3	1, 2, 3, 4, 5, 8a, 8b, 9	4

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2.1 Industrial use of Xylenes and Xylenes containing products	
Title	Industrial use of xylenes and xylenes containing products
Sector of Use	3, 8, 9, 10
Process category	1, 2, 3, 4, 5, 6, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 21
Environmental release category	ERCs 1-7
Processes, tasks, activities covered	Industrial processes relevant for xylenes and xylenes containing products
2.2 Operational conditions and risk management measures	
2.2.1 Contributing scenario controlling environmental exposure	
Assessment method	EUSES 2.1.1 using default release fractions from ESVOC SpERC (see Table 2 for specific version for each scenario)
Operational conditions	
Product characteristics	The Xylenes category consists of liquids of medium volatility. The water solubility for the category is 166mg/l; the vapour pressure is 821 Pa at 20°C; and the log Kow is 3.16 and is readily biodegradable.
Frequency and duration of use	Emission days per year 300
Amount used	See Table 2
Environmental factors not influenced by risk management	See Table 2
Other Operational Conditions of use affecting environmental exposure	See Table 2
Risk Management Measures	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	<p>Typical onsite wastewater treatment technology provides removal efficiency of 93.67%. [TCR 11] Prevent discharge of undissolved substance to or recover from wastewater [TCR14]. Treat air emissions to provide a typical removal efficiency of % [TCR 7]: for each scenario see table 2</p> <p>Specific for: ES4: Release fraction to air from process (after typical onsite RMMs consistent with EU Solvent Emissions Directive requirements): [OOC11]</p> <p>ES5, ES8, ES14: Soil emission controls are not applicable as there is no direct release to soil. [TCR 4]</p> <p>ES27: Discharge to aquatic environment is restricted</p>
Organizational measures to prevent/limit release from site	<p>Do not apply industrial sludge to natural soils [OMS2]. Sludge should be incinerated, contained or reclaimed [OMS3].</p> <p>Specific for ES27: Prevent environmental discharge consistent with regulatory requirements.</p>
Conditions and measures related to waste water treatment	Estimated substance removal from wastewater via domestic sewage treatment 93.67 (%) [STP3], unless stated otherwise Assumed domestic sewage treatment plant flow 2000 (m ³ /d) [STP5], unless stated otherwise
Conditions and measures related to external treatment of waste for disposal	<p>ES1: During manufacturing no waste of the substance is generated. [ETW 4] ES2, ES4, ES5, ES8, ES11, ES14, ES18, ES22, ES24, ES27, ES30, ES32, ES34: External treatment and disposal of waste should comply with applicable local and/or national regulations. [ETW 3] ES3, ES21, ES33: This substance is consumed during use and no waste of the substance is generated. [ETW 5]</p>
Conditions and measures related to external recovery of waste	<p>ES1: During manufacturing no waste of the substance is generated. [EWR 2] ES2, ES4, ES5, ES8, ES11, ES14, ES18, ES22, ES24, ES27, ES30, ES32, ES34: External recovery and recycling of waste should comply with applicable local and/or national regulations.[EWR 1] ES3, ES21, ES33: This substance is consumed during use and no waste of the substance is generated. [EWR 3]</p>
2.2.2 Contributing scenario controlling workers exposure	
Product characteristics	Liquid, vapor pressure 0.5 - 10 kPa [OC4].
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless stated differently) [G2].
Human factors not influenced by risk management	Not applicable
Other Operational Conditions affecting worker exposure	Assumes use at not > 20°C above ambient [G15]. Assumes a good basic standard of occupational hygiene is implemented [G1].
Given operational conditions and risk management measures affecting workers exposure	
Assumes use at not > 20°C above ambient [G15]. Assumes a good basic standard of occupational hygiene is implemented [G1].	

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General measures flammable substance:

- *Substance Handling and Transfer Preventative Measures*

Avoid Splash Filling – N/A for Gases.

Do NOT use compressed air for filling, discharging or handling operations.

Electrostatic charges may be generated during pumping.

Electrostatic discharge may cause fire.

Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (< 1m.sec-1 until fill pipe submerged to twice its diameter, then < 7m.sec-1).

Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (<10m.sec-1).

The vapour is heavier than air, spreads along the ground and distant ignition is possible.

If positive displacement pumps are used, these must be fitted with a non-integral pressure relief valve.

Use explosion-proof electrical/ventilating/ lighting and other equipment.

Use appropriate equipment for filling IBCs and other containers.

IBC's and other containers must be constructed of appropriate material).

Ensure electrical continuity by bonding and grounding (earthing) all equipment.

Keep away from oxidising agents.

Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks.

Handle and open container with care in a well-ventilated area.

Avoid Overfilling.

Do NOT empty into drains.

- *Storage:*

Must be stored in a dike (bunded) and well-ventilated area, away from sunlight, ignition sources and other sources of heat.

Storage Temperature: Ambient.

Keep away from flames, sources of ignition and hot surfaces. No smoking.

Take precautionary measures against static discharges.

Keep container in a well-ventilated place.

Keep container tightly closed.

General measures skin irritants: Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if direct hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin effects that may develop.

Plus (where there is the potential for additional and significant aerosol exposure): 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.

General measures aspiration hazard- qualitative assessment: Do not ingest. If swallowed then seek immediate medical assistance

For the operational conditions and risk management measures for each contributing scenario, see Table 3.

2.2.3 Contributing scenario controlling consumer exposure

There is no consumer exposure for this scenario.

2.3 Exposure estimation and reference to its source

2.3.1 Exposure estimations contributing scenario for environmental exposure

Tool used for evaluation	EUSES 2.1.1 using default release fractions from ESVOC SpERC (see Table 2 for specific version for each scenario)
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When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1 as indicated in Table 2

2.3.2 Exposure estimations contributing scenario for workers

Tool used for evaluation	ECETOC TRA v2 (www.ecetoc.org/tra)
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General parameter set	Type of setting:	industrial
	Dustiness:	low (liquid substance)
	Duration of exposure:	> 4 hours/day, unless stated otherwise in the RMM
	Use of ventilation:	none, unless stated otherwise in the RMM
	Use of respiratory protection:	none, unless stated otherwise in the RMM
	Use of dermal protection:	none, unless stated otherwise in the RMM
Concentration in preparation:	> 25%	

When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1 as indicated in Table 3

2.3.3 Exposure estimations contributing scenario for consumers

There is no consumer exposure for this scenario.

2.4 Guidance to DUs to evaluate whether they work inside the boundaries set by the ES

2.4.1 Guidance to DUs to check compliance with the contributing scenario for environmental exposure

Confirm that RMMs and OCs are as described or of equivalent efficiency.

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. [DSU1]

Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. [DSU2]

Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. [DSU3]

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Further details on scaling and control technologies are provided in SpERC factsheet (<http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3>).[DSU4]

2.4.2 Guidance to DUs to check compliance with the contributing scenario for workers

Predicted exposures are not expected to exceed the DNEL when the Risk Management Measures/Operational Conditions outlined in Table 3 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) Risk characterization ratios (RCRs) were calculated by comparing the predicted exposure levels with the corresponding DNELs (derived no effect levels) (RCR = exposure level/DNEL).

Table 2.OCs, RMMs, Risk Characterization- Environment- Industrial Uses

Identifier ¹	Operational Conditions and Risk Management Measures								Risk Characterization					
	ERC/SpERC	Amount used Site tonnage tonnes/year	Local dilution factor		RMMs advised				RCR Freshwater	RCR Marine water	RCR Freshwater sediment	RCR Marine water sediment	RCR Soil	RCR STP
			Freshwater	Marine water	Water removal efficiency %	Air removal efficiency %	Total STP removal %	Domestic STP flow m ³ /day						
ES1	ESVOC SpERC 1.1.v1	50000	40	100	93.67%	>90%	93.67%	2000	4.22E-02	1.63E-02	5.46E-02	2.11E-02	6.65E-03	8.01E-02
ES2	ESVOC SpERC 1.1b.v1	200	10	100	93.67%	>90%	93.67%	2000	1.99E-03	1.86E-04	2.58E-03	2.41E-04	2.45E-04	3.203E-05
ES3	ESVOC SpERC 6.1a.v1	3750	10	100	93.67%	>80%	93.67%	2000	3.64E-01	3.64E-02	4.71E-01	4.71E-02	7.36E-01	1.80E-01
ES4	ESVOC SpERC 2.2.v1	3750	10	100	93.67%	>0%	93.67%	2000	2.44E-01	2.43E-02	3.15E-01	3.15E-02	4.92E-01	1.20E-01
ES5	ESVOC SpERC 4.3a.v1	5000	10	100	93.67%	>90%	93.67%	2000	1.15E-01	1.15E-02	1.48E-01	1.48E-02	2.42E-01	5.61E-02
ES8	ESVOC SpERC 4.4a.v1	5000	10	100	93.67%	>70%	93.67%	2000	6.76E-03	6.63E-04	8.75E-03	8.58E-04	4.89E-02	2.40E-03
ES11	ESVOC SpERC 4.6a.v1	5000	10	100	93.67%	>70%	93.67%	2000	5.03E-02	5.01E-03	6.50E-02	6.49E-03	9.85E-02	2.40E-02
ES14	ESVOC SpERC 4.10a.v1	5000	10	100	93.67%	>80%	93.67%	2000	6.76E-03	6.63E-04	8.75E-03	8.58E-04	3.59E-02	2.40E-03
ES18	ESVOC SpERC 7.12a.v1	5000	10	100	93.67%	>95%	93.67%	2000	3.54E-03	3.41E-04	4.58E-03	4.41E-04	3.42E-03	8.01E-04
ES21	ESVOC SpERC 4.20.v1	100	10	100	93.67%	>80%	93.67%	2000	1.16E-02	1.15E-03	1.50E-02	1.48E-03	1.98E-02	4.81E-03
ES22	ESVOC SpERC 4.21a.v1	5000	10	100	93.67%	>80%	93.67%	2000	1.93E-03	1.80E-04	2.49E-03	2.32E-04	6.60E-03	0.00E+00
ES24	ESVOC SpERC 7.13a.v1	100	10	100	93.67%	>80%	93.67%	2000	2.89E-03	2.76E-04	3.74E-03	3.57E-04	2.09E-03	4.81E-04
ES27	There are no expected releases to the environment from this use, so no exposure assessment is made.													
ES30	ERCs 2 e 4	100	10	100	93.67%	>0%	93.67%	2000	6.64E-02	6.62E-03	8.59E-02	8.57E-03	1.31E-01	3.20E-02
ES32	ESVOC SpERC 2.18.v1	100	10	100	93.67%	>80%	93.67%	2000	2.89E-03	2.76E-04	3.74E-03	3.57E-04	2.08E-03	4.81E-04
ES33	ESVOC SpERC 4.19.v1	100	10	100	93.67%	>0%	93.67%	2000	1.16E-02	1.15E-03	1.50E-02	1.48E-03	1.98E-02	4.81E-03
ES34	ESVOC SpERC 4.23.v1	25	10	100	93.67%	>80%	93.67%	2000	4.05E-01	4.05E-02	5.24E-01	5.23E-02	8.18E-01	2.00E-01

Table 3. OCs, RMMs, Risk Characterization- Workers- Industrial Uses

Identifier ¹	Operational Conditions and Risk Management Measures				Risk Characterization				
	Contributing scenarios	PRO C	OCs and typical RMMs	RMMs advised	Inhalation		Dermal		RCR (all routes)
					Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	
ES1	General exposures (closed systems) [CS15].	1	ambient temp. Closed process. No exposure. >4 hours. Continuous; daily; 15 min - 1 hour; product temp. Outdoor Closed processes	Handle substance within a closed system [E47]		0.00		0.00	0.00
ES1	General exposures (closed systems) [CS15]. With sample collection [CS56].	2	>4 hours, ambient temp. Continuous; daily; 15 min - 1 hour; product temp. Outdoor Enclosed process; Outdoor location; closed/semi closed sampling point	Handle substance within a closed system [E47].		0.56		0.01	0.57
ES1	General exposures (closed systems) [CS15].	3	>4 hours, ambient temp. Batch process; daily; 15 min - 1 hour; product temp.; Indoor/Outdoor Closed equipment, enclosed or vented sampling points	Handle substance within a closed system [E47]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].	Dilution ventilation effectiveness 30 %	0.59		0.00	0.59

¹ the number in the exposure scenario corresponds to the numbering in the CSR

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Identifier ¹	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		RCR (all routes)
	Contributing scenarios	PRO C	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	
ES1	General exposures (open systems) [CS16].	4	Daily; 15 min - 1 hour; product temp.; Indoor/Outdoor Enclosed transfers, clear lines prior to decoupling	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].	Dilution ventilation effectiveness 30 %	0.79		0.04	0.83
ES1	Process sampling [CS2].	8b	Daily; <15 min; product temp.; Indoor/Outdoor Closed or ventilated sampling points	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].	Dilution ventilation effectiveness 30 % TRA duration factor 15 min-1 hour	0.39		0.04	0.43
ES1	Laboratory activities [CS36].	15	Daily; 15 min – 1 hour; product temp.; Indoor Fume cupboard. PPE.	No specific measures identified [E118].		0.56		0.01	0.57
ES1	Bulk transfers [CS14] (open systems) [CS108] With potential for aerosol generation [CS138].	8b	Daily; 15 min - 1 hour; product temp.; Indoor/Outdoor Enclosed transfers, clear lines prior to decoupling	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].	Dilution ventilation effectiveness 30 % TRA duration factor 15 min-1 hour	0.39		0.04	0.43
ES1	Bulk transfers [CS14]. (closed systems) [CS107];	8b	Daily; 15 min - 1 hour; product temp.; Indoor/Outdoor Enclosed transfers, vented transfer points; clear lines prior to decoupling	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].	Dilution ventilation effectiveness 30 % TRA duration factor 15 min-1 hour	0.39		0.04	0.43
ES1	Equipment cleaning and maintenance [CS39].	8a	Daily; 15 min - 1 hour; product temp; collection of line waste in container; Indoor/Outdoor Enclosed lines; retain wash down in sealed storage pending disposal or use as recycled material for subsequent formulation. PPE.	Drain down system prior to equipment break-in or maintenance [E65].	Extra exposure modifier: 0,2 LEV effectiveness assumed to equate to SOP relating to draining etc prior to maintenance; additional LEV (80%)	0.56		0.08	0.64
ES1	Storage [CS67]	2	Daily; 8 hrs; product temp; samples collected at dedicated sample point	Handle substance within a closed system [E47].		0.56		0.01	0.57
ES2	General exposures (closed systems) [CS15].	1	Continuous; Outdoor; daily; 15 min - 1 hour; product temp. Closed process. No exposure.	Handle substance within a closed system [E47].		0		0	0
ES2	General exposures (closed systems) [CS15]. With sample collection [CS56]. With occasional controlled exposure [CS137].	2	Continuous; Outdoor; daily; 15 min – 1 hour; product temp. Enclosed process; closed/semi-closed sampling point	Handle substance within a closed system [E47]		0.56		0.01	0.57
ES2	General exposures (closed systems) [CS15]. Use in contained batch processes [CS37].	3	Batch process; Outdoor; daily; 15 – 1 hour; product temp. ambient Closed equipment, enclosed or vented sampling points	Handle substance within a closed system [E47]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].	Dilution ventilation effectiveness 30 %	0.59		0.00	0.59
ES2	General exposures (open systems) [CS16]. Batch process [CS55]. With sample collection [CS56].	4	Daily; Indoor/Outdoor; 15 min - 1 hour; product temp. ambient Enclosed transfers, clear lines prior to decoupling	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].	Dilution ventilation effectiveness 30 %	0.79		0.04	0.83
ES2	Process sampling [CS2].	3	Daily; <15 min; product temp. ambient; Outdoor Closed or ventilated sampling points	Handle substance within a closed system [E47]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].	Dilution ventilation effectiveness 30 %	0.59		0.00	0.59
ES2	Laboratory activities [CS36].	15	Daily; 15 min - 1 hour; product temp. ambient; Indoor Fume cupboard. PPE.	No specific measures identified [E118].		0.56		0.01	0.57
ES2	Bulk transfers [CS14]. (closed systems) [CS107].	8b	Outdoor; Daily; 15 min - 1 hour; product temp. ambient; exposure potential during breaking of hose connection Enclosed transfers, clear lines prior to decoupling	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].	Dilution ventilation effectiveness 30 % TRA duration factor 15 min-1 hour	0.39		0.04	0.43
ES2	Bulk transfers [CS14]. (open systems) [CS108].	8b	Outdoor; Daily; 1 - 4 hours; product temp ambient; exposure potential from vapor emissions from tank opening Enclosed transfers, submerged loading via tank opening, collection of drips from loading arm. May involve LEV and/or RPE.	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].	Dilution ventilation effectiveness 30 % TRA duration factor 15 min-1 hour	0.39		0.04	0.43
ES2	Drum and small package	9	Indoor; Continuous; daily; 8 hour;	Transfer via enclosed lines [E52].	TRA LEV : efficiency	0.56		0.04	0.60

versalis – Exposure scenario - Xylenes

EC number: 215-535-7, CAS number: 1330-20-7

Identifier ¹	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		RCR (all routes)
	Contributing scenarios	PRO C	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	
	filling [CS6].		product temp. Enclosed transfers, vented transfer points, dedicated filling line		80%				
ES2	Equipment cleaning and maintenance [CS39].	8a	Daily; 15 min - 1 hour; product temp; collection of line waste in container Enclosed lines; retain wash down in sealed storage pending disposal or use as recycled material for subsequent formulation. PPE.	Drain down and flush system prior to equipment break-in or maintenance [E55].	Extra exposure modifier: 0.1 LEV effectiveness assumed to equate to SOP relating to draining etc prior to maintenance.	0.28		0.08	0.36
ES2	Storage [CS67]. With occasional controlled exposure [CS137].	2	Daily; 8 hrs; product temp; Outdoors Samples collected at dedicated sample point	Handle substance within a closed system [E47].		0.56		0.01	0.57
ES3	See ES1	1,2,3,4,8a,8b,15	Human health assessment is not required for this use, as use as an intermediate is included in the manufacture of streams in the xylenes category						
ES4	General exposures (closed systems) [CS15].	1	>4 hours, ambient temp. Continuous; daily; 15 min - 1 hour; product temp. Closed processes.	Handle substance within a closed system [E47].		0.00		0.00	0.00
ES4	General exposures (closed systems) [CS15]. With sample collection [CS56]. With occasional controlled exposure [CS137].	2	>4 hours, ambient temp. Continuous; daily; 15 min - 1 hour Enclosed process; closed/semi closed sampling point.	Handle substance within a closed system [E47].Ensure material transfers are under containment or extract ventilation [E66].		0.56		0.01	0.57
ES4	General exposures (closed systems) [CS15]. Use in contained batch processes [CS37].	3	>4 hours, ambient temp. Batch process; daily; 15 min - 1 hour; product temp. Closed equipment, enclosed or vented sampling points.	Handle substance within a closed system [E47].Ensure material transfers are under containment or extract ventilation [E66].	Dilution ventilation effectiveness 30 %	0.59		0.00	0.59
ES4	General exposures (open systems) [CS16]. Batch process [CS55]. With sample collection [CS56]. With potential for aerosol generation [CS138].	4	>4 hours, ambient temp. Daily; Indoor; 15 – 1 hour; product temp. Enclosed transfers, clear lines prior to decoupling.	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11].	Dilution ventilation effectiveness 30 %	0.79		0.04	0.83
ES4	Batch processes at elevated temperatures [CS136].	3	>4 hours, ambient temp. Batch process; daily; 15 min - 1 hour; product temp. (elevated) Closed equipment, enclosed or vented sampling points, vented mixing/process vessels.	Handle substance within a closed system [E47].Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11].	Dilution ventilation effectiveness 30 %	0.59		0.00	0.59
ES4	Process sampling [CS2].	3	>4 hours, ambient temp. Daily; <15 min; product temp. Closed or ventilated sampling points.	Handle substance within a closed system [E47].Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11].	Dilution ventilation effectiveness 30 %	0.59		0.00	0.59
ES4	Laboratory activities [CS36].	15	>4 hours, ambient temp. Daily; 15 min – 1 hour; product temp. (ambient); Indoor Fume cupboard. PPE.	No specific measures identified [E118].		0.56		0.00	0.57
ES4	Bulk transfers [CS14].	8b	daily; ambient temp. Daily; 15 min - 1 hour; product temp (ambient); collection of line waste in container Enclosed transfers, vented transfer points; clear lines prior to decoupling.	Ensure material transfers are under containment or extract ventilation [E66].	TRA LEV : efficiency 97%	0.08		0.04	0.12
ES4	Mixing operations (open systems) [CS30]. With potential for aerosol generation [CS138].	5	daily; ambient temp. Indoor. Batch process; daily; 8 hours; product temp (ambient) LEV, PPE	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85		0.08	0.92
ES4	Manual [CS34]. Transfer from/pouring from containers [CS22].	8a	daily; ambient temp. Indoor; daily; 15 – 1 hour; product temp.(ambient) Manual transfers, LEV, PPE, RPE	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85		0.08	0.92
ES4	Drum/batch transfers [CS8].	8b	daily; ambient temp. Indoor; daily; 15 – 1 hour; product temp. (ambient) Drum pump or dedicated drum handling equipment	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].Avoid spillage when withdrawing pump [C&H16].	Dilution ventilation effectiveness 70%	0.85		0.04	0.88
ES4	Production or preparation or articles	14	daily; ambient temp. Indoor; daily; 8 hours; product temp. (ambient)	Provide a good standard of general or controlled ventilation (10 to 15 air	Dilution ventilation effectiveness 70%	0.85		0.02	0.87

versalis – Exposure scenario - Xylenes

EC number: 215-535-7, CAS number: 1330-20-7

Identifier ¹	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		RCR (all routes)
	Contributing scenarios	PRO C	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	
	by tableting, compression, extrusion or pelletisation [CS100].		LEV, PPE	changes per hour) [E40].					
ES4	Drum and small package filling [CS6].	9	daily; ambient temp. Indoor, Continuous; daily; 8 hour; product temp. (ambient) Enclosed transfers, vented transfer points	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85		0.04	0.88
ES4	Equipment cleaning and maintenance [CS39].	8a	daily; ambient temp. Indoor, Daily; 1 – 4 hours; product temp (ambient); collection of line waste in container Enclosed lines; retain wash down in sealed storage pending disposal or use as recycled material for subsequent formulation. PPE.	Drain down and flush system prior to equipment break-in or maintenance [E55].	Extra exposure modifier:0,1 LEV effectiveness assumed to equate to SOP relating to draining etc prior to maintenance. RPE (0.1x)	0.28	TRA Dermal Exposure LEV reduction factor 0.1	0.01	0.29
ES4	Storage [CS67]. With occasional controlled exposure [CS137].	2	daily; ambient temp. Daily; <15 min (sampling) product temp (ambient); samples collected at dedicated sample point	Handle substance within a closed system [E47].		0.56		0.01	0.57
ES5	General exposures (closed systems) [CS15].	1	Continuous; daily; 8hour Enclosed process; closed/semi closed sampling point	Handle substance within a closed system [E47].		0.00		0.00	0.00
ES5	General exposures (closed systems) [CS15]. With sample collection [CS56]. Use in contained systems [CS38].	2	Continuous; daily; 8hour Enclosed process; closed/semi closed sampling point	Handle substance within a closed system [E47].		0.56		0.01	0.57
ES5	Film formation - force drying (50 - 100°C). Stoving (>100°C). UV/EB radiation curing [CS94].	2	enclosed in situ in workplace	Handle substance within a closed system [E47].		0.56		0.01	0.57
ES5	Mixing operations (closed systems) [CS29]. General exposures (closed systems) [CS15].	3		Handle substance within a closed system [E47]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11]	Dilution ventilation effectiveness 30%	0.59		0.00	0.59
ES5	Film formation - air drying [CS95].	4	LEV	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11].	Dilution ventilation effectiveness 30%	0.79	TRA Dermal Exposure LEV reduction factor 0.1	0.00	0.79
ES5	Preparation of material for application [CS96]. Mixing operations (open systems) [CS30].	5	liquid/ powder products); LEV	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85	TRA Dermal Exposure LEV reduction factor 0.005	0.00	0.85
ES5	Spraying (automatic/robotic) [CS97].	7	Daily; >4 hours, product temp (ambient) Enclosed. Vented spray booth; specific workforce education, PPE; LEV	Carry out in a vented booth provided with laminar airflow [E59].	TRA LEV : efficiency 95%	0.71	TRA Dermal Exposure LEV reduction factor 0.05	0.01	0.72
ES5	Manual [CS34]. Spraying [CS10].	7	Open , Air supplied masks, respirator.	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]	Dilution ventilation effectiveness 70% TRA RPE Factor: half mask	0.42		0.24	0.66
ES5	Material transfers [CS3]. Non-dedicated facility [CS82].	8a	Daily; 15 min - 1 hour; product temp (ambient); collection of line waste in container. outdoor/ indoor. Enclosed transfers, vented transfer points; clear lines prior to decoupling ; LEV	Ensure material transfers are under containment or extract ventilation [E66].	TRA LEV : efficiency 90%	0.28	TRA Dermal Exposure LEV reduction factor 0.1	0.01	0.29
ES5	Material transfers [CS3]. Dedicated facility [CS81].	8b	Daily; 15 min - 1 hour; product temp (ambient); collection of line waste in container. outdoor/ indoor. Enclosed transfers, vented transfer points; clear lines prior to decoupling ; LEV	Ensure material transfers are under containment or extract ventilation [E66].	TRA LEV : efficiency 97%	0.08		0.04	0.12
ES5	Roller, spreader, flow application [CS98].	10	Daily; >4 hours, product temp. (ambient); Range from 2-3% upto 40-50% Local exhaust ventilation at rollers; remove spills as they occur, PPE. Large scale (open equipment); LEV	Provide extract ventilation to points where emissions occur [E54].	TRA LEV : efficiency 90%	0.28		0.15	0.43
ES5	Dipping, immersion and pouring [CS4].	13	Daily; >4 hours, ambient Local exhaust ventilation at open surface;	Provide a good standard of general or controlled ventilation (10 to 15 air	Dilution ventilation effectiveness 70%	0.85		0.08	0.92

versalis – Exposure scenario - Xylenes

EC number: 215-535-7, CAS number: 1330-20-7

Identifier ¹	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		RCR (all routes)
	Contributing scenarios	PRO C	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	
			remove spills as they occur, PPE	changes per hour) [E40].					
ES5	Laboratory activities [CS36].	15	Small scale activities small amount, daily 15 min	No specific measures identified [E18].		0.56		0.00	0.57
ES5	Equipment cleaning and maintenance [CS39].	8a	Daily; 15 min -1 hour; product temp; collection of line waste in container; Indoor/Outdoor Enclosed lines; retain wash down in sealed storage pending disposal or use as recycled material for subsequent formulation. PPE.	Drain down system prior to equipment break-in or maintenance [E65].	Extra exposure modifier:0.2 LEV effectiveness assumed to equate to SOP relating to draining etc prior to maintenance; additional LEV (80%)	0.56	TRA Dermal Exposure LEV reduction factor 0.05	0.00	0.57
ES5	Storage [CS67]. With occasional controlled exposure [CS137].	2	Daily; <15 min (sampling) product temp (ambient); samples collected at dedicated sample point	Handle substance within a closed system [E47].		0.56		0.01	0.57
ES8	Bulk transfers [CS14].	8a	Daily; 15 min – 1 hour; ambient temp; collection of line waste in container Enclosed transfers, vented transfer points; clear lines prior to decoupling LEV	Ensure material transfers are under containment or extract ventilation [E66].	TRA LEV : efficiency 90%	0.28	TRA Dermal Exposure LEV Reduction factor 0.01	0.00	0.28
ES8	Automated process with (semi) closed systems [CS93] Use in contained systems [CS38].	2	Daily; 8hour Enclosed process; closed/semi closed	Handle substance within a closed system [E47].		0.56		0.01	0.57
ES8	Automated process with (semi) closed systems [CS93] Use in contained systems [CS38]. ;Drum/batch transfers [CS8].	3	daily; 15min – 1 hour; ambient temp Enclosed process; closed/semi closed	Handle substance within a closed system [E47].Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11].	Dilution ventilation effectiveness 30%	0.59		0.00	0.59
ES8	General exposures [CS1]	1	Daily; >4 hours, Ambient. Enclosed process; closed/ semiclosed	No specific measures identified [E118].		0.00		0.00	0.00
ES8	Application of cleaning products in closed systems [CS101]	2	daily; 8hour Enclosed process; closed/semi closed	Handle substance within a closed system [E47].		0.56		0.01	0.57
ES8	Filling / preparation of equipment from drums or containers. [CS45].Dedicated facility [CS81]	8b	daily; 15min – 1 hour; ambient temp Pumped transfer from drum to equipment LEV	Provide extract ventilation to points where emissions occur [E54].	TRA LEV : efficiency 97%	0.08	TRA Dermal Exposure LEV Reduction factor 0.1	0.00	0.09
ES8	Use in contained batch processes [CS37]. Treatment by heating [OC129]	4	Daily; 1-4 hours, temperature above boiling point Closed equipment, enclosed or vented transfer points; LEV	Provide extract ventilation to points where emissions occur [E54].	TRA LEV :efficiency 90%	0.56	TRA Dermal Exposure LEV Reduction factor 0.1	0.00	0.57
ES8	Degreasing small objects in cleaning station [CS41].	13	Daily; >4 hours, ambient Local exhaust ventilation at open surface; remove spills as they occur, PPE LEV	Provide extract ventilation to points where emissions occur [E54].	TRA LEV : efficiency 90%	0.28	TRA Dermal Exposure LEV Reduction factor 0.05	0.00	0.29
ES8	Cleaning with low-pressure washers [CS42].	10	Daily; 15min - 1hour; ambient temp specific workforce education, PPE	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.51		0.15	0.66
ES8	Cleaning with high pressure washers [CS44].	7	Daily; 15 min – 1 hour; ambient temp; collection of waste and wipe cloths in container	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].Avoid carrying out activities involving exposure for more than 1 hour [OC27].	Dilution ventilation effectiveness 70% TRA duration factor 15 min-1 hour	0.85	gloves	0.05	0.89
ES8	Manual [CS34]. Surfaces [CS48]. ; Cleaning [CS47]. ; No spraying [CS60]	10	Daily; 15 min -1 hour; product temp; collection of line waste in container;	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].Avoid carrying out activities involving exposure for more than 1 hour [OC27].	Dilution ventilation effectiveness 70% TRA duration factor 15 min-1 hour	0.17		0.15	0.32
ES8	Equipment cleaning and maintenance [CS39].	8a	Daily; 15 min -1 hour; product temp; collection of line waste in container; Indoor/Outdoor Enclosed lines; retain wash down in sealed storage pending disposal or use as recycled material for subsequent formulation. PPE.	Drain down system prior to equipment break-in or maintenance [E65].	Extra exposure modifier:0.2 LEV effectiveness assumed to equate to SOP relating to draining etc prior to maintenance; additional LEV (80%)	0.56	TRA Dermal Exposure LEV Reduction factor 0.01	0.00	0.56

versalis – Exposure scenario - Xylenes

EC number: 215-535-7, CAS number: 1330-20-7

Identifier ¹	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		RCR (all routes)
	Contributing scenarios	PRO C	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	
ES8	Storage [CS67] With occasional controlled exposure [CS137]	2	Daily; <15 min (sampling) product temp (ambient); samples collected at dedicated sample point	Handle substance within a closed system [E47].		0.56		0.01	0.57
ES11	General exposures (closed systems) [CS15].	1	Continuous; daily; ambient temp. Closed processes	Handle substance within a closed system [E47].		0.00		0.00	0.00
ES11	General exposures (closed systems) [CS15]. With occasional controlled exposure [CS137].	2	Continuous; daily; ambient temp. Closed processes	Handle substance within a closed system [E47].		0.56		0.01	0.57
ES11	General exposures (closed systems) [CS15]. Batch process [CS55].	3	Continuous; daily; ambient temp. Enclosed process; ; closed/semi closed sampling point	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.42		0.00	0.42
ES11	General exposures (open systems) [CS16]. With occasional controlled exposure [CS137].	4	Continuous; daily; ambient temp. Enclosed transfers,	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11].	Dilution ventilation effectiveness 30%	0.79		0.04	0.83
ES11	General exposures (open systems) [CS16]. Batch process [CS55].	4	Continuous; daily; ambient temp. Enclosed transfers,	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11].	Dilution ventilation effectiveness 30%	0.79		0.04	0.83
ES11	Bulk transfers [CS14]. Dedicated facility [CS81].	8b	Daily; 1-4 hour; ambient temp. Enclosed transfers, clear lines prior to decoupling	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85		0.04	0.88
ES11	Filling / preparation of equipment from drums or containers [CS45]. Non-dedicated facility [CS82].	8a	Daily; 15 min – 1 hour; ambient temp Manual filling of equipment from containers. Eye protection, Gloves, Apron	Use drum pumps or carefully pour from container [E64].	TRA LEV : efficiency 80%	0.56		0.04	0.60
ES11	Filling / preparation of equipment from drums or containers [CS45]. Dedicated facility [CS81].	8b	Daily; 15 min – 1 hour; ambient temp Manual filling of equipment from containers. Eye protection, Gloves, Apron	Use drum pumps or carefully pour from container [E64]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	TRA LEV : efficiency 80%	0.56		0.04	0.60
ES11	Initial factory fill of equipment [CS75].	9	Continuous; 8 hours; daily; ambient temp. Dedicated filling lines, including spill containment. LEV in larger facilities	Ensure material transfers are under containment or extract ventilation [E66].	TRA LEV : efficiency 90%	0.28		0.04	0.32
ES11	Operation and lubrication of high energy open equipment [CS17]. Indoor [OC8].	17	Indoor, Daily; 8 hours; ambient temp. Restrict area of openings; extract ventilation to emission points; PPE	Restrict area of openings to equipment [E68]. Provide extract ventilation to points where emissions occur [E54].	TRA LEV : efficiency 95%	0.14	TRA Dermal Exposure LEV Reduction factor 0.05	0.01	0.15
ES11	Operation and lubrication of high energy open equipment [CS17].	18	Continuous; daily; ambient temp. Restrict area of openings; extract ventilation to emission points; PPE	Restrict area of openings to equipment [E68]. Provide extract ventilation to points where emissions occur [E54].	TRA LEV efficiency 95%	0.14	TRA Dermal Exposure LEV Reduction factor 0.05	0.00	0.14
ES11	Manual roller application or brushing [CS13].	10	Indoor, Daily; 8 hours, ambient temp, Automated replenishment of roller or brush PPE	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.51		0.15	0.66
ES11	Treatment by dipping and pouring [CS35].	13	Indoor, Daily; 8 hours, ambient temp, automatic dipping in a bath Cabinet to allow the dipping and the dripping of the pieces. PPE	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85		0.08	0.92
ES11	Spraying [CS10].	7	Indoor, Daily; 8 hours, ambient temp, automated spraying LEV, Spraying cabinet with capture of the aerosols, PPE	Minimize exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60].	TRA LEV : efficiency 95%	0.71	TRA Dermal Exposure LEV Reduction factor 0.05	0.01	0.72
ES11	Spraying [CS10].	7	automatic spraying at room temperature continuous spraying cabinet with capture of the aerosols	Minimize exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60].	TRA LEV : efficiency 95%	0.71	TRA Dermal Exposure LEV Reduction factor 0.05	0.01	0.72
ES11	Maintenance (of larger plant items) and machine set up [CS77].	8b	Daily; 1-4 hours; ambient temp; Enclosed transfers, vented transfer points; clear lines prior to decoupling; PPE	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85		0.04	0.88
ES11	Maintenance (of larger plant items) and machine set up [CS77].	8b	Daily; 1-4 hours; Elevated temp (30o above ambient) Enclosed transfers, vented transfer points; clear lines prior to decoupling; PPE	Ensure material transfers are under containment or extract ventilation [E66].	TRA LEV : efficiency 97%	0.25	TRA Dermal Exposure LEV Reduction factor 0.1	0.00	0.26
ES11	Maintenance of small items [CS18].	8a	Daily; 1 - 4 hours; ambient temp. Retain drainings in sealed storage pending disposal. PPE.	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85		0.08	0.92
ES11	Remanufacture of reject	9	Daily; 1 - 4 hours; ambient temp.	Provide a good standard of general or	Dilution ventilation	0.85		0.04	0.88

versalis – Exposure scenario - Xylenes

EC number: 215-535-7, CAS number: 1330-20-7

Identifier ¹	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		RCR (all routes)
	Contributing scenarios	PRO C	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	
	articles [CS19].		Retain drainings in sealed storage pending disposal. PPE.	controlled ventilation (10 to 15 air changes per hour) [E40].	effectiveness 70%				
ES11	Storage [CS67].	2	Daily; 8 hrs; ambient temp; samples collected at dedicated sample point	Handle substance within a closed system [E47].		0.56		0.00	0.56
ES14	Material transfers [CS3].	1	Daily; 1 - 4 hours; ambient temp. Enclosed transfers, clear lines prior to decoupling	Handle substance within a closed system [E47].		0.00		0.00	0.00
ES14	Material transfers [CS3]. With occasional controlled exposure [CS137].	2	Daily; 1 - 4 hours; ambient temp. Enclosed transfers, clear lines prior to decoupling	Handle substance within a closed system [E47].		0.56		0.01	0.57
ES14	Material transfers [CS3]. Batch process [CS55]. (closed systems) [CS107].	3	Daily; 1 - 4 hours; ambient temp. Enclosed transfers, clear lines prior to decoupling	Handle substance within a closed system [E47]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11].	Dilution ventilation effectiveness 30%	0.59		0.00	0.59
ES14	Drum/batch transfers [CS8].	8b	Daily; 15 min – 1 hour; ambient temp Pumped transfer from drum to holding tanks.	Transfer via enclosed lines [E52].	TRA LEV : efficiency 80%	0.56		0.04	0.60
ES14	Mixing operations (closed systems) [CS29].	3	Daily; >4 hours Enclosed or ventilated mixing vessel	Handle substance within a closed system [E47]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11].	Dilution ventilation effectiveness 30%	0.59		0.00	0.59
ES14	Mixing operations (open systems) [CS30].	4	Daily; >4 hours Enhanced general ventilation	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11].	Dilution ventilation effectiveness 30%	0.79		0.04	0.83
ES14	Mold forming [CS31].	14	Daily; >4 hours, ambient temp PPE	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40]. Avoid carrying out activities involving exposure operation for more than 1 hour [OC27]	Dilution ventilation effectiveness 30% TRA duration factor 15 min-1 hour	0.39		0.02	0.41
ES14	Casting operations [CS32].	6	Daily; 1 - 4 hours; elevated temp. sufficient to create fume Enhanced general ventilation, PPE	Minimize exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60].	TRA LEV : efficiency 95%	0.14	TRA Dermal Exposure LEV Reduction factor 0.05	0.01	0.15
ES14	Spraying [CS10]. ; Machine [CS33].	7	Daily; 1 - 4 hours; ambient temp. Enclosed or ventilated production line. Automation.	Minimize exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60].	TRA LEV : efficiency 95%	0.71	TRA Dermal Exposure LEV Reduction factor 0.05	0.01	0.72
ES14	Manual roller application or brushing [CS13].	10	Daily; 1 - 4 hours; ambient temp.PPE	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85		0.03	0.88
ES14	Spraying [CS10]. ; Manual [CS34].	7	Daily; 1 - 4 hours; ambient temp. PPE, face mask	Carry out in a vented booth or extracted enclosure [E57]. Avoid carrying out activities involving exposure operation for more than 4 hours [OC28].	TRA LEV : efficiency 90% TRA duration factor 1-4 hours	0.85	TRA Dermal Exposure LEV Reduction factor 0.1	0.02	0.87
ES14	Storage [CS67]	1	Daily; 8 hrs; ambient temp; samples collected at dedicated sample point	Store substance within a closed system [E84].		0.00		0.00	0.00
ES14	Storage [CS67] With occasional controlled exposure [CS137]	2	Daily; 8 hrs; ambient temp; samples collected at dedicated sample point	Store substance within a closed system [E84].		0.56		0.00	0.56
ES18	Bulk transfers [CS14].	4	Daily; 1 - 4 hours; ambient temp. Enclosed transfers, clear lines prior to decoupling	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11].	Dilution ventilation effectiveness 30%	0.79		0.04	0.83
ES18	Drum/batch transfers [CS8].	8b	Daily; 1 - 4 hours; ambient temp Pumped transfer from drum to equipment.	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].	Dilution ventilation effectiveness 30% TRA duration factor 15 min-1 hour	0.39		0.04	0.43
ES18	General exposures (closed systems) [CS15].	1	Indoor; Daily; >4 hours Closed equipment; designed for ease of maintenance; PPE	No specific measures identified [E18].		0.00		0.00	0.00
ES18	General exposures (closed systems) [CS15]. With occasional controlled exposure [CS137]	2	Indoor; Daily; >4 hours Closed equipment; designed for ease of maintenance; PPE	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].		0.56		0.01	0.57
ES18	General exposures (closed systems) [CS15]. Batch process [CS55].	3	Indoor; Daily; >4 hours Closed equipment; designed for ease of maintenance; PPE	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.42		0.00	0.42

versalis – Exposure scenario - Xylenes

EC number: 215-535-7, CAS number: 1330-20-7

Identifier ¹	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		RCR (all routes)
	Contributing scenarios	PRO C	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	
ES18	General exposures (open systems) [CS16]. ; (closed systems) [CS107]	16	Daily; >4 hours, to 100% Closed equipment;	No specific measures identified [E118].		0.28		0.00	0.28
ES18	General exposures (open systems) [CS16]. ; (closed systems) [CS107] Batch process [CS55].	3	Daily; >4 hours, to 100% Closed equipment;	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11].	Dilution ventilation effectiveness 30%	0.99		0.00	0.99
ES18	Equipment maintenance [CS5].	8a	Daily; >4 hours, to 100% PPE. Operator training.	Drain down and flush system prior to equipment break-in or maintenance [E55]. Retain drain downs in sealed storage pending disposal or for subsequent recycle [ENV4].	SOP equivalent to 90% efficiency LEV	0.28	TRA Dermal Exposure LEV Reduction factor 0.1	0.01	0.29
ES18	Vessel and container cleaning [CS103]	8a	Infrequent; >4 hours vessel entry procedures, retain wash down in sealed storage pending disposal. PPE	Provide extract ventilation to points where emissions occur [E54].	TRA LEV : efficiency 90%	0.28	TRA Dermal Exposure LEV Reduction factor 0.01	0.00	0.28
ES18	Storage [CS67]	1	Daily; 8 hrs; ambient temp; Samples collected at dedicated sample point	No specific measures identified [E118].		0.00		0.00	0.00
ES18	Storage [CS67] With occasional controlled exposure [CS137]	2	Daily; 8 hrs; ambient temp Samples collected at dedicated sample point	No specific measures identified [E118].		0.56		0.01	0.57
ES18	Disposal of wastes [CS28].	8a	Daily; 8 hrs; ambient temp Samples collected at dedicated sample point	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]	Dilution ventilation effectiveness 30% TRA duration factor 15 min-1 hour	0.39		0.01	0.40
ES21	General exposures (closed systems) [CS15]. Continuous process [CS54]. No sampling [CS57].	1	Continuous; daily; 15 min - 1 hour; ambient temp. Closed processes	No specific measures identified [E118].		0.00		0.00	0.00
ES21	Bulk transfers [CS14]. Transport [CS58]. ; With sample collection [CS56].	8b	Daily; <15 min; ambient temp. Enclosed transfers, vented transfer points; clear lines prior to decoupling	Ensure material transfers are under containment or extract ventilation [E66].	TRA LEV : Efficiency 90%	0.28	TRA Dermal Exposure LEV Reduction factor 0.1	0.00	0.29
ES21	Polymerisation (bulk and batch) [CS65] Continuous process [CS54]. ; With sample collection [CS56].	2	Continuous; daily; 15 min - 1 hour Enclosed process; Outside location; closed/semi closed sampling point	No specific measures identified [E118].		0.56		0.01	0.57
ES21	Polymerisation (bulk and batch) [CS65] Batch process [CS55].; With sample collection [CS56].	3	Batch process; daily; 8 hour; ambient temp. Closed equipment, enclosed or vented sampling points	Provide a good standard of general or controlled ventilation (not less than 3 to 5 air changes per hour) [E11], or [G9], Ensure operation is undertaken outdoors [E69].	Dilution ventilation effectiveness 30%	0.59		0.00	0.59
ES21	Polymerisation (bulk and batch) [CS65] Batch process [CS55]. ; With sample collection [CS56]. Elevated Temperature	3	Batch process; daily; 8 hour; ambient temp. Closed equipment, enclosed or vented sampling points	Provide a good standard of general or controlled ventilation (not less than 3 to 5 air changes per hour) [E11], or [G9], Ensure operation is undertaken outdoors [E69]. Avoid carrying out activities involving exposure for more than 1 hour [OC 27].	Dilution ventilation effectiveness 30% TRA duration factor 15 min-1 hour	0.59		0.00	0.59
ES21	Finishing operations [CS102] Batch process [CS55]. ; With sample collection [CS56]. Catalyst inactivation and removal, washing and stripping / distillation to remove unreacted monomer	3	Batch process; daily; 8 hour; ambient temp. Closed equipment, enclosed or vented sampling points	Provide a good standard of general or controlled ventilation (not less than 3 to 5 air changes per hour) [E11], or [G9], Ensure operation is undertaken outdoors [E69].	Dilution ventilation effectiveness 30%	0.59		0.00	0.59
ES21	Intermediate polymer storage [CS66]	4	Batch process; daily; 8 hour; ambient temp. Closed equipment, enclosed or vented sampling points	Provide a good standard of general or controlled ventilation (not less than 3 to 5 air changes per hour) [E11], or [G9], Ensure operation is undertaken outdoors [E69].	Dilution ventilation effectiveness 30%	0.79		0.04	0.83
ES21	Additivation and stabilisation [CS69]	3	Batch process; daily; 8 hour; ambient temp. Closed equipment, enclosed or vented sampling points	Provide extract ventilation to points where emissions occur [E54].	TRA LEV : Efficiency 90%	0.14	TRA Dermal Exposure LEV Reduction factor 0.1	0.00	0.14
ES21	Mixing in containers [CS23]. Batch process [CS55].	5	Batch process; daily; 8 hour; ambient temp. Closed or contained equipment, enclosed or vented	Provide extract ventilation to points where emissions occur [E54].	TRA LEV : Efficiency 90%	0.28	TRA Dermal Exposure LEV Reduction factor	0.00	0.28

versalis – Exposure scenario - Xylenes

EC number: 215-535-7, CAS number: 1330-20-7

Identifier ¹	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		RCR (all routes)
	Contributing scenarios	PRO C	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	
			sampling points			0.005			
ES21	Pelletizing [CS53]. Extrusion and master batching [CS88]	6	Batch process; daily; 8 hour; ambient temp. Closed equipment, enclosed or vented extrusion heads.	Provide extract ventilation to points where emissions occur [E54]. Avoid carrying out activities involving exposure for more than 4 hours [OC 28].	TRA LEV : Efficiency 90% TRA duration factor 1-4 hour	0.28	TRA Dermal Exposure LEV Reduction factor 0.05	0.01	0.29
ES21	Pelletizing [CS53].	14	daily; 8 hour; ambient temp. Semi closed equipment with extraction ventilation; good GV.	Provide extract ventilation to points where emissions occur [E54].	TRA LEV : Efficiency 90%	0.28	TRA Dermal Exposure LEV Reduction factor 0.1	0.00	0.28
ES21	Pelletisation and pellet screening [CS68] (open systems) [CS108]	8b	Batch process; daily; 8 hour; ambient temp. Open transport lines, conveyor belts	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85		0.04	0.88
ES21	Bulk transfers [CS14]. Continuous process [CS54]. ; With sample collection [CS56].	3	Batch process; daily; 8 hour; ambient temp. Outside location. Closed equipment, enclosed or vented sampling points	Provide a good standard of general or controlled ventilation (not less than 3 to 5 air changes per hour) [E11], or [G9]. Ensure operation is undertaken outdoors [E69].	Dilution ventilation effectiveness 30%	0.59		0.00	0.59
ES21	Transport [CS58]. With sample collection [CS56].	8b	Daily; <15 min; ambient temp. Closed or ventilated sampling points	Ensure material transfers are under containment or extract ventilation [E66].	TRA LEV : Efficiency 90%	0.28	TRA Dermal Exposure LEV Reduction factor 0.1	0.00	0.29
ES21	Equipment maintenance [CS5].	8a	Daily; 15 min – 1 hour; ambient temp; collection of line waste in container Enclosed lines; retain wash down in sealed storage pending disposal or use as recycled material for subsequent formulation. PPE.	Drain down and flush system prior to equipment break-in or maintenance [E55].	SOP equivalent to 90% LEV efficiency	0.28	TRA Dermal Exposure LEV Reduction factor 0.01	0.00	0.28
ES21	Material transfers [CS3]	9		Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85		0.04	0.88
ES21	Remanufacture of reject artiche [CS19].	21		No specific measures identified [E18].		0.00		0.01	0.02
ES21	Storage [CS67] With occasional controlled exposure [CS137]	2	Daily; <15 min (sampling) product temp (ambient); samples collected at dedicated sample point	No specific measures identified [E18].		0.56		0.01	0.57
ES22	Bulk transfers [CS14]. ; (closed systems) [CS107]	1	Daily; 15 min – 1 hour; ambient temp Enclosed transfers, clear lines prior to decoupling	Handle substance within a closed system [E47].		0.00		0.00	0.00
ES22	Bulk transfers [CS14]. ; (closed systems) [CS107] With occasional controlled exposure [CS137]	2	Daily; 15 min – 1 hour; ambient temp Enclosed transfers, clear lines prior to decoupling LEV	Handle substance within a closed system [E47].		0.56		0.01	0.57
ES22	Bulk transfers [CS14]. Dedicated facility [CS81].	8b	Daily; 15 min – 1 hour; ambient temp general ventilation, Minimize spills	Transfer via enclosed lines [E52].	Extra exposure modifier: 0.2 [E52]	0.56		0.04	0.60
ES22	Bulk weighing [CS91] (closed systems) [CS107].	1	Daily; 15 min – 1 hour; ambient temp Enclosed activity	Handle substance within a closed system [E47].		0.00		0.00	0.00
ES22	Bulk weighing [CS91] With occasional controlled exposure [CS137]	2	Daily; 15 min – 1 hour; ambient temp Enclosed activity	Handle substance within a closed system [E47].		0.56		0.01	0.57
ES22	Small scale weighing [CS90]	9	Daily; 15 min – 1 hour; ambient temp; LEV; minimize spillages; operator training	Ensure material transfers are under containment or extract ventilation [E66].	TRA LEV : Efficiency 90%	0.28	TRA Dermal Exposure LEV Reduction factor 0.1	0.00	0.29
ES22	Additive premixing [CS92] (closed systems) [CS107]	3	Daily; 15 min – 1 hour; ambient temp; LEV; minimize spillages;	Ensure material transfers are under containment or extract ventilation [E66].	TRA LEV : Efficiency 90%	0.14	TRA Dermal Exposure LEV Reduction factor 0.1	0.00	0.14
ES22	Additive premixing [CS92] (open systems) [CS108]; With sample collection [CS56].	4	Daily; 15 min – 1 hour; ambient temp; LEV; minimize spillages;	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11].	Dilution ventilation effectiveness 30%	0.79		0.04	0.83
ES22	Additive premixing [CS92] General exposures (open systems) [CS16].	5	Daily; 1-4 hours; ambient temp LEV; minimize spillages;	Ensure material transfers are under containment or extract ventilation [E66].	TRA LEV : Efficiency 90%	0.28	TRA Dermal Exposure LEV Reduction factor 0.005	0.00	0.28
ES22	Bulk transfers [CS14].	8b	Daily; 15 min – 1 hour; ambient temp	Transfer via enclosed lines [E52].	Extra exposure	0.56	TRA Dermal	0.00	0.57

versalis – Exposure scenario - Xylenes

EC number: 215-535-7, CAS number: 1330-20-7

Identifier ¹	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		RCR (all routes)
	Contributing scenarios	PRO C	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	
	Drum/batch transfers [CS8].		Enclosed activity		modifier: 0.2 [E52]		Exposure LEV Reduction factor 0.1		
ES22	Bulk transfers [CS14]. Small package filling [CS7].	9	Daily; 15 min – 1 hour; ambient temp Enclosed activity	Transfer via enclosed lines [E52].	Extra exposure modifier: 0.2 [E52]	0.56		0.04	0.60
ES22	Calendering (including Banburys) [CS64]	6	Daily; >4 hours, elevated temperature LEV; minimize area/size of openings	Minimize exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60]. ;Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11].	TRA LEV : Efficiency 90% Dilution ventilation effectiveness 30%	0.59	TRA Dermal Exposure LEV Reduction factor 0.05	0.01	0.60
ES22	Production of articles by dipping and pouring [CS113].	13	Daily; >4 hours, ambient good GV	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85		0.04	0.88
ES22	Extrusion and masterbatching [CS88]	14	Daily; >4 hours, ambient good GV	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85		0.02	0.87
ES22	Injection moulding of articles [CS89]	14	Daily; >4 hours, ambient LEV; minimize area/size of openings; good GV	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85		0.02	0.87
ES22	Equipment maintenance [CS5].	8a	Daily; 15 min – 1 hour; ambient temp; collection of line waste in container work procedures; retain wash down in sealed storage pending disposal or use as recycled material for subsequent	Drain down system prior to equipment break-in or maintenance [E65].	LEV effectiveness of 90% assumed to equate to SOP relating to draining etc prior to maintenance (0.1)	0.28	TRA Dermal Exposure LEV Reduction factor 0.1	0.01	0.29
ES22	Storage [CS67]; With occasional controlled exposure [CS137]	2	Daily; 8 hrs; ambient temp; samples collected at dedicated sample point LEV	Store substance within a closed system [E84].		0.56		0.01	0.57
ES24	Bulk transfers [CS14].	1	Daily; 15 min – 1 hour; ambient temp Enclosed transfers, clear lines prior to decoupling	No specific measures identified [E18].		0.00		0.00	0.00
ES24	Bulk transfers [CS14]. With occasional controlled exposure [CS137]	2	Daily; 15 min – 1 hour; ambient temp Enclosed transfers, clear lines prior to decoupling	No specific measures identified [E18].		0.56		0.00	0.56
ES24	Bulk transfers [CS14]. Batch process [CS55].	3	Daily; 15 min – 1 hour; ambient temp Enclosed transfers, clear lines prior to decoupling	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11]. OR; [G9], Ensure operation is undertaken outdoor [E69].	Dilution ventilation effectiveness 30%	0.59		0.00	0.59
ES24	Bulk transfers [CS14].	4	Daily; 15 min – 1 hour; ambient temp Enclosed transfers, clear lines prior to decoupling	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11]. OR; [G9], Ensure operation is undertaken outdoor [E69].	Dilution ventilation effectiveness 30%	0.79		0.04	0.83
ES24	Drum/batch transfers [CS8]. Dedicated facility [CS81].	8b	Daily; 15 min – 1 hour; ambient temp Pumped transfer from drum to holding tanks.	Ensure material transfers are under containment or extract ventilation [E66].	TRA LEV : Efficiency 97%	0.08	TRA Dermal exposure LEV reduction factor: 0.1	0.00	0.09
ES24	Pelletizing [CS53]. ;(closed systems) [CS107]	9	Daily; >4 hours, ambient enclosed operations, size of openings Minimized	Minimize exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60].	TRA LEV : Efficiency 90%	0.28	TRA Dermal exposure LEV reduction factor: 0.1	0.00	0.29
ES24	Filling / preparation of equipment from drums or containers. [CS45].	8a	Daily; 1-4 hours, ambient careful pouring, worker instructions	Use drum pumps or carefully pour from container [E64].	TRA LEV : Efficiency 80%	0.28	TRA Dermal exposure LEV reduction factor: 0.1	0.01	0.29
ES24	General exposures (closed systems) [CS15].	2	Daily; >4 hours, ambient	No specific measures identified [E18].		0.56		0.01	0.57
ES24	General exposures (open systems) [CS16].	4	Daily; >4 hours, ambient Well ventilated area.	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11]. OR; [G9], Ensure operation is undertaken outdoor [E69].	Dilution ventilation effectiveness 30%	0.79		0.04	0.83
ES24	General exposures (open systems) [CS16].	4	Daily; >4 hours, ambient (product at 80°C)	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11]. OR; [G9], Ensure operation is undertaken	TRA LEV : Efficiency 80% Dilution ventilation effectiveness 30%	0.79		0.04	0.83

versalis – Exposure scenario - Xylenes

EC number: 215-535-7, CAS number: 1330-20-7

Identifier ¹	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		RCR (all routes)
	Contributing scenarios	PRO C	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	
				outdoor [E69].; Provide extract ventilation to points where emissions occur [E54].					
ES24	Remanufacture of reject articles [CS19].	9	Daily; >4 hours, ambient work methods, drain prior to work, retain spills	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11]. OR; [G9], Ensure operation is undertaken outdoor [E69].; Provide extract ventilation to points where emissions occur [E54].	TRA LEV : Efficiency 80% Dilution ventilation effectiveness 30%	0.56		0.04	0.60
ES24	Equipment maintenance [CS5].	8a	Daily; 1-4 hours, ambient work methods, drain prior to work, retain spills, gloves	Drain down system prior to equipment break-in or maintenance [E65].	Extra exposure modifier:0.2 SOP re drain down equates to LEV reduction of 80% (x0.2)	0.56		0.00	0.56
ES24	Storage [CS67]	1	Daily; 8 hrs; ambient temp; samples collected at dedicated sample point	No specific measures identified [E18].		0.00		0.00	0.00
ES24	Storage [CS67] With occasional controlled exposure [CS137]	2	Daily; 8 hrs; ambient temp; samples collected at dedicated sample point	No specific measures identified [E18].		0.56		0.00	0.56
E27	Bulk transfers [CS14].	8b	Daily; 15 min - 1 hour; product temp (ambient). Enclosed transfers, clear lines prior to decoupling	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], or: [G9], Ensure operation is undertaken outdoors [E69].Avoid carrying out activities involving exposure for more than 1 hour [OC27].	Dilution ventilation effectiveness 30% TRA duration factor 15 min-1 hour	0.39		0.04	0.43
E27	Filling / preparation of equipment from drums or containers. [CS45].	8b	Daily; 15 min – 1 hour; product temp (ambient) Pumped transfer from drum to holding tanks.	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], or: [G9], Ensure operation is undertaken outdoors [E69].Avoid carrying out activities involving exposure for more than 1 hour [OC27].	Dilution ventilation effectiveness 30% TRA duration factor 15 min-1 hour	0.39		0.04	0.43
E27	Drill floor operations [CS116].	3	Daily; 1-4 hour; product temp (ambient); indoor Closed equipment, enclosed or vented sampling points	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], or: [G9], Ensure operation is undertaken outdoors [E69].	Dilution ventilation effectiveness 30%	0.99		0.00	0.99
E27	Drill floor operations [CS116].	4	Daily; 1-4 hour per operator; product temp ambient, outdoors	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], or: [G9], Ensure operation is undertaken outdoors [E69].	Dilution ventilation effectiveness 30%	0.79		0.04	0.83
E27	Operation of solids filtering equipment vapor exposures [CS118].	4	Daily; >4 hours; indoor; product temperature approx. 60 dC Local exhaust ventilation	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], or: [G9], Ensure operation is undertaken outdoors [E69].	Dilution ventilation effectiveness 30%	0.79		0.04	0.83
E27	Operation of solids filtering equipment - aerosol exposures [CS119].	4	Daily; >4 hours; indoor; product temperature approx. 60 dC Local exhaust ventilation	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], or: [G9], Ensure operation is undertaken outdoors [E69].	Dilution ventilation effectiveness 30%	0.79		0.04	0.83
E27	Operation of solids filtering equipment [CS117].	8a	Daily; 15 min - 1 hour; product temp (ambient). Local exhaust ventilation	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], or: [G9], Ensure operation is undertaken outdoors [E69]. Avoid carrying out activities involving exposure for more than 1 hour [OC27].	Dilution ventilation effectiveness 30%; TRA duration factor 15 min-1 hour	0.39		0.08	0.47
E27	Treatment and disposal of filtered solids [CS121].	3	Daily; 1-4 hour per operator; product temp ambient), outdoors; Base oil content 1-5% Local exhaust ventilation	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], or: [G9], Ensure operation is undertaken outdoors [E69].	Dilution ventilation effectiveness 30%	0.99		0.00	0.99
E27	Process sampling [CS2].	3	Daily; <15 min; product temp (ambient). Indoor or Outdoor. Closed or ventilated sampling points	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], or: [G9], Ensure operation is undertaken outdoors [E69].	Dilution ventilation effectiveness 30%	0.99		0.00	0.99

versalis – Exposure scenario - Xylenes

EC number: 215-535-7, CAS number: 1330-20-7

Identifier ¹	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		RCR (all routes)
	Contributing scenarios	PRO C	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	
E27	General exposures (closed systems) [CS15].	1	Daily; >4 hours, product temp (ambient) Outdoor	No specific measures identified [E18].		0.00		0.00	0.00
E27	Pouring from small containers [CS9].	8a	Daily; <15 min; product temp (ambient). Indoor or Outdoor	Use drum pumps or carefully pour from container [E64].	Extra exposure modifier: 0.2 Use of drum pump equivalent to 80% efficiency LEV	0.56		0.08	0.64
E27	General exposures (open systems) [CS16].	4	Daily; >4 hours, product temp (ambient) Local exhaust ventilation; or Outdoor	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], or: [G9], Ensure operation is undertaken outdoors [E69].	Dilution ventilation effectiveness 30%	0.79		0.04	0.83
E27	Equipment cleaning and maintenance [CS39].	8a	Daily; 15 min – 1 hour; product temp (ambient); collection of line waste in container Enclosed lines; retain wash down in sealed storage pending disposal or use as recycled material for subsequent	Use drum pumps or carefully pour from container [E64].	Extra exposure modifier: 0.2 Use of drum pump equivalent to 80% efficiency LEV	0.56		0.08	0.64
E27	Batch process [CS55].	1	Continuous; daily; 8hour Enclosed process; closed/semi closed sampling point	No specific measures identified [E18].		0.00		0.00	0.00
E27	Batch process [CS55]. With occasional controlled exposure [CS137]	2	Continuous; daily; 8hour Enclosed process; closed/semi closed sampling point	No specific measures identified [E18].		0.56		0.01	0.57
ES30	Laboratory activities [CS36]. Small scale [CS61]. Handling small quantities (<1000ml) for more than 4 hours/day - inside fume cupboard.	15	Continuous; daily; > 4 hour; ambient temp. Fume cupboard or ventilated glove box; selected disposable gloves LEV	No specific measures identified [E18].		0.56		0.00	0.56
ES30	Cleaning [CS47]. Rolling, Brushing [CS51]. Vessel and container cleaning [CS103] Cleaning equipment, glassware etc under general ventilation for 15 min - 1 hour/day	10	Continuous; daily; 15 min - 1 hour/d; ambient temp. Controlled general ventilation (10 ACH); selected disposable gloves LEV	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85		0.01	0.85
ES32	Bulk transfers [CS14].	3	Daily; 1 - 4 hours; ambient temp. Enclosed transfers, clear lines prior to decoupling	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], or: [G9], Ensure operation is undertaken outdoors [E69].	Dilution ventilation effectiveness 30%	0.59		0.00	0.59
ES32	Drum/batch transfers [CS8].	8a	Daily; 15 min – 1 hour; ambient temp. Pumped transfer from drum to holding tanks.	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], or: [G9], Ensure operation is undertaken outdoors [E69]. Avoid carrying out activities involving exposure for more than 1 hour [OC27].	Dilution ventilation effectiveness 30% TRA duration factor 15 min-1 hour	0.39		0.08	0.47
ES32	Mixing in containers [CS23].; (closed systems) [CS107]	3	Daily; 1 - 4 hours; ambient temp. Enclosed or ventilated mixing vessel	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], or: [G9], Ensure operation is undertaken outdoors [E69].	Dilution ventilation effectiveness 30%	0.59		0.00	0.59
ES32	Mixing in containers [CS23].; (closed systems) [CS107]	3	Daily; 1 - 4 hours; ambient temp. Enclosed or ventilated mixing vessel	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], or: [G9], Ensure operation is undertaken outdoors [E69].	Dilution ventilation effectiveness 30%	0.59		0.00	0.59
ES32	Mixing in containers [CS23].; (open systems) [CS108]	5	Daily; 1 - 4 hours; ambient temp. Enclosed or ventilated mixing vessel	Provide extract ventilation to points where emissions occur [E54]. Avoid carrying out activities involving exposure for more than 4 hours [OC28].	TRA LEV : Efficiency 80% TRA duration factor 1-4 hours	0.34	TRA Dermal Exposure LEV reduction factor 0.01	0.00	0.34
ES32	Material transfers [CS3].	8a	Daily; 15 min - 1 hour; ambient temp. Enclosed transfers to charge hole	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], or: [G9], Ensure operation is undertaken outdoors [E69]. Avoid carrying out activities involving exposure for more	Dilution ventilation effectiveness 30% TRA duration factor 15 min-1 hour	0.39		0.08	0.47

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Identifier ¹	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		RCR (all routes)
	Contributing scenarios	PRO C	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	
				than 1 hour [OC27].					
ES32	Transfer from/pouring from containers [CS22]. ; Non-dedicated facility [CS82]	8a	Outdoors, Daily; 15 min - 1 hour; product temp. (ambient) PPE	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], or: [G9], Ensure operation is undertaken outdoors [E69]. Avoid carrying out activities involving exposure for more than 1 hour [OC27].	Dilution ventilation effectiveness 30% TRA duration factor 15 min-1 hour	0.39		0.04	0.43
ES32	Clean down and maintenance [CS26].	8b	Daily; 15 min – 1 hour; ambient temp; collection of line waste in container Enclosed lines; retain wash down in sealed storage pending disposal or use as recycled material for subsequent	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], or: [G9], Ensure operation is undertaken outdoors [E69]. Avoid carrying out activities involving exposure for more than 1 hour [OC27].	Dilution ventilation effectiveness 30% TRA duration factor 15 min-1 hour	0.39		0.08	0.047
ES32	Equipment maintenance [CS5].	8a	Indoor; Daily; 1 – 4 hour; product temp. (ambient); standard operating procedure, open windows and doors, PPE	Drain down system prior to equipment break-in or maintenance [E65]. Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour) [E40].	TRA LEV : Efficiency 70% Extra exposure modifier 0.2 SOP equivalent to 80% efficiency	0.17	TRA Dermal Exposure LEV reduction factor 0.1	0.08	0.25
ES32	Laboratory activities [CS36].	15	Indoor; Daily; 1 – 4 hour; product temp.(ambient)	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.17		0.00	0.17
ES32	General exposures [CS1].	4	Indoor; Daily; 1 – 4 hour; product temp.(ambient)	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.34		0.04	0.38
ES32	Storage [CS67]	1	Daily; 8 hrs; ambient temp; samples collected at dedicated sample point	No specific measures identified [E18].		0.00		0.00	0.00
ES32	Storage [CS67]	2	Daily; 8 hrs; ambient temp; samples collected at dedicated sample point	Ensure operation is undertaken outdoors [E69].	Dilution ventilation effectiveness 30%	0.39		0.00	0.39
ES33	Material transfers [CS3].	1	Daily; 15 min – 1 hour; ambient temp. Enclosed transfers, clear lines prior to decoupling	No specific measures identified [E18].		0.00		0.00	0.00
ES33	Material transfers [CS3]. With occasional controlled exposure [CS137]	2	Daily; 15 min – 1 hour; ambient temp. Enclosed transfers, clear lines prior to decoupling	No specific measures identified [E18].		0.56		0.00	0.56
ES33	Material transfers [CS3]. Dedicated facility [CS81]. Large Containers	8b	Daily; 15 min – 1 hour; ambient temp general ventilation, minimize spills	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], or: [G9], Ensure operation is undertaken outdoors [E69]. Avoid carrying out activities involving exposure for more than 1 hour [OC27].	Dilution ventilation effectiveness 30% TRA Duration factor 15 min-1 hour	0.85		0.03	0.88
ES33	Bulk weighing [CS91] (closed systems) [CS107].	1	Daily; 15 min – 1 hour; ambient temp Enclosed activity	No specific measures identified [E18].		0.00		0.00	0.00
ES33	Bulk weighing [CS91] With occasional controlled exposure [CS137]	2	Daily; 15 min – 1 hour; ambient temp Enclosed activity	No specific measures identified [E18].		0.56		0.00	0.56
ES33	Small scale weighing [CS90] Dedicated facility [CS81].	9	Daily; 15 min – 1 hour; ambient temp LEV; minimize spillages; operator training	Ensure material transfers are under containment or extract ventilation [E66]	TRA LEV : efficiency 90%	0.28	TRA Dermal Exposure LEV reduction factor 0.1	0.00	0.29
ES33	Additive premixing [CS92] Batch process [CS55]. ; (closed systems) [CS107].	3	Daily; 15 min – 1 hour; ambient temp LEV; minimize spillages	Provide extract ventilation to material transfer points and other openings [E82].	TRA LEV : efficiency 90%	0.14	TRA Dermal Exposure LEV reduction factor 0.1	0.00	0.14
ES33	Additive premixing [CS92]	4	Daily; 15 min – 1 hour; ambient temp LEV; minimize spillages	Provide extract ventilation to points where emissions occur [E54].	TRA LEV : efficiency 90%	0.11	TRA Dermal Exposure LEV reduction factor 0.1	0.00	0.12
ES33	Material transfers [CS3]. Dedicated facility [CS81].	8b	Daily; 15 min – 1 hour; ambient temp Enclosed activity	Ensure material transfers are under containment or extract ventilation [E66].	TRA LEV : efficiency 90%	0.28		0.04	0.32
ES33	Material transfers [CS3]. Small Containers	9	Daily; 15 min – 1 hour; ambient temp Enclosed activity	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11], OR: [G9], Ensure operation is undertaken outdoors [E69]. ; Provide extract ventilation to points where emissions occur [E54].	Dilution ventilation effectiveness 30% Extra exposure modifier: 0.2 Enclosed transfer lines equivalent to 80% efficiency	0.34		0.04	0.38
ES33	Additive premixing [CS92]	5	Daily; 1-4 hours;; ambient temp	Provide extract ventilation to points	TRA LEV : efficiency	0.28	TRA Dermal	0.00	0.28

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EC number: 215-535-7, CAS number: 1330-20-7

Identifier ¹	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		RCR (all routes)
	Contributing scenarios	PRO C	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	
	Mixing operations (open systems) [CS30].		LEV; minimize spillages	where emissions occur [E54].	90%		Exposure LEV reduction factor 0.01		
ES33	Calendering (including Banburys) [CS64]	6	Daily; >4 hours, Elevated temperature LEV; minimize area/size of openings	Restrict area of openings to equipment [E68]. Provide extract ventilation to points where emissions occur [E54].	TRA LEV : efficiency 90% Extra exposure modifier: 0.2 Restrict area openings to equipment.	0.28	TRA Dermal Exposure LEV reduction factor 0.05	0.01	0.29
ES33	Calendering (including Banburys) [CS64]	6	Daily; >4 hours, Elevated temperature LEV; minimize area/size of openings	Restrict area of openings to equipment [E68]. 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]	Dilution ventilation effectiveness 30% TRA Duration factor 15 min-1 hour Extra exposure modifier: 0.2 Restrict area openings to equipment.	0.85		0.01	0.85
ES33	Pressing uncured rubber blanks [CS73]	14	Daily; 1-4 hours; ambient temp Good GV	Provide a good standard of controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85		0.02	0.87
ES33	Vulcanisation [CS70]	6	Daily; >4 hours, elevated temperature LEV at emission points; minimize area/size of openings; good GV	Restrict area of openings to equipment [E68]. Provide extract ventilation to points where emissions occur [E54].	TRA LEV : efficiency 90% Extra exposure modifier: 0.2 Restrict area openings to equipment.	0.28	TRA Dermal Exposure LEV reduction factor 0.05	0.01	0.29
ES33	Cooling cured articles [CS71]	6	> 4 hours; daily; ambient temp. Extract ventilation/hood	Provide extract ventilation to points where emissions occur [E54].	TRA LEV : efficiency 90%	0.28	TRA Dermal Exposure LEV reduction factor 0.05	0.01	0.29
ES33	Laboratory activities [CS36].	15	Daily; <15 min; ambient temp. Local exhaust ventilation at fill point, PPE	Handle in a fume cupboard or under extract ventilation [E83].	TRA LEV : efficiency 90%	0.06	TRA Dermal Exposure LEV reduction factor 0.1	0.00	0.06
ES33	Tyre build up [CS112].	7		Carry out in a vented booth or extracted enclosure [E57]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40]. Wear suitable gloves tested to EN374 [PPE15].	TRA LEV : efficiency 90%	0.85	Gloves	0.04	0.89
ES33	Production of articles by dipping and pouring [CS113].	13		Provide a good standard of controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85		0.08	0.92
ES33	Finishing operations [CS102].	21		No specific measures identified [E118].		0.00		0.02	0.02
ES33	Equipment maintenance [CS5].	8a	Daily; 15 min – 1 hour; ambient temp; collection of line waste in container Enclosed lines; retain wash down in sealed storage pending disposal or use as recycled material for subsequent	Drain or remove substance from equipment prior to break-in or maintenance [E81]. Retain drain downs in sealed storage pending disposal or for subsequent recycle [ENV4].	Extra exposure modifier: 0.1 LEV effectiveness of 90% assumed to equate to SOP relating to draining etc prior to maintenance (0.1)	0.28		0.08	0.36
ES34	Bulk transfers [CS14]. With occasional controlled exposure [CS137]	2	Continuous; daily; 8hour Enclosed transfers, clear lines prior to decoupling	No specific measures identified [E118].		0.56		0.01	0.57
ES34	Drum/batch transfers [CS8]. Dedicated facility [CS81].	8b	Daily; 15 min – 1 hour; ambient temp Pumped transfer from drum	Use drum pumps [E53].	0.2 Drum pump equivalent to 80% efficiency	0.56		0.04	0.60
ES34	Pouring from small containers [CS9].	9	Daily; 15 min – 1 hour; ambient temp carefully pour; good general ventilation	Provide a good standard of controlled ventilation (not less than 3 to 15 air changes per hour) [E11]. Avoid carrying out activities involving exposure for more than 1 hour [OC 27].	Dilution ventilation effectiveness 30% TRA Duration factor 15 min-1 hour	0.39		0.04	0.43
ES34	General exposures (closed systems) [CS15]. Batch process [CS55].	3	Daily; >4 hours; good general ventilation ; often outdoors	Provide a good standard of controlled ventilation (not less than 3 to 15 air changes per hour) [E11], OR; [G9], Ensure operation is undertaken outdoors [E69].	Dilution ventilation effectiveness 30%	0.59		0.00	0.59
ES34	General exposures (open systems) [CS16].	5	Daily; >4 hours; good general ventilation ; often outdoors	Provide extract ventilation to points where emissions occur [E54].	TRA LEV : Efficiency 80%	0.56	TRA Dermal Exposure LEV	0.00	0.56

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Identifier ¹	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		RCR (all routes)
	Contributing scenarios	PRO C	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	
							reduction factor 0.01		
ES34	phase separation [CS106]; (closed systems) [CS107]	4	Daily; >4 hours; good general ventilation ; often outdoors	Provide a good standard of controlled ventilation (not less than 3 to 15 air changes per hour) [E11], OR; [G9], Ensure operation is undertaken outdoors [E69].	Dilution ventilation effectiveness 30%	0.79		0.04	0.83
ES34	Ion exchange processes [CS105]; (closed systems) [CS107] With occasional controlled exposure [CS137]	2	Daily; >4 hours; good general ventilation ; often outdoors	No specific measures identified [E118].		0.56		0.01	0.57
ES34	Process sampling [CS2]. Batch process [CS55]. ; (closed systems) [CS107].	3	Daily; <15 min; product temp (ambient). Indoor or Outdoor. Closed or ventilated sampling points	Provide a good standard of controlled ventilation (not less than 3 to 15 air changes per hour) [E11], OR; [G9], Ensure operation is undertaken outdoors [E69].	Dilution ventilation effectiveness 30%	0.59		0.00	0.59
ES34	Mixing in containers [CS23].; (closed systems) [CS107]	1	Daily; >4 hours, product temp (ambient) Outdoor	No specific measures identified [E118].		0.00		0.00	0.00
ES34	Equipment cleaning and maintenance [CS39]. Non-dedicated facility [CS82].	8a	Daily; 15 min – 1 hour; product temp (ambient); collection of line waste in container Enclosed lines; retain wash down in sealed storage pending disposal or use as recycled material for subsequent	Provide a good standard of controlled ventilation (not less than 3 to 15 air changes per hour) [E11], OR; [G9], Ensure operation is undertaken outdoors [E69]. Avoid carrying out activities involving exposure for more than 1 hour [OC 27]	Dilution ventilation effectiveness 30% TRA Duration factor 15 min-1 hour	0.39		0.08	0.47
ES34	General exposures (closed systems) [CS15].	1	Continuous; daily; 8hour Enclosed process; closed/semi closed sampling point	No specific measures identified [E118].		0.00		0.00	0.00
ES34	General exposures (closed systems) [CS15]. With occasional controlled exposure [CS137]	2	Continuous; daily; 8hour Enclosed process; closed/semi closed sampling point	No specific measures identified [E118].		0.56		0.00	0.57
ES34	Storage [CS67]	1	Daily; 8 hrs; ambient temp; samples collected at dedicated sample point	No specific measures identified [E118].		0.00		0.00	0.00

3 Xylenes Professional Uses

Identified Professional uses of Xylenes and generic exposure scenario

In Table 4, the identified professional uses of the substance are presented.

If the DUs want to check compliance they have to start with the overview table 4 and, based on the textual description of the different exposure scenarios, recognize their identified use, PROCs and ERCs associated with the specific activity done.

DUs can identify the detailed contributing scenarios that are relevant to them in section 3.2.1 for environment, 3.2.2 for workers and 3.2.3 for consumers.

DUs can check in section 3.3 the exposure and risk characterization for environment and for workers.

For each of the exposure scenarios described, certain assumptions are made regarding operational conditions, which may not necessarily apply to all sites. It could therefore be required to do scaling in order to identify compliance with the conditions set out in the exposure scenarios.

Table 4. Identified professional contributing Exposure Scenarios for Xylenes

Identified use	Description	Sector of use (SU)	Process Category (PROC)	Environmental Release category (ERC)
ES6 Coatings	Covers the use in coatings (paints, inks, adhesives, etc) including exposures during use (including materials receipt, storage, preparation and transfer from bulk and semi-bulk, application by spray, roller, brush, spreader by hand or similar methods, and film formation), and equipment cleaning, maintenance and associated laboratory activities.	22	1, 2, 3, 4, 5, 8a, 8b, 10, 11, 13, 15, 19	8a, 8d
ES9 Cleaning agents	Covers the use as a component of cleaning products including pouring/unloading from drums or containers; and exposures during mixing/diluting in the preparatory phase and cleaning activities (including spraying, brushing, dipping, wiping automated and by hand).	22	1, 2, 3, 4, 8a, 8b, 10, 11, 13	8a, 8d
ES12 Lubricants	Covers the use of formulated lubricants in closed and open systems including transfer operations, operation of engines and similar articles, reworking on reject articles, equipment maintenance and disposal of waste oil.	22	1, 2, 3, 4, 8a, 8b, 9, 10, 11, 13, 17, 18, 20	8a, 8d, 9a, 9b
ES15 Binders	Covers the use as binders and release agents including material transfers, mixing, application by spraying, brushing, and handling of waste.	22	1, 2, 3, 4, 6, 8a, 8b, 10, 11, 14	8a, 8d
ES16 Agrochemicals	Use as an agrochemical excipient for application by manual or machine spraying, smokes and fogging; including equipment clean-downs and disposal.	22	1, 2, 4, 8a, 8b, 11, 13	8a, 8d
ES19 Fuels	Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste.	22	1, 2, 3, 4, 8a, 8b, 16	9a, 9b
ES23 Polymer Processing	Processing of formulated polymers including material transfers, moulding and forming activities, material re-works and associated maintenance.	22	1, 2, 6, 8a, 8b, 14, 21	8a, 8d
ES25 Functional Fluids	Use as functional fluids e.g. cable oils, transfer oils, coolants, insulators, refrigerants, hydraulic fluids in professional equipment including maintenance and related material transfers.	22	1, 2, 3, 8a, 9, 20	9a, 9b
ES28 Oil Fields	Oil field well drilling and production operations (including drilling muds and well cleaning) including material transfers, on-site formulation, well head operations, shaker room activities and related maintenance.	22	1, 2, 3, 4, 8a, 8b	8d
ES29 Road Construction	Application of surface coatings and binders in road and construction activities, including paving uses, manual mastic and in the application of roofing and water-proofing membranes.	22	8a, 8b, 9, 10, 11, 13	8d, 8f
ES31 Laboratory Applications	Use of small quantities within laboratory settings, including material transfers and equipment cleaning.	22	10, 15	8a

3.1 Professional use of Xylenes and Xylenes containing products

Title	Professional use of xylenes and xylenes containing products
Sector of Use	Professional (SU 22)
Process category	1, 2, 3, 4, 5, 6, 7, 8a, 8b, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21
Environmental release category	8a, 8d, 8f, 9a, 9b
Processes, tasks, activities covered	Professional processes relevant for xylenes and xylenes containing products

3.2 Operational conditions and risk management measures

3.2.1 Contributing scenario controlling environmental exposure

Assessment method	EUSES 2.1.1 using default release fractions from ESVOC SpERC (see Table 5 for specific version for each scenario)
Operational conditions	
Product characteristics	The Xylenes category consists of liquids of medium volatility. The water solubility for the category is 166mg/l; the vapour pressure is 821 Pa at 20°C; and the log Kow is 3.16 and is readily biodegradable.
Frequency and duration of use	Emission days per year 365. Only for ES28 N.A.
Amount used	See Table 5
Environmental factors not influenced by risk management	See Table 5

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Other Operational Conditions of use affecting environmental exposure	See Table 5
Risk Management Measures	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Treat air emissions to provide a typical removal efficiency of 0%. [TCR 7] Typical onsite wastewater treatment technology provides removal efficiency of 93.67%. [TCR 11] Specific for ES9, ES31: Soil emission controls are not applicable as there is no direct release to soil. [TCR 4] Specific for ES28: Discharge to aquatic environment is restricted
Organizational measures to prevent/limit release from site	Prevent environmental discharge consistent with regulatory requirements. [OMS 4]
Conditions and measures related to waste water treatment	Estimated substance removal from wastewater via domestic sewage treatment 93.67 (%) [STP3] Assumed domestic sewage treatment plant flow 2000 (m ³ /d) [STP5] ES28: Not applicable
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations. [ETW 3]
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.[ERW 1]
3.2.2 Contributing scenario controlling workers exposure	
Product characteristics	Liquid
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless stated differently) [G2].
Human factors not influenced by risk management	Not applicable
Other Operational Conditions affecting worker exposure	Assumes use at not > 20°C above ambient [G15]. Assumes a good basic standard of occupational hygiene is implemented [G1].
Given operational conditions and risk management measures affecting workers exposure	
Assumes use at not > 20°C above ambient [G15]. Assumes a good basic standard of occupational hygiene is implemented [G1]. <u>General measures flammable substance:</u> <ul style="list-style-type: none"> - <i>Substance Handling and Transfer Preventative Measures:</i> Ensure electrical continuity by bonding and grounding (earthing) all equipment. Use appropriate equipment for filling IBCs and other containers. Keep away from oxidising agents. Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks . Handle and open container with care in a well-ventilated area. Avoid Overfilling. Do NOT empty into drains. - <i>Storage:</i> Keep away from flames, sources of ignition and hot surfaces. No smoking. Take precautionary measures against static discharges. Keep container in a well-ventilated place. Keep container tightly closed <u>General measures aspiration hazard- qualitative assessment:</u> Do not ingest. If swallowed then seek immediate medical assistance <u>General measures (skin irritants):</u> Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if direct hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin effects that may develop. Plus (where there is the potential for additional and significant aerosol exposure): 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. For the operational conditions and risk management measures for each contributing scenario, see Table 6	
3.2.3 Contributing scenario controlling consumer exposure	
There is no consumer exposure for this scenario.	
3.3 Exposure estimation and reference to its source	
3.3.1 Exposure estimations contributing scenario for environmental exposure	
Tool used for evaluation	EUSES 2.1.1 using default release fractions from ESVOC SpERC (see Table 5 for specific version for each scenario)

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When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1 as indicated in Table 5

3.3.2 Exposure estimations contributing scenario for workers

Tool used for evaluation	ECETOC TRA v2 (www.ecetoc.org/tra)	
General parameter set	Type of setting:	professional
	Dustiness:	low (liquid substance)
	Duration of exposure:	> 4 hours/day, unless stated otherwise in the RMM
	Use of ventilation:	none, unless stated otherwise in the RMM
	Use of respiratory protection:	none, unless stated otherwise in the RMM
	Use of dermal protection:	none, unless stated otherwise in the RMM
	Concentration in preparation:	> 25%

When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1 as indicated in Table 6

3.3.3 Exposure estimations contributing scenario for consumers

There is no consumer exposure for this scenario.

3.4 Guidance to DUs to evaluate whether they work inside the boundaries set by the ES

3.4.1 Guidance to DUs to check compliance with the contributing scenario for environmental exposure

Confirm that RMMs and OCs are as described or of equivalent efficiency.

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. [DSU1]

Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. [DSU2]

Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. [DSU3]

Further details on scaling and control technologies are provided in SpERC factsheet (<http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3>). [DSU4]

3.4.2 Guidance to DUs to check compliance with the contributing scenario for workers

Predicted exposures are not expected to exceed the DNEL when the Risk Management Measures/Operational Conditions outlined in Table 6 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)

Risk characterization ratios (RCRs) were calculated by comparing the predicted exposure levels with the corresponding DNELs (derived no effect levels) (RCR = exposure level/DNEL).

Table 5.OCs, RMMs, Risk Characterization- Environment- Professional Uses

Identifier ²	ERC/SpERC	Operational Conditions and Risk Management Measures							Risk Characterization					
		Amount used	Local dilution factor		RMMs advised				RCR Freshwater	RCR Marine water	RCR Freshwater sediment	RCR Marine water sediment	RCR Soil	RCR STP
		Site tonnage tonnes/year	freshwater	marine water	Water efficiency %	Air efficiency %	Total STP removal %	Domestic STP flow m ³ /day						
ES6	ESVOC SpERC 8.3b.v1	10	10	100	93.67%	>0%	93.67%	2000	4.58E-03	4.44E-04	5.92E-03	5.75E-04	5.75E-03	1.32E-03
ES9	ESVOC SpERC 8.4b.v1	10	10	100	93.67%	>0%	93.67%	2000	1.93E-03	1.80E-04	2.49E-03	2.32E-04	1.19E-04	1.32E-07
ES12	ESVOC SpERC 9.6b.v1	10	10	100	93.67%	>0%	93.67%	2000	4.58E-03	4.44E-04	5.92E-03	5.75E-04	5.49E-03	1.32E-03
ES15	ESVOC SpERC 8.10b.v1	10	10	100	93.67%	>0%	93.67%	2000	8.55E-03	8.42E-04	1.11E-02	1.09E-03	1.38E-02	3.29E-03
ES16	ESVOC SpERC 8.11a.v1	10	10	100	93.67%	>0%	93.67%	2000	4.58E-03	4.44E-04	5.92E-03	5.75E-04	5.73E-03	1.32E-03
ES19	ESVOC SpERC 9.12b.v1	0.20	10	100	93.67%	>0%	93.67%	2000	1.93E-03	1.80E-04	2.49E-03	2.32E-04	1.13E-04	2.63E-08
ES23	ESVOC SpERC 8.21b.v1	10	10	100	93.67%	>0%	93.67%	2000	4.58E-03	4.44E-04	5.92E-03	5.75E-04	5.75E-03	1.32E-03
ES25	ESVOC SpERC 9.13b.v1	0.20	10	100	93.67%	>0%	93.67%	2000	2.06E-03	1.93E-04	2.66E-03	2.49E-04	3.83E-04	6.58E-05
ES28	There are no expected releases to the environment from this use, so no exposure assessment is made.													
ES29	ESVOC SpERC 8.15.v1	0.20	10	100	93.67%	>0%	93.67%	2000	1.98E-03	1.85E-04	2.56E-03	2.39E-04	2.26E-04	2.63E-05
ES31	ERC 1,4	0.20	10	100	93.67%	>0%	93.67%	2000	4.57E-03	4.44E-04	5.92E-03	5.75E-04	5.50E-03	1.32E-03

² the number in the exposure scenario corresponds to the numbering in the CSR

versalis – Exposure scenario - Xylenes

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Table 6. OCs, RMMs, Risk Characterization- Workers- Professional Uses

Identifier ²	Operational Conditions and Risk Management Measures				Risk Characterization				
	Contributing scenarios	PROC	OCs and typical RMMs	RMMs advised	Inhalation		Dermal		
					Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	RCR (all routes)
ES6	General exposures (closed systems) [CS15].	1	Continuous; daily; 8hour closed, continuous	Handle substance within a closed system [E47].		0.01		0.00	0.01
ES6	Filling / preparation of equipment from drums or containers. [CS45].	2	Closed, continuous	Handle substance within a closed system [E47]. Ensure material transfers are under containment or extract ventilation [E66].	TRA LEV : efficiency 80%	0.23	TRA Dermal Exposure LEV reduction factor 0.1	0.00	0.23
ES6	General exposures (closed systems) [CS15]. Use in contained systems [CS38].	2	Continuous; daily; 8hour Enclosed process; closed/semiclosed sampling point, LEV	Handle substance within a closed system [E47]. Ensure material transfers are under containment or extract ventilation [E66].	TRA LEV : efficiency 80%	0.23	TRA Dermal Exposure LEV reduction factor 0.1	0.00	0.23
ES6	Preparation of material for application [CS96]	3	Closed, continuous	Handle substance within a closed system [E47]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.42	TRA Dermal Exposure LEV reduction factor 0.1	0.00	0.42
ES6	Film formation air drying [CS95]. Outdoor [OC9].	4	Outdoor	Ensure operation is undertaken outdoors [E69]. Avoid carrying out activities involving exposure for more than 1 hour [OC27]. Wear suitable gloves tested to EN374 [PPE15].	Dilution ventilation effectiveness 30% TRA duration factor 15 min-1 hour	0.39	PPE factor: gloves	0.01	0.40
ES6	Film formation air drying [CS95]. Indoor [OC8].	4	Daily; >4 hours, product temp (ambient); Indoor Good general ventilation (equivalent to outdoors) supplemented with LEV	Provide extract ventilation to points where emissions occur [E54]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	TRA LEV : efficiency 90% Dilution ventilation effectiveness 30%	0.20		0.04	0.24
ES6	Preparation of material for application [CS96]. Indoor [OC8].	5	Indoor, with and without LEV batch, indoor. With LEV.	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40]. Avoid carrying out activities involving exposure for more than 1 hour [OC27].	Dilution ventilation effectiveness 70% TRA duration factor 15 min-1 hour	0.34		0.08	0.41
ES6	Preparation of material for application [CS96]. Outdoor [OC9].	5	Outdoor	Ensure operation is undertaken outdoors [E69]. Avoid carrying out activities involving exposure for more than 1 hour [OC27].	Dilution ventilation effectiveness 30% TRA duration factor 15 min-1 hour	0.79		0.08	0.87
ES6	Material transfers [CS3]. Drum/batch transfers [CS8].	8a	Daily; 15 min - 1 hour; product temp (ambient), indoor, outdoor Pumped transfer from drum to equipment. With and without LEV	Transfer via enclosed lines [E52]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11].	TRA LEV : efficiency 80% Dilution ventilation effectiveness 30%	0.79		0.08	0.87
ES6	Material transfers [CS3]. Drum/batch transfers [CS8].	8b	Daily; 15 min 1 hour; product temp (ambient), indoor Pumped transfer from drum to equipment. With LEV	Transfer via enclosed lines [E52]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].	Dilution ventilation effectiveness 70%	0.85		0.04	0.88
ES6	Roller, spreader, flow application [CS98]. Indoor [OC8].	10	Indoor	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40]. Wear a respirator conforming to EN140 with Type A filter or better [PPE22].	Dilution ventilation effectiveness 70% TRA RPE factor half mask	0.17		0.15	0.32
ES6	Roller, spreader, flow application [CS98]. Outdoor [OC9].	10	Outdoor , PPE	Ensure operation is undertaken outdoors [E69]. Wear a respirator conforming to EN140 with Type A filter or better [PPE22].	Dilution ventilation effectiveness 30% TRA RPE factor half mask	0.39		0.15	0.55
ES6	Manual [CS34]. Spraying [CS10]. Indoor [OC8].	11	Daily; >4 hours, ambient, Indoors, Vented spray booth; specific workforce education, PPE, LEV	Carry out in a vented booth provided with laminar airflow [E59].	TRA LEV : efficiency 99%	0.28	TRA Dermal Exposure LEV reduction factor 0.02	0.01	0.29
ES6	Manual [CS34]. Spraying [CS10]. Outdoor [OC9].	11	Outdoor , 4 hour PPE	Ensure operation is undertaken outdoors [E69]. 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. [PPE24].	Dilution ventilation effectiveness 30% TRA duration factor 1-4 hours TRA RPE factor full face	0.59	PPE factor: gloves	0.12	0.71
ES6	Dipping, immersion and pouring [CS4]. Indoor [OC8].	13	Daily; >4 hours, ambient Local exhaust ventilation at open surface; remove spills as they occur, PPE	Provide extract ventilation to points where emissions occur [E54]. Avoid carrying out activities involving exposure for more than 4 hours	TRA LEV : efficiency 80% TRA duration factor 1-4 hours	0.68	TRA Dermal Exposure LEV reduction factor 0.05	0.00	0.68

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Identifier ²	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		
	Contributing scenarios	PROC	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	RCR (all routes)
			LEV	[OC28].					
ES6	Dipping, immersion and pouring [CS4]. Outdoor [OC9].	13	Daily; >4 hours, ambient, outdoor PPE,,LEV	Ensure operation is undertaken outdoors [E69]. Wear a respirator conforming to EN140 with Type A filter or better [PPE22].	Dilution ventilation effectiveness 30% TRA RPE factor half mask	0.39	TRA Dermal Exposure LEV reduction factor 0.05	0.00	0.40
ES6	Laboratory activities [CS36].	15	Daily; >4 hours, ambient, LEV	Handle in a fume cupboard or under extract ventilation [E83].	TRA LEV : efficiency 80% Dilution ventilation effectiveness 70%	0.03	TRA Dermal Exposure LEV reduction factor 0.1	0.00	0.03
ES6	Hand application fingerpaints, pastels, adhesives [CS72]. Indoor [OC8].	19	Daily; >4 hours, ambient indoor	Limit the substance content in the product to 5% [OC17]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40]. Wear suitable gloves tested to EN374 [PPE15].	Dilution ventilation effectiveness 70% TRA concentration Factor 1-5%	0.34	PPE factor: gloves	0.16	0.50
ES6	Hand application - fingerpaints, pastels, adhesives [CS72]. Outdoor [OC9].	19	15 minutes; ambient outdoor, PPE	Limit the substance content in the product to 5% [OC17]. Ensure operation is undertaken outdoors [E69]. Avoid carrying out activities involving exposure for more than 4 hours [OC28]. Wear suitable gloves tested to EN374 [PPE15].	Dilution ventilation effectiveness 30% TRA duration factor 1-4 hours TRA concentration Factor 1-5%	0.47	PPE factor: gloves	0.16	0.63
ES6	Equipment cleaning and maintenance [CS39].	8a	Daily; 15 min -1 hour; product temp; collection of line waste in container; Indoor/Outdoor Enclosed lines; retain wash down in sealed storage pending disposal or use as recycled material for subsequent formulation. PPE.	Drain down system prior to equipment break-in or maintenance [E65]. Avoid carrying out activities involving exposure for more than 4 hours [OC28].	TRA duration factor 1-4 hours Extra exposure modifier: 0,2 LEV effectiveness assumed to equate to SOP relating to draining etc prior to maintenance; additional LEV (80%)	0.68		0.08	0.75
ES6	Storage [CS67]. With occasional controlled exposure [CS137].	2	Daily; <15 min (sampling) product temp (ambient); samples collected at dedicated sample point	Handle substance within a closed system [E47]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.34		0.01	0.35
ES9	Filling / preparation of equipment from drums or containers [CS45]. Dedicated facility [CS81].	8b	daily; 15min – 1 hour; ambient temp (<10%) Manual transfer from small pack to application equipment.	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85		0.04	0.88
ES9	Automated process with (semi) closed systems [CS93]. Use in contained systems [CS38].	2	daily; 8hour Enclosed process; closed	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].	Dilution ventilation effectiveness 30%	0.79		0.01	0.80
ES9	Automated process with (semi) closed systems [CS93]. Use in contained systems [CS38]. Drum/batch transfers [CS8].	3	daily; 15min – 1 hour Enclosed process; closed	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].	Dilution ventilation effectiveness 30%	0.59		0.00	0.59
ES9	Semi Automated process. (e.g.: Semi automatic application of floor care and maintenance products) [CS76].	4	daily; 8hour Semi enclosed process; closed	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85		0.04	0.88
ES9	Filling / preparation of equipment from drums or containers. [CS45]. Outdoor [OC9].	8a	daily; 15min – 1 hour; ambient temp Outdoors Manual transfer from small pack to application equipment.	Use drum pumps or carefully pour from container [E64]. Ensure operation is undertaken outdoors [E69].	TRA LEV : efficiency 80% Dilution ventilation effectiveness 30%	0.79		0.08	0.87
ES9	Manual [CS34]. Cleaning [CS47]. Surfaces [CS48]. Dipping, immersion and pouring [CS4].	13	Daily; >4 hours, ambient No Local exhaust ventilation at open surface; remove spills as they occur, PPE	Wear a respirator conforming to EN140 with Type A filter or better [PPE22]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 30% Half mask	0.39	TRA concentration factor 1-5%	0.08	0.47
ES9	Cleaning with low-pressure washers [CS42]. Rolling, Brushing [CS51]. No spraying [CS60].	10	Daily; >4 hours, ambient temp. 5% max specific workforce education, PPE	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]. Wear a respirator conforming to EN140 with	Dilution ventilation effectiveness 30% Half mask	0.39	TRA concentration factor <1%	0.03	0.43

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Identifier ²	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		
	Contributing scenarios	PROC	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	RCR (all routes)
				Type A filter or better [PPE22].					
ES9	Cleaning with high pressure washers [CS44]. Spraying [CS10]. Indoor [OC8].	11	Daily; 8 hours; ambient temp. Indoor. 0.5% max specific workforce education, PPE	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40]. Wear a respirator conforming to EN140 with Type A filter or better [PPE22].	Dilution ventilation effectiveness 70% Half mask	0.85	TRA concentration factor <1%	0.06	0.91
ES9	Cleaning with high pressure washers [CS44]. Spraying [CS10]. Outdoor [OC9].	11	Daily; 8 hours; ambient temp. Outdoor 0.5% max specific workforce education, PPE	Limit the substance content in the product to 5% [OC17] Ensure operation is undertaken outdoors [E69]. Wear a respirator conforming to EN140 with Type A filter or better [PPE22].	Dilution ventilation effectiveness 30% TRA concentration Factor 1-5% Half mask	0.39		0.06	0.45
ES9	Manual [CS34]. Surfaces [CS48]. Cleaning [CS47]. Spraying [CS10].	10	Daily; >4 hours; ambient temp. 10% max. waste is flushed out with waste water, wipe cloths in container., LEV	Provide extract ventilation to points where emissions occur [E54]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].	TRA LEV : efficiency 80% Dilution ventilation effectiveness 30%	0.79		0.01	0.80
ES9	Ad hoc manual application via trigger sprays, dipping, etc. [CS27]. Rolling, Brushing [CS51].	10	Daily; >4 hours; ambient temp. in a workshop"(with LEV) waste is flushed out with waste water, wipe cloths in container, LEV	Provide extract ventilation to points where emissions occur [E54]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].	TRA LEV : efficiency 80% Dilution ventilation effectiveness 30%	0.79	TRA Dermal exposure LEV reduction factor 0.05	0.01	0.80
ES9	Ad hoc manual application via trigger sprays, dipping, etc. [CS27]. Rolling, Brushing [CS51].	10	Daily; < 1 hours; ambient temp. occasional use. waste is flushed out with waste water, wipe cloths in container.	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].	Dilution ventilation effectiveness 30% TRA duration factor 15 min-1 hour	0.79		0.15	0.94
ES9	Application of cleaning products in closed systems [CS101] Outdoor [OC9].	4	daily; 8hour Enclosed process; closed/semiclosed	Handle substance within a closed system [E47]. Ensure operation is undertaken outdoors [E69]	TRA LEV : efficiency 80% Dilution ventilation effectiveness 30%	0.39		0.04	0.43
ES9	Cleaning of medical devices [CS74].	4	daily; 8hour Enclosed process; closed/semiclosed, LEV	Minimize exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60].	TRA LEV : efficiency 80%	0.56	TRA Dermal exposure LEV reduction factor 0.1	0.00	0.57
ES9	Equipment cleaning and maintenance [CS39].	8a	Daily; 15 min -1 hour; product temp; collection of line waste in container; Indoor/Outdoor Enclosed lines; retain wash down in sealed storage pending disposal or use as recycled material for subsequent formulation. PPE	Drain down system prior to equipment break-in or maintenance [E65] Avoid carrying out activities involving exposure for more than 4 hours [OC28].	TRA concentration factor <1% TRA duration factor 1-4 hours 0.2 LEV effectiveness assumed to equate to SOP relating to draining etc prior to maintenance; additional LEV (80%)	0.68		0.08	0.75
ES9	Storage [CS67]. With occasional controlled exposure [CS137].	2	Daily; <15 min (sampling) product temp (ambient); samples collected at dedicated sample point	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].	Dilution ventilation effectiveness 30%	0.79		0.01	0.80
ES12	General exposures (closed systems) [CS15].	1	Continuous; daily; ambient temp. Closed processes	Handle substance within a closed system [E47].		0.00		0.00	0.00
ES12	General exposures (closed systems) [CS15]. Batch process [CS55].	2	Continuous; daily; ambient temp. Closed processes	Handle substance within a closed system [E47]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11].	Dilution ventilation effectiveness 30%	0.79		0.01	0.80
ES12	General exposures (closed systems) [CS15].	3	Continuous; daily; ambient temp. Enclosed process; closed/semiclosed sampling point	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].	Dilution ventilation effectiveness 30%	0.59		0.00	0.59
ES12	General exposures (open systems) [CS16].	20	Daily; >4 hours, ambient. Fluid inside equipment	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].	Dilution ventilation effectiveness 30%	0.79		0.01	0.80
ES12	General exposures (open systems) [CS16].	4	Continuous; daily; ambient temp. Enclosed transfers, LEV	Ensure material transfers are under containment or extract ventilation [E66].	TRA LEV : efficiency 80%	0.56	TRA Dermal exposure LEV reduction factor 0.1	0.00	0.57
ES12	Bulk transfers [CS14]. Dedicated facility [CS81].	8b	Daily; 1-4 hour; ambient temp. Enclosed transfers, clear lines prior to decoupling	Transfer via enclosed lines [E52].	TRA LEV : efficiency 80%	0.56		0.04	0.60
ES12	Filling / preparation of equipment from drums	8b	Daily; 15 min – 1 hour; ambient temp Pumped	Transfer via enclosed lines [E52].	TRA LEV : efficiency 80%	0.56		0.04	0.60

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Identifier ²	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		
	Contributing scenarios	PROC	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	RCR (all routes)
	or containers. [CS45]. Dedicated facility [CS81].		transfer or use of dedicated container. Eye protection, Gloves, Apron						
ES12	Filling / preparation of equipment from drums or containers. [CS45]. Non-dedicated facility [CS82].	8a	Daily; 15 min – 1 hour; ambient temp Pumped transfer or use of dedicated container. Eye protection, Gloves, Apron	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]. Use drum pumps or Carefully pour from containers [E64].	TRA LEV : efficiency 80% Dilution ventilation effectiveness 30%	0.79		0.08	0.87
ES12	Operation and lubrication of high energy open equipment [CS17].	17	Continuous; daily; ambient temp. Indoors Restrict area of openings; extract ventilation to emission points, LEV	Restrict area of openings to equipment [E68]. Provide extract ventilation to points where emissions occur [E54].	TRA LEV : efficiency 90%	0.56	TRA Dermal exposure LEV reduction factor 0.05	0.01	0.57
ES12	Operation and lubrication of high energy open equipment [CS17].	18	Continuous; daily; ambient temp. Restrict area of openings; extract ventilation to emission points, LEV	Restrict area of openings to equipment [E68]. Provide extract ventilation to points where emissions occur [E54]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].	TRA LEV : efficiency 90% Dilution ventilation effectiveness 30%	0.79	TRA Dermal exposure LEV reduction factor 0.05	0.00	0.79
ES12	Operation and lubrication of high energy open equipment [CS17]. Outdoors [OC9].	17	Continuous; daily; ambient temp. Outdoors Total loss systems	Limit the substance content in the product to 5% [OC17]. Ensure operation is undertaken outdoors [E69]. Avoid carrying out activities involving exposure for more than 4 hours [OC 28].	Dilution ventilation effectiveness 30% TRA duration factor 1-4 hours TRA concentration factor 1-5%	0.32	TRA concentration factor 1-5%	0.03	0.35
ES12	Operation and lubrication of high energy open equipment [CS17].	17	Continuous; daily; ambient temp. Total loss systems	Limit the substance content in the product to 5% [OC17]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70% TRA concentration factor 1-5%	0.68	TRA concentration factor 1-5%	0.03	0.71
ES12	Maintenance (of larger plant items) and machine set up [CS77]. Dedicated facility [CS81].	8b	Daily; 1-4 hours; ambient temp; Enclosed transfers ,vented transfer points; clear lines prior to decoupling.	Ensure material transfers are under containment or extract ventilation [E66].	TRA LEV : efficiency 80%	0.56		0.04	0.60
ES12	Maintenance (of larger plant items) and machine set up [CS77]. Elevated Temperature..	8b	Daily; 1-4 hours; Elevated temp (30o above ambient) Enclosed transfers, vented transfer points; clear lines prior to decoupling LEV	Provide extract ventilation to emission points when contact with warm (>50 deg C) lubricant is likely [E67]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40]	TRA LEV : efficiency 90% Dilution ventilation effectiveness 70%	0.42	TRA Dermal exposure LEV reduction factor 0.1	0.00	0.43
ES12	Maintenance of small items [CS18]. Drain down and flush system prior to equipment break-in or maintenance [E55].	8a	Daily; 1-4 hours; Elevated temp (30o above ambient) Retain draining in sealed storage pending disposal PPE; LEV	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40]. Avoid carrying out activities involving exposure for more than 4 hours [OC28].	TRA LEV : efficiency 90% Dilution ventilation effectiveness 70% TRA duration factor 1-4 hours	0.51	TRA Dermal exposure LEV reduction factor 0.01	0.00	0.51
ES12	Engine lubricant service [CS78]. Transfer via enclosed lines [E52].	9	Daily; 1-4 hours; ambient temp.	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].	TRA LEV : efficiency 80% Dilution ventilation effectiveness 30%	0.79		0.04	0.83
ES12	Batch process [CS55].	1	Daily; 8 hrs; ambient temp; samples collected at dedicated sample point	Handle substance within a closed system [E47]		0.00		0.00	0.00
ES12	Batch process [CS55]. With occasional controlled exposure [CS137]..	2	Daily; 8 hrs; ambient temp; samples collected at dedicated sample point	Handle substance within a closed system [E47]	Dilution ventilation effectiveness 30%	0.79		0.00	0.79
ES15	Material transfers [CS3]. (closed systems) [CS107].	1	Daily; 1 - 4 hours; ambient temp. Enclosed transfers, clear lines prior to decoupling	Handle substance within a closed system [E47].		0.00		0.00	0.00
ES15	Material transfers [CS3]. (closed systems) [CS107]. With occasional controlled exposure [CS137].	2	Daily; 1 - 4 hours; ambient temp. Enclosed transfers, clear lines prior to decoupling	Handle substance within a closed system [E47]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].	Dilution ventilation effectiveness 30%	0.79		0.01	0.80
ES15	Material transfers [CS3]. (closed systems) [CS107]. Batch process [CS55].	3	Daily; 1 - 4 hours; ambient temp. Enclosed transfers, clear lines prior to decoupling	Handle substance within a closed system [E47]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].	Dilution ventilation effectiveness 30%	0.59		0.00	0.59
ES15	Drum/batch transfers	8b	Daily; 15 mins - 1 hour;	Use drum pumps or carefully pour	TRA LEV : efficiency	0.56	TRA Dermal exposure	0.00	0.57

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Identifier ²	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		
	Contributing scenarios	PROC	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	RCR (all routes)
	[CS8].		ambient temp Pumped transfer from drum to holding tanks.	from container [E64].	80%		LEV reduction factor 0.1		
ES15	Mixing operations (closed systems) [CS29].	3	Daily; >4 hours Enclosed or ventilated mixing vessel	Formulate in enclosed or ventilated mixing vessels [E46]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	Dilution ventilation effectiveness 30%	0.59	TRA Dermal exposure LEV reduction factor 0.1	0.00	0.59
ES15	Mixing operations (open systems) [CS30].	4	Daily; >4 hours	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85	TRA Dermal exposure LEV reduction factor 0.1	0.00	0.85
ES15	Mold forming [CS31].	14	Daily; >4 hours, ambient temp PPE	Minimize exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].	TRA LEV : efficiency 80% Dilution ventilation effectiveness 30%	0.79	TRA Dermal exposure LEV reduction factor 0.1	0.00	0.79
ES15	Casting operations [CS32]. (open systems) [CS108].	6	Daily; 1 - 4 hours; elevated temp. sufficient to create fume Enhanced general ventilation, PPE	Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60]. Wear a respirator conforming to EN140 with Type A filter or better [PPE22].	TRA LEV : efficiency 80% TRA RPE factor half mask	0.56	TRA Dermal exposure LEV reduction factor 0.05	0.01	0.57
ES15	Spraying [CS10]. Manual [CS34].	11	Daily; 1 - 4 hours; ambient temp. Enclosed or ventilated enclosure	Minimise exposure by extracted full enclosure for the operation or equipment [E61]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	TRA LEV : efficiency 90% Dilution ventilation effectiveness 70%	0.85	TRA Dermal exposure LEV reduction factor 0.02	0.01	0.86
ES15	Manual roller application or brushing [CS13].	10	Daily; 1 - 4 hours; ambient temp. PPE	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40]. Provide extract ventilation to points where emissions occur [E54]. Wear a respirator conforming to EN140 with Type A filter or better [PPE22].	TRA LEV : efficiency 80% Dilution ventilation effectiveness 70%	0.34	TRA Dermal exposure LEV reduction factor 0.1	0.02	0.35
ES15	Spraying [CS10]. Manual [CS34].	11	Daily; 1 - 4 hours; ambient temp. PPE, face mask	Carry out in a vented booth or extracted enclosure [E57]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40]. Wear suitable gloves tested to EN374 [PPE15]. Wear a respirator conforming to EN140 with Type A filter or better [PPE22].	TRA LEV : efficiency 90% Dilution ventilation effectiveness 70%	0.85	TRA Dermal exposure LEV reduction factor 0.02	0.01	0.86
ES15	Storage [CS67].	1	Daily; 8 hrs; ambient temp; samples collected at dedicated sample point	Store substance within a closed system [E84].		0.00		0.00	0.00
ES15	Storage [CS67]. With occasional controlled exposure [CS137].	2	Daily; 8 hrs; ambient temp; samples collected at dedicated sample point	Store substance within a closed system [E84]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]	Dilution ventilation effectiveness 30%	0.79		0.00	0.79
ES16	Transfer from/pouring from containers [CS22]	8b	Daily; 15 mins - 1 hour; ambient temp gloves	Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85		0.04	0.88
ES16	Mixing in containers [CS23].	4	Daily; 15 min - 1 hour; ambient temp. outdoors. Gloves	Ensure operation is undertaken outdoors [E69]. Avoid carrying out activities involving exposure for more than 1 hour [OC27].	Dilution ventilation effectiveness 30% TRA duration factor 15 min - 1 hour	0.39		0.04	0.43
ES16	Spraying/fogging by manual application [CS24]	11	Daily; 1-4 hours; ambient temp; outdoors. Full protective body suit and RPE	Ensure operation is undertaken outdoors carrying out activities involving exposure for more than 4 hours [OC28]. Wear suitable gloves tested [PPE15]. Wear a full face respirator conforming with Type A filter or better [PPE24].	Dilution ventilation effectiveness 30% TRA duration factor 1-4 hours TRA RPE factor full face	0.59	PPE factor: gloves	0.12	0.71
ES16	Spraying/fogging by machine application [CS25].	11	Daily; 1-4 hours; ambient temp; ventilated cab	Limit the substance content in the product to 25% [OC18]. Apply within a vented cab supplied with filtered air under positive pressure and with a protection factor of >20 [E70]. Wear suitable gloves tested to EN374	TRA LEV : efficiency 95% TRA concentration factor 5-25%	0.85	TRA Dermal exposure LEV reduction factor 0.02	0.01	0.86

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Identifier ²	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		
	Contributing scenarios	PROC	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	RCR (all routes)
				[PPE15].					
ES16	Ad hoc manual application via trigger sprays, dipping, etc. [CS27].	13	<1 hours daily; ambient temp.	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]. Avoid carrying out activities involving exposure for more than 1 hour [OC27]. Wear suitable gloves tested to EN374 [PPE15]	Dilution ventilation effectiveness 30% TRA duration factor 15 min - 1 hour TRA concentration factor 5-25%	0.47	TRA concentration factor 5-25% PPE factor: gloves	0.01	0.48
ES16	Clean down and maintenance [CS26]. Non dedicated facility [CS82].	8a	<1 hours daily; ambient temp. Retain drainings in sealed storage pending disposal. PPE.	Avoid carrying out activities involving exposure for more than 1 hour [OC27]. Wear suitable gloves tested to EN374 [PPE15].	Dilution ventilation effectiveness 70% TRA duration factor 15 min - 1 hour	0.34	PPE factor: gloves	0.02	0.35
ES16	Disposal of wastes [CS28]. Non-dedicated facility [CS82].	8a	<1 hours daily; ambient temp. outdoors. Gloves	Drain down system prior to equipment break-in or maintenance [E65]. Ensure operation is undertaken outdoors [E69]. Avoid carrying out activities involving exposure for more than 1 hour [OC27]. Wear suitable gloves tested to EN374 [PPE15].	Dilution ventilation effectiveness 30% TRA duration factor 15 min - 1 hour	0.79	PPE factor: gloves	0.02	0.80
ES16	Storage [CS67]	1	Daily; 8 hrs; ambient temp; samples collected at dedicated sample point	Handle substance within a closed system [E47].		0.00		0.00	0.00
ES16	Storage [CS67]. With occasional controlled exposure [CS137]	2	Daily; 8 hrs; ambient temp; samples collected at dedicated sample point	Handle substance within a closed system [E47]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].	Dilution ventilation effectiveness 30%	0.79		0.00	0.79
ES19	Bulk transfers [CS14].	4	Daily; 1-4 hour; ambient temp. Enclosed transfers, clear lines prior to decoupling	Provide a good standard of general or controlled ventilation (not less than 3 to 5 air changes per hour) [E11]. Avoid carrying out activities involving exposure for more than 1 hour [OC27].	Dilution ventilation effectiveness 30% TRA duration factor 15 min - 1 hour	0.39		0.04	0.43
ES19	Drum/batch transfers [CS8].	8b	Daily; 15 mins - 1 hour; ambient temp Pumped transfer from drum to equipment	Provide a good standard of general or controlled ventilation (not less than 3 to 5 air changes per hour) [E11]. Avoid carrying out activities involving exposure for more than 1 hour [OC27].	Dilution ventilation effectiveness 30% TRA duration factor 15 min - 1 hour	0.39		0.02	0.41
ES19	Dipping, immersion and pouring [CS4].	8b	Daily; >4 hours, to 100% Pumped transfer to vehicle	Provide a good standard of general or controlled ventilation (not less than 3 to 5 air changes per hour) [E11]. Avoid carrying out activities involving exposure for more than 1 hour [OC27].	Dilution ventilation effectiveness 30% TRA duration factor 15 min - 1 hour	0.39		0.02	0.41
ES19	General exposures (closed systems) [CS15].	1	Daily; >4 hours Closed equipment	No specific measures identified [E118].		0.00		0.00	0.00
ES19	General exposures (closed systems) [CS15]. With occasional controlled exposure [CS137]	2	Daily; >4 hours Closed equipment	No specific measures identified [E118]. Avoid carrying out activities involving exposure for more than 4 hours [OC28]	TRA duration factor 1-4 hours	0.68		0.01	0.68
ES19	General exposures (open systems) [CS16]. (closed systems) [CS107] Batch process [CS55].	3	Daily; >4 hours, to 100% Enclosed or ventilated mixing vessel	Provide a good standard of general or controlled ventilation (not less than 3 to 5 air changes per hour) [E11]. Avoid carrying out activities involving exposure for more than 1 hour [OC27].	Dilution ventilation effectiveness 30%	0.99		0.00	0.99
ES19	General exposures (open systems) [CS16]. ; (closed systems) [CS107]	16	Daily; >4 hours, to 100% Closed equipment	No specific measures identified [E118].		0.56		0.00	0.57
ES19	Equipment cleaning and maintenance [CS39].	8a	Daily; >4 hours, to 100% PPE. Operator training.	Provide a good standard of general or controlled ventilation (not less than 3 to 5 air changes per hour) [E11]. Avoid carrying out activities involving exposure for more than 1 hour [OC27].	Dilution ventilation effectiveness 30% TRA duration factor 15 min-1 hour	0.79		0.08	0.87
ES19	Vessel and container cleaning [CS103]	8a	Daily; >4 hours, to 100% vessel entry procedures, retain wash down in sealed storage pending disposal. PPE	Provide a good standard of general or controlled ventilation (not less than 3 to 5 air changes per hour) [E11]. Avoid carrying out activities involving exposure for more than 1 hour [OC27].	Dilution ventilation effectiveness 30% TRA duration factor 15 min-1 hour	0.79		0.08	0.87

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Identifier ²	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		
	Contributing scenarios	PROC	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	RCR (all routes)
ES19	Storage [CS67]	1	Daily; 8 hrs; ambient temp; samples collected at dedicated sample point	No specific measures identified [E18].		0.00		0.00	0.00
ES23	Bulk transfers [CS14]. (closed systems) [CS107].	1	Daily; 15 min - 1 hour; ambient temp Enclosed transfers, clear lines prior to decoupling	Handle substance within a closed system [E47].		0.00		0.00	0.00
ES23	Bulk transfers [CS14]. (closed systems) [CS107]. With occasional controlled exposure [CS137].	2	Daily; 15 min - 1 hour; ambient temp Enclosed transfers, clear lines prior to decoupling	Handle substance within a closed system [E47]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].	Dilution ventilation effectiveness 30%	0.79		0.01	0.80
ES23	Material transfers [CS3].	8b	Daily; 15 min - 1 hour; ambient temp general ventilation, minimise spills	Transfer via enclosed lines [E52].	TRA LEV : efficiency 80% Dilution	0.56		0.04	0.60
ES23	Injection moulding of articles [CS89].	6	Daily; >4 hours, Ambient LEV; minimise area/size of openings; good GV	Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60].	TRA LEV : efficiency 90% Dilution	0.56	TRA Dermal exposure LEV reduction factor 0.05	0.01	0.57
ES23	Production or preparation or articles by tableting, compression, extrusion or pelletisation [CS100].	14	Daily; >4 hours, Ambient	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85		0.02	0.87
ES23	Rework of articles [CS86].	21	Daily; 1-4 hours; ambient temp	No specific measures identified [E18].		0.00		0.02	0.02
ES23	Equipment maintenance [CS5].	8a	Daily; 15 min - 1 hour; ambient temp; collection of line waste in container work procedures; retain wash down in sealed storage pending disposal or use as recycled material for subsequent formulation. PPE.	Drain down system prior to equipment break-in or maintenance [E65]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].	Dilution ventilation effectiveness 30% Extra exposure modifier: 0.2 LEV effectiveness of 80% assumed to equate to SOP relating to draining etc prior to maintenance (x0.2). Can use E40 (70%) to lower RCR<1	0.79		0.08	0.87
ES23	Storage [CS67].	1	Daily; 8 hrs; ambient temp; samples collected at dedicated sample point	Handle substance within a closed system [E47]. No specific measures identified [E18].		0.00		0.00	0.00
ES23	Storage [CS67]. With occasional controlled exposure [CS137]	2	Daily; 8 hrs; ambient temp; samples collected at dedicated sample point	Handle substance within a closed system [E47]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11].	Dilution ventilation effectiveness 30%	0.79		0.01	0.80
ES25	Drum/batch transfers [CS8]. Non-dedicated facility [CS82].	8a	Daily; 15 min - 1 hour; ambient temp Pumped transfer from drum to holding tanks.	Use drum pumps or carefully pour from container [E64]. Avoid carrying out activities involving exposure for more than 4 hours [OC28].	TRA duration factor 1-4 hours Extra exposure modifier: 0.2 use of drum pump equates to 80% (x0.2)	0.68		0.08	0.75
ES25	Transfer from/pouring from containers [CS22].	9	Daily; >4 hours, Ambient enclosed operations, size of openings minimised, LEV to emission points	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], OR; [G9], Ensure activity is undertaken outdoors [E69].	Dilution ventilation effectiveness 30% Extra exposure modifier: 0.2 use of drum pump equates to 80% (x0.2)	0.79		0.04	0.83
ES25	Filling / preparation of equipment from drums or containers. [CS45].	9	Daily; 1-4 hours, Ambient Pumped transfer from drum to article/machine	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], OR; [G9], Ensure activity is undertaken outdoors [E69].	Dilution ventilation effectiveness 30% Extra exposure modifier: 0.2 use of drum pump equates to 80% (x0.2)	0.68		0.04	0.71
ES25	General exposures (closed systems) [CS15].	1	Daily; >4 hours, ambient	No specific measures identified [E18].		0.00		0.01	0.01
ES25	General exposures (closed systems) [CS15]. With occasional controlled exposure [CS137]	2	Daily; >4 hours, ambient	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], OR; [G9], Ensure activity is undertaken outdoors [G69]	Dilution ventilation effectiveness 30%	0.79		0.01	0.80

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Identifier ²	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		
	Contributing scenarios	PROC	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	RCR (all routes)
ES25	General exposures (open systems) [CS16]. At elevated temperature (product at 80oC)	20	Daily; >4 hours, ambient (product at 80oC)	Provide extract ventilation to points where emissions occur [E54].	TRA LEV : efficiency 80% Dilution	0.56	TRA Dermal exposure LEV reduction factor 0.1	0.00	0.56
ES25	Remanufacture of reject articles [CS19].	9	Daily; 1-4 hours, Ambient work methods, drain prior to work, retain spills	Drain down system prior to equipment break-in or maintenance [E65]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], OR; [G9], Ensure activity is undertaken outdoors [E69].	Dilution ventilation effectiveness 30% Extra exposure modifier: 0.2 SOP on draining equates to 80% reduction (x0.2)	0.79		0.00	0.79
ES25	Equipment maintenance [CS5]. Non-dedicated facility [CS82].	8a	Daily; 1-4 hours, Ambient work methods, drain prior to work, retain spills, gloves	Drain down system prior to equipment break-in or maintenance [E65]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], OR; [G9], Ensure activity is undertaken outdoors [G69]	Dilution ventilation effectiveness 30% Extra exposure modifier: 0.2 SOP on draining equates to 80% reduction (x0.2)	0.68		0.00	0.68
ES25	Mixing operations (closed systems) [CS29].	3	Daily; 1-4 hours, Ambient	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.42		0.00	0.42
ES25	Storage [CS67]	1	Daily; 8 hrs; ambient temp; samples collected at dedicated sample point	No specific measures identified [E18].		0.00		0.00	0.00
ES25	Storage [CS67] With occasional controlled exposure [CS137]	2	Daily; 8 hrs; ambient temp; samples collected at dedicated sample point	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], OR; [G9], Ensure activity is undertaken outdoors [E69].	Dilution ventilation effectiveness 30%	0.79		0.00	0.79
ES28	Bulk transfers [CS14].	8b	Daily; 15 min - 1 hour; product temp (ambient). Enclosed transfers, clear lines prior to decoupling	Transfer via enclosed lines [E52].	TRA LEV : efficiency 80% Dilution	0.56		0.04	0.60
ES28	Filling / preparation of equipment from drums or containers. [CS45].	8b	Daily; 15 mins - 1 hour; product temp (ambient) Pumped transfer from drum to holding tanks.	Transfer via enclosed lines [E52].	TRA LEV : efficiency 80% Dilution	0.56		0.04	0.60
ES28	Drill floor operations [CS116].	3	Daily; 1-4 hour; product temp (ambient); indoor Closed equipment, enclosed or vented sampling points	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).	Dilution ventilation effectiveness 30%	0.99		0.00	0.99
ES28	Drill floor operations [CS116].	4	Daily; 1-4 hour per operator; product temp (ambient), outdoors	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11]. OR Ensure operation is undertaken outdoors [E69]. Avoid carrying out activities involving exposure for more than 1 hour [OC27]	Dilution ventilation effectiveness 30% TRA duration factor 15 min-1 hour	0.39	TRA Dermal exposure LEV reduction factor 0.1	0.00	0.40
ES28	Operation of solids filtering equipment – vapour exposures [CS118].	4	Daily; >4 hours; indoor; product temperature approx. 60 °C Local exhaust ventilation	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85	TRA Dermal exposure LEV reduction factor 0.1	0.00	0.85
ES28	Operation of solids filtering equipment aerosol exposures [CS119].	4	Daily; >4 hours; indoor; product temperature approx. 60 dC Local exhaust ventilation	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].	Dilution ventilation effectiveness 70%	0.85	TRA Dermal exposure LEV reduction factor 0.1	0.00	0.85
ES28	Operation of solids filtering equipment [CS117].	8a	Daily; 15 min - 1 hour; product temp (ambient). Local exhaust ventilation	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40]. Avoid carrying out activities involving exposure for more than 1 hour [OC27].	Dilution ventilation effectiveness 70% TRA duration factor 15 min-1 hour	0.34	TRA Dermal exposure LEV reduction factor 0.1	0.01	0.35
ES28	Treatment and disposal of filtered solids [CS121].	3	Daily; 1-4 hour per operator; product temp (ambient), outdoors; Base oil content 1-5% Local exhaust ventilation	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11]. OR Ensure operation is undertaken outdoors [E69].	Dilution ventilation effectiveness 30%	0.99		0.00	0.99
ES28	Process sampling [CS2].	3	Daily; <15 mins; product temp (ambient). Indoor or Outdoor. Closed or ventilated sampling points	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11]. OR Ensure operation is undertaken outdoors [E69].	Dilution ventilation effectiveness 30%	0.99		0.00	0.99

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Identifier ²	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		
	Contributing scenarios	PROC	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	RCR (all routes)
ES28	General exposures (closed systems) [CS15].	1	Daily; >4 hours, product temp (ambient) Outdoor	No specific measures identified [E118].		0.00		0.00	0.00
ES28	Pouring from small containers [CS9].	8a	Daily; <15 mins; product temp (ambient). Indoor or Outdoor	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]. OR Ensure operation is undertaken outdoors [E69].	Dilution ventilation effectiveness 30% Extra exposure modifier: 0.2 Drum pump equivalent to 80% efficiency	0.79	TRA Dermal exposure LEV reduction factor 0.1	0.01	0.80
ES28	General exposures (open systems) [CS16].	4	Daily; >4 hours, product temp (ambient) Local exhaust ventilation; or Outdoor	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11]. OR Ensure operation is undertaken outdoors [E69]. Avoid carrying out activities involving exposure for more than 1 hour [OC27].	Dilution ventilation effectiveness 30% TRA duration factor 15 min-1 hour	0.39	TRA Dermal exposure LEV reduction factor 0.1	0.00	0.40
ES28	Equipment cleaning and maintenance [CS39].	8a	Daily; 15 min - 1 hour; product temp (ambient); collection of line waste in container Enclosed lines; retain wash down in sealed storage pending disposal or use as recycled material for subsequent	Drain down and flush system prior to equipment break-in or maintenance [E55].	Extra exposure modifier: 0.1 SoP equivalent to 90% efficiency	0.56		0.01	0.57
ES28	Batch process [CS55].	1	Continuous; daily; 8hour Enclosed process; closed/semiclosed sampling point	No specific measures identified [E118].		0.00		0.00	0.00
ES28	Batch process [CS55]. With occasional controlled exposure [CS137]	2	Continuous; daily; 8hour Enclosed process; closed/semiclosed sampling point	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11]. OR Ensure operation is undertaken outdoors [E69]. No specific measures identified [E118].	Dilution ventilation effectiveness 30%	0.79		0.01	0.80
ES29	Drum/batch transfers [CS8]. Non-dedicated facility [CS82]	8a	Daily; >4 hours, product temp (ambient) Product transfer - non-dedicated systems	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], OR: [G9] Ensure activity is undertaken outdoors [E69].	Dilution ventilation effectiveness 30% Extra exposure modifier: 0.2 Drum Pump 80% effectiveness	0.34		0.00	0.34
ES29	Drum/batch transfers [CS8]. Dedicated facility [CS81]	8b	Daily; >4 hours, product temp (elevated) Product transfer - dedicated systems	Ensure material transfers are under containment or extract ventilation [E66]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], OR: [G9] Ensure activity is undertaken outdoors [E69].	TRA LEV : efficiency 90% Dilution ventilation effectiveness 30%	0.59		0.01	0.60
ES29	Manual roller application or brushing [CS13].	10	Daily; >4 hours, product temp (ambient) Outdoor	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], OR: [G9] Ensure activity is undertaken outdoors [E69]. Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]	Dilution ventilation effectiveness 30% TRA RPE factor half mask	0.39		0.15	0.55
ES29	Spraying/fogging by machine application [CS25].	11	Daily; >4 hours, product temp (ambient); outdoors, 50% gasoil Enclosed machinery, operator remote from spray head, PPE	Ensure operation is undertaken outdoors [E69]. Provide extract ventilation to points where emissions occur [E54], OR: [G9], Operate away from sources of substance emission or release [E77]. Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]	TRA LEV : efficiency 80% Dilution ventilation effectiveness 30% TRA RPE factor half mask	0.39		0.01	0.41
ES29	Dipping, immersion and pouring [CS4].	13	Daily; >4 hours, product temp (ambient) Outdoor	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11], OR: [G9] Ensure activity is undertaken outdoors [E69]. Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]	Dilution ventilation effectiveness 30% TRA RPE factor half mask	0.39		0.08	0.47
ES29	Equipment cleaning and maintenance [CS39]	8a	Daily; 15 min - 1 hour; product temp (ambient); collection of line waste in container Retain wash down in sealed storage	Drain down and flush system prior to equipment break-in or maintenance [E55]. Provide extract ventilation to points where emissions occur [E54], OR: [G9], Operate away from sources	Dilution ventilation effectiveness 30% Extra exposure modifier: 0.2 SoP Equivalent to 80%	0.34		0.08	0.41

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EC number: 215-535-7, CAS number: 1330-20-7

Identifier ²	Operational Conditions and Risk Management Measures				Risk Characterization				
					Inhalation		Dermal		RCR (all routes)
	Contributing scenarios	PROC	OCs and typical RMMs	RMMs advised	Specific parameters	RCR Inhalation	Specific parameters	RCR Dermal	
			pending disposal. PPE	of substance emission or release [E77]. Retain drain downs in sealed storage pending disposal or for subsequent recycle [ENVT4].	efficiency				
ES31	Laboratory activities [CS36]. Small scale [CS61]. Fume-cupboard Activity [CS139].	15	Continuous; daily; > 4 hour; ambient temp. Fume cupboard or ventilated glove-box; selected disposable gloves	No specific measures identified [EI18].		0.56		0.00	0.56
ES31	Cleaning [CS47]. Rolling, Brushing [CS51]. Vessel and container cleaning [CS103]	10	Continuous; daily; 15 min - 1 hour/d; ambient temp. Controlled general ventilation (10 ACH); selected disposable gloves	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11]. Handle in a fume cupboard or under extract ventilation [E83].	TRA LEV : efficiency 80% Dilution ventilation effectiveness 30%	0.78		0.15	0.93

4 Xylenes Consumer Uses

Identified Xylenes consumer uses and generic exposure scenario

In Table 7, the identified consumer uses of the substance are presented.

If the DUs want to check compliance they have to start with the overview table7 and, based on the textual description of the different exposure scenarios, recognize their identified use and PCs associated with the specific activity done.

DUs can identify the detailed contributing scenarios that are relevant to them in section 4.2.1 for environment , 4.2.2 for workers and 4.2.3 for consumers.

DUs can check in section 4.3 the exposure and risk characterization for environment and for consumers.

For each of the exposure scenarios described, certain assumptions are made regarding operational conditions, which may not necessarily apply to all sites. It could therefore be required to do scaling in order to identify compliance with the conditions set out in the exposure scenarios.

Table 7. Identified consumer contributing Exposure Scenarios for Xylenes

Identified use	Description	Sector of use (SU)	Product Category (PC)	Environmental Release category (ERC)
ES7 Coatings	Covers the use in coatings (paints, inks, adhesives, etc) including exposures during use (including product transfer and preparation, application by brush, spray by hand or similar methods) and equipment cleaning.	21	1, 4, 8, 9, 15, 18, 23, 24, 31, 34	8a, 8d
ES10 Cleaning agents	Covers general exposures to consumers arising from the use of household products sold as washing and cleaning products, aerosols, coatings, de-icers, lubricants and air care products.	21	3, 4, 8, 9, 24, 35, 38	8a, 8d
ES13 Lubricants	Covers the consumer use of formulated lubricants in closed and open systems including transfer operations, application, operation of engines and similar articles, equipment maintenance and disposal of waste oil.	21	1, 24, 31	8a, 8d, 9a, 9b
ES17 Agrochemicals	Covers the consumer use in agrochemicals in liquid and solid forms.	21	12, 27	8a, 8d
ES20 Fuels	Covers consumer uses in liquid fuels	21	13	9a, 9b
ES26 Functional Fluids	Use of sealed items containing functional fluids e.g. transfer oils, hydraulic fluids, refrigerants	21	16, 17	9a, 9b

4.1 Consumer use of Xylenes and Xylenes containing products

Title	Consumer use of Xylenes and Xylenes containing products
Sector of Use	Consumer (SU 21)
Product category	1, 3, 4, 8, 9, 12, 13, 15, 16, 17, 18, 23, 24, 27, 31, 34, 35, 38
Environmental release category	8a, 8d, 9a, 9b
Processes, tasks, activities covered	Consumer uses relevant for Xylenes and Xylenes containing products

4.2 Operational conditions and risk management measures

4.2.1 Contributing scenario controlling environmental exposure

Assessment method	EUSES 2.1.1 using default release fractions from ESVOC SpERC: ES7 ESVOC SpERC 8.3c.v1 ES10 ESVOC SpERC 8.4c.v1 ES13 ESVOC SpERC 9.6d.v1 ES17 ESVOC SpERC 8.11b.v1 ES20 ESVOC SpERC 9.12c.v1 ES26 ESVOC SpERC 9.13c.v1
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Operational conditions

Product characteristics	The Xylenes category consists of liquids of medium volatility. The water solubility for the category is 166mg/l; the vapour pressure is 821 Pa at 20°C; and the log Kow is 3.16 and is readily biodegradable.
Frequency and duration of use	Emission days per year 365
Amount used	See ESVOC SpERC factsheet
Environmental factors not influenced by risk management	See ESVOC SpERC factsheet
Other Operational Conditions of use affecting environmental exposure	See ESVOC SpERC factsheet

Risk Management Measures

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Treat air emission to provide a typical removal efficiency of 0% [TCR7] Typical onsite wastewater treatment technology provides removal efficiency of 93.67%. [TCR 11]
Organizational measures to prevent/limit release from site	ES7, ES13, ES17: Prevent environmental discharge consistent with regulatory requirements. [OMS4] ES10, ES20: Do not apply industrial sludge to natural soils [OMS2];

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	Sludge should be incinerated, contained or reclaimed [OMS3]. ES26: Do not apply industrial sludge to natural soils [OMS2]
Conditions and measures related to waste water treatment	Estimated substance removal from wastewater via domestic sewage treatment 93.67 (%) [STP3] Assumed domestic sewage treatment plant flow 2000 (m ³ /d) [STP5]
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations [ETW3]. Specific for ES20: This substance is consumed during use and no waste of the substance is generated. [ETW 5]
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations. [ERW1] Specific for ES20: This substance is consumed during use and no waste of the substance is generated. [EWR 3]
4.2.2 Contributing scenario controlling workers exposure	
There is no worker exposure for this scenario.	
4.2.3 Contributing scenario controlling consumer exposure	
Product characteristics	Liquid
Amount used	ES7, ES10 :Unless otherwise stated, covers use amounts up to 6900g [ConsOC2]; covers skin contact area up to 857.5cm ² [ConsOC5] ES13: Unless otherwise stated, covers use amounts up to 3195g [ConsOC2]; covers skin contact area up to 468cm ² [ConsOC5] ES17: Unless otherwise stated, covers use amounts up to 0g [ConsOC2]; covers skin contact area up to 857.5cm ² [ConsOC5] ES20: Unless otherwise stated, covers use amounts up to 37500g [ConsOC2]; covers skin contact area up to 420cm ² [ConsOC5] ES26: Unless otherwise stated, covers use amounts up to 2200g [ConsOC2]; covers skin contact area up to 468cm ² [ConsOC5]
Concentration of substance in product	ES7, ES20:Unless otherwise stated, cover concentrations up to 100% [ConsOC1] ES10, ES13, ES26: Unless otherwise stated, cover concentrations up to 50% [ConsOC1] ES17: Unless otherwise stated, cover concentrations up to 4.5% [ConsOC1]
Frequency and duration of use/exposure	ES7, ES13: Unless otherwise stated, covers use frequency up to 1 times per day [ConsOC4]; covers exposure up to 6 hours per event [ConsOC14] ES10: Unless otherwise stated, covers use frequency up to 4 times per day [ConsOC4]; covers exposure up to 8 hours per event [ConsOC14] ES17: Unless otherwise stated, covers use frequency up to 1 times per day [ConsOC4]; covers exposure up to 2 hours per event [ConsOC14] ES20: Unless otherwise stated, covers use frequency up to 0.143 times per day [ConsOC4]; covers exposure up to 2 hours per event [ConsOC14] ES26: Unless otherwise stated, covers use frequency up to 0.011 times per day [ConsOC4]; covers exposure up to 0.17 hours per event [ConsOC14]
Human factors not influenced by risk management	N.A.
Other Operational Conditions affecting exposure	Unless otherwise stated assumes use at ambient temperatures [ConsOC15]; assumes use in a 20 m ³ room [ConsOC11]; assumes use with typical ventilation [ConsOC8].
Given operational conditions and risk management measures affecting consumers exposure	
<p>General measures (skin irritants- qualitative assessment): Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if direct hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off skin contamination immediately.</p> <p>General measures flammable substance <i>Substance Handling and Transfer Preventative Measures :</i> Use only with adequate ventilation. Avoid all possible sources of ignition (spark or flame). Do not puncture or incinerate container. Empty pressure vessels should be returned to the supplier. - <i>Storage:</i> Keep away from flames, sources of ignition and hot surfaces. No smoking. Take precautionary measures against static discharges. Keep container in a well-ventilated place. Keep container tightly closed.</p> <p>General measures aspiration hazard- qualitative assessment: Do not ingest. If swallowed then seek immediate medical assistance</p> <p>For the operational conditions for each contributing scenario, see Table 8.</p>	
4.3 Exposure estimation and reference to its source	
4.3.1 Exposure estimations contributing scenario for environmental exposure	
Tool used for evaluation	EUSES 2.1.1 using default release fractions from ESVOC SpERC

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When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1.

4.3.2 Exposure estimations contributing scenario for workers

There is no worker exposure for this scenario.

4.3.3 Exposure estimations contributing scenario for consumers

When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.

4.4 Guidance to DUs to evaluate whether they work inside the boundaries set by the ES

4.4.1 Guidance to DUs to check compliance with the contributing scenario for environmental exposure

Confirm that RMMs and OCs are as described or of equivalent efficiency.

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. [DSU1]

Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. [DSU2]

Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. [DSU3]

Further details on scaling and control technologies are provided in SpERC factsheet (<http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3>).[DSU4]

4.4.2 Guidance to DUs to check compliance with the contributing scenario for consumer

Predicted exposures are not expected to exceed the DNEL when the Risk Management Measures/Operational Conditions outlined in Table 8 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)
Risk characterization ratios (RCRs) were calculated by comparing the predicted exposure levels with the corresponding DNELs (derived no effect levels) (RCR = exposure level/DNEL).

Table 8.OCs, RMMs - Health - Consumer Uses

Identifier ³	Contributing scenarios	Operational Conditions	Risk Management Measures
ES7	PC1 Adhesives, sealants--Glues, hobby use	Unless otherwise stated, covers concentrations up to 30% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 35.73 cm2 [ConsOC5]; for each use event, covers use amounts up to 9g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 4.00hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC1 Adhesives, sealants--Glues DIY-use (carpet glue, tile glue, wood parquet glue)	Unless otherwise stated, covers concentrations up to 0.2% [ConsOC1]; covers use up to 1 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 35.70 cm2 [ConsOC5]; for each use event, covers use amounts up to 6390g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 6.00hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC1 Adhesives, sealants--Sealants	Unless otherwise stated, covers concentrations up to 5% [ConsOC1]; covers use up to 6 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 35.73 cm2 [ConsOC5]; for each use event, covers use amounts up to 85.05g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 4.00hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC1 Adhesives, sealants--Glue from spray	Unless otherwise stated, covers concentrations up to 25% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 35.73 cm2 [ConsOC5]; for each use event, covers use amounts up to 75g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 1.00hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC4_n:Anti-freeze and de-icing products-- Washing car window	Unless otherwise stated, covers concentrations up to 1% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 0.5g [ConsOC2]; Covers use in a one car garage (34m3) under typical ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0.02hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC4_n:Anti-freeze and de-icing products--Pouring into radiator	Unless otherwise stated, covers concentrations up to 10% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428.00 cm2 [ConsOC5]; for each use event, covers use amounts up to 2000g [ConsOC2]; Covers use in a one car garage (34m3) under typical ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0.17hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC4_n:Anti-freeze and de-icing products--Lock de-icer	Unless otherwise stated, covers concentrations up to 50% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 214.40 cm2 [ConsOC5]; for each use event, covers use amounts up to 4g [ConsOC2]; Covers use in a one car garage (34m3) under typical ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0.25hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC8_n: Biocidal products (excipient use only for solvent products)--Laundry and dish washing products	Unless otherwise stated, covers concentrations up to 5% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 857.50 cm2 [ConsOC5]; for each use event, covers use amounts up to 15g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0.50hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC8_n: Biocidal products (excipient use only for solvent products)--Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners)	Unless otherwise stated, covers concentrations up to 5% [ConsOC1]; covers use up to 128 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 857.50 cm2 [ConsOC5]; for each use event, covers use amounts up to 27g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0.33hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC8_n: Biocidal products (excipient use only for solvent products)--Cleaners, trigger sprays (all purpose cleaners,	Unless otherwise stated, covers concentrations up to 15% [ConsOC1]; covers use up to 128 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428.00 cm2 [ConsOC5]; for each use event, covers use amounts up to 35g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0.17hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.

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	sanitary products, glass cleaners)		
ES7	PC9a:Coatings and paints, fillers putties, thinners- - Waterborne latex wall paint	Unless otherwise stated, covers concentrations up to 0.5% [ConsOC1]; covers use up to 4 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428.75 cm2 [ConsOC5]; for each use event, covers use amounts up to 2760g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 2.20hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC9a:Coatings and paints, fillers putties, thinners- - Solvent rich, high solid, water borne paint	Unless otherwise stated, covers concentrations up to 2% [ConsOC1]; covers use up to 6 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428.75 cm2 [ConsOC5]; for each use event, covers use amounts up to 744g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 2.20hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC9a:Coatings and paints, fillers putties, thinners- - Aerosol spray can	Unless otherwise stated, covers concentrations up to 21% [ConsOC1]; covers use up to 2 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 215g [ConsOC2]; Covers use in a one car garage (34m3) under typical ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0.33hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC9a:Coatings and paints, fillers putties, thinners- - Removers (paint-, glue-, wall paper-, sealantremover)	Unless otherwise stated, covers concentrations up to 3% [ConsOC1]; covers use up to 3 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 857.50 cm2 [ConsOC5]; for each use event, covers use amounts up to 491g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 2.00hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC9b:Fillers, putties, plasters, modeling clay-- Fillers and putty	Unless otherwise stated, covers concentrations up to 2% [ConsOC1]; covers use up to 12 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 35.73 cm2 [ConsOC5]; for each use event, covers use amounts up to 85g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 4.00hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC9b:Fillers, putties, plasters, modeling clay-- Plasters and floor equalizers	Unless otherwise stated, covers concentrations up to 0.3% [ConsOC1]; covers use up to 2 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 857.50 cm2 [ConsOC5]; for each use event, covers use amounts up to 6900g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0.50hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC9b:Fillers, putties, plasters, modeling clay-- Modelling clay	Unless otherwise stated, covers concentrations up to 1% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 254.40 cm2 [ConsOC5]; for each use event, assumes swallowed amount of 1g [ConsOC13]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 1.00hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC9c:Finger paints --Finger paints	Unless otherwise stated, covers concentrations up to 1% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 254.40 cm2 [ConsOC5]; for each use event, assumes swallowed amount of 1.35g [ConsOC13]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0.03hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC15_n: Non-metal surface treatment products-- Waterborne latex wall paint	Unless otherwise stated, covers concentrations up to 0.5% [ConsOC1]; covers use up to 4 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428.75 cm2 [ConsOC5]; for each use event, covers use amounts up to 2760g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 2.20hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC15_n: Non-metal surface treatment products-- Solvent rich, high solid, water borne paint	Unless otherwise stated, covers concentrations up to 2.2% [ConsOC1]; covers use up to 6 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428.75 cm2 [ConsOC5]; for each use event, covers use amounts up to 744g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 2.20hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC15_n: Non-metal surface treatment products-- Aerosol spray can	Unless otherwise stated, covers concentrations up to 21% [ConsOC1]; covers use up to 2 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 215g [ConsOC2]; Covers use in a one car garage (34m3) under typical ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0.33hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC15_n: Non-metal surface treatment products-- Removers (paint-, glue-, wall paper-, sealant remover)	Unless otherwise stated, covers concentrations up to 3.4% [ConsOC1]; covers use up to 3 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 857.50 cm2 [ConsOC5]; for each use event, covers use amounts up to 491g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 2.00hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC18_n: Ink and toners--Inks and toners.	Unless otherwise stated, covers concentrations up to 10% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 71.40 cm2 [ConsOC5]; for each use event, covers use amounts up to 40g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 2.20hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC23_n: Leather tanning, dye, finishing, impregnation and care products--Polishes, wax / cream (floor, furniture, shoes)	stated PC23_n: Leather tanning, dye, finishing, impregnation and care products--Polishes, wax / cream (floor, furniture, shoes) OC Unless otherwise stated, covers concentrations up to 25% [ConsOC1]; covers use up to 29 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 430.00 cm2 [ConsOC5]; for each use event, covers use amounts up to 56g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 1.23hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC23_n: Leather tanning, dye, finishing, impregnation and care products--Polishes, spray (furniture, shoes)	Unless otherwise stated, covers concentrations up to 33% [ConsOC1]; covers use up to 8 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 430.00 cm2 [ConsOC5]; for each use event, covers use amounts up to 56g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0.33hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC24: Lubricants, greases, and release products-- Liquids	Unless otherwise stated, covers concentrations up to 100% [ConsOC1]; covers use up to 4 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 468.00 cm2 [ConsOC5]; for each use event, covers use amounts up to 2200g [ConsOC2]; Covers use in a one car garage (34m3) under typical ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0.17hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC24: Lubricants, greases, and release products-- Pastes	Unless otherwise stated, covers concentrations up to 15% [ConsOC1]; covers use up to 10 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 468.00 cm2 [ConsOC5]; for each use event, covers use amounts up to 34g [ConsOC2]; covers use in room size of 20m3[ConsOC11];	No specific RMMs identified beyond those OCs stated.
ES7	PC24: Lubricants, greases, and release products-- Sprays	Unless otherwise stated, covers concentrations up to 45% [ConsOC1]; covers use up to 6 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428.75 cm2 [ConsOC5]; for each use event, covers use amounts up to 73g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0.17hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.

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ES7	PC31:Polishes and wax blends--Polishes, wax / cream (floor, furniture, shoes)	Unless otherwise stated, covers concentrations up to 10% [ConsOC1]; covers use up to 29 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 430.00 cm2 [ConsOC5]; for each use event, covers use amounts up to 142g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 1.23hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC31:Polishes and wax blends--Polishes, spray (furniture, shoes)	Unless otherwise stated, covers concentrations up to 48% [ConsOC1]; covers use up to 8 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 430.00 cm2 [ConsOC5]; for each use event, covers use amounts up to 35g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0.33hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES7	PC34_n: Textile dyes, finishing and impregnating products--	Unless otherwise stated, covers concentrations up to 10% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 857.50 cm2 [ConsOC5]; for each use event, covers use amounts up to 115g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 1.00hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES10	PC3:Air care products--Air care, instant action (aerosol sprays)	Unless otherwise stated, covers concentrations up to 50% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 4 times/day of use[ConsOC4]; for each use event, covers use amounts up to 0.1g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0.25hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES10	PC3:Air care products--Air care, continuous action (solid and liquid)	Unless otherwise stated, covers concentrations up to 10% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 35.70 cm2 [ConsOC5]; for each use event, covers use amounts up to 0.48g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 8.00hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES10	PC4_n:Anti-freeze and de-icing products--Washing car window	Unless otherwise stated, covers concentrations up to 1% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 0.5g [ConsOC2]; Covers use in a one car garage (34m3) under typical ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0.02hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES10	PC4_n:Anti-freeze and de-icing products--Pouring into radiator	Unless otherwise stated, covers concentrations up to 10% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428.00 cm2 [ConsOC5]; for each use event, covers use amounts up to 2000g [ConsOC2]; Covers use in a one car garage (34m3) under typical ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0.17hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES10	PC4_n:Anti-freeze and de-icing products--Lock de-icer	Unless otherwise stated, covers concentrations up to 50% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 214.40 cm2 [ConsOC5]; for each use event, covers use amounts up to 4g [ConsOC2]; Covers use in a one car garage (34m3) under typical ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0.25hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES10	PC8_n: Biocidal products (excipient use only for solvent products)--Laundry and dish washing products	Unless otherwise stated, covers concentrations up to 5% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 857.50 cm2 [ConsOC5]; for each use event, covers use amounts up to 15g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0.50hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES10	PC8_n: Biocidal products (excipient use only for solvent products)--Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners)	Unless otherwise stated, covers concentrations up to 5% [ConsOC1]; covers use up to 128 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 857.50 cm2 [ConsOC5]; for each use event, covers use amounts up to 27g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0.33hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES10	PC8_n: Biocidal products (excipient use only for solvent products)--Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners)	Unless otherwise stated, covers concentrations up to 17% [ConsOC1]; covers use up to 128 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428.00 cm2 [ConsOC5]; for each use event, covers use amounts up to 35g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0.17hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES10	PC9a:Coatings and paints, fillers putties, thinners--Waterborne latex wall paint	Unless otherwise stated, covers concentrations up to 0.2% [ConsOC1]; covers use up to 4 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428.75 cm2 [ConsOC5]; for each use event, covers use amounts up to 2760g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 2.20hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES10	PC9a:Coatings and paints, fillers putties, thinners--Solvent rich, high solid, water borne paint	Unless otherwise stated, covers concentrations up to 2.3% [ConsOC1]; covers use up to 6 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428.75 cm2 [ConsOC5]; for each use event, covers use amounts up to 744g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 2.20hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES10	PC9a:Coatings and paints, fillers putties, thinners--Aerosol spray can	Unless otherwise stated, covers concentrations up to 5.5% [ConsOC1]; covers use up to 2 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 215g [ConsOC2]; Covers use in a one car garage (34m3) under typical ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0.33hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES10	PC9a:Coatings and paints, fillers putties, thinners--Removers (paint-, glue-, wall paper-, sealant-remover)	Unless otherwise stated, covers concentrations up to 3% [ConsOC1]; covers use up to 3 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 857.50 cm2 [ConsOC5]; for each use event, covers use amounts up to 491g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 2.00hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES10	PC9b:Fillers, putties, plasters, modeling clay--Fillers and putty	Unless otherwise stated, covers concentrations up to 2% [ConsOC1]; covers use up to 12 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 35.73 cm2 [ConsOC5]; for each use event, covers use amounts up to 85g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 4.00hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES10	PC9b:Fillers, putties, plasters, modeling clay--Plasters and floor equalizers	Unless otherwise stated, covers concentrations up to 0.2% [ConsOC1]; covers use up to 4 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 857.50 cm2 [ConsOC5]; for each use event, covers use amounts up to 6900g [ConsOC2]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 1.00hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES10	PC9b:Fillers, putties, plasters, modeling clay--Modelling clay	Unless otherwise stated, covers concentrations up to 1% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to	No specific RMMs identified beyond those OCs stated.

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		254.40 cm ² [ConsOC5]; for each use event, assumes swallowed amount of 1g [ConsOC13]; covers use in room size of 20m ³ [ConsOC11];	
ES10	PC9c:Finger paints --Finger paints	Unless otherwise stated, covers concentrations up to 1% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 254.40 cm ² [ConsOC5]; for each use event, assumes swallowed amount of 1.35g [ConsOC13]; covers use in room size of 20m ³ [ConsOC11];	No specific RMMs identified beyond those OCs stated.
ES10	PC24: Lubricants, greases, and release products--Liquids	Unless otherwise stated, covers concentrations up to 50% [ConsOC1]; covers use up to 4 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 468.00 cm ² [ConsOC5]; for each use event, covers use amounts up to 2200g [ConsOC2]; Covers use in a one car garage (34m ³) under typical ventilation [ConsOC10]; covers use in room size of 34m ³ [ConsOC11]; for each use event, covers exposure up to 0.17hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES10	PC24: Lubricants, greases, and release products--Pastes	Unless otherwise stated, covers concentrations up to 20% [ConsOC1]; covers use up to 10 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 468.00 cm ² [ConsOC5]; for each use event, covers use amounts up to 34g [ConsOC2]; Covers use in a one car garage (34m ³) under typical ventilation [ConsOC10]; covers use in room size of 34m ³ [ConsOC11];	No specific RMMs identified beyond those OCs stated.
ES10	PC24: Lubricants, greases, and release products--Sprays	Unless otherwise stated, covers concentrations up to 5% [ConsOC1]; covers use up to 6 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428.75 cm ² [ConsOC5]; for each use event, covers use amounts up to 73g [ConsOC2]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 0.17hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES10	PC35:Washing and cleaning products (including solvent based products)--Laundry and dish washing products	Unless otherwise stated, covers concentrations up to 5% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 857.50 cm ² [ConsOC5]; for each use event, covers use amounts up to 15g [ConsOC2]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 0.50hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES10	PC35:Washing and cleaning products (including solvent based products)--Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners)	Unless otherwise stated, covers concentrations up to 5% [ConsOC1]; covers use up to 128 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 857.50 cm ² [ConsOC5]; for each use event, covers use amounts up to 27g [ConsOC2]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 0.33hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES10	PC35:Washing and cleaning products (including solvent based products)-Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners)	Unless otherwise stated, covers concentrations up to 17% [ConsOC1]; covers use up to 128 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428.00 cm ² [ConsOC5]; for each use event, covers use amounts up to 35g [ConsOC2]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 0.17hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES10	PC38_n: Welding and soldering products, flux products-- NOTE, n_assessment not in TRA	Unless otherwise stated, covers concentrations up to 20% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 12g [ConsOC2]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 1.00hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES13	PC1:Adhesives, sealants--Glues, hobby use	Unless otherwise stated, covers concentrations up to 30% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 35.73 cm ² [ConsOC5]; for each use event, covers use amounts up to 9g [ConsOC2]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 4.00hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES13	PC1:Adhesives, sealants--Glues DIY-use (carpet glue, tile glue, wood parquet glue)	Unless otherwise stated, covers concentrations up to 0.1% [ConsOC1]; covers use up to 1 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 110.00 cm ² [ConsOC5]; for each use event, covers use amounts up to 3195g [ConsOC2]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 6.00hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES13	PC1:Adhesives, sealants--Glue from spray	Unless otherwise stated, covers concentrations up to 5% [ConsOC1]; covers use up to 6 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 35.73 cm ² [ConsOC5]; for each use event, covers use amounts up to 85.05g [ConsOC2]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 4.00hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES13	PC1:Adhesives, sealants--Sealants	Unless otherwise stated, covers concentrations up to 10% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 35.73 cm ² [ConsOC5]; for each use event, covers use amounts up to 75g [ConsOC2]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 1.00hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES13	PC24: Lubricants, greases, and release products-- Liquids	Unless otherwise stated, covers concentrations up to 50% [ConsOC1]; covers use up to 4 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 468.00 cm ² [ConsOC5]; for each use event, covers use amounts up to 2200g [ConsOC2]; Covers use in a one car garage (34m ³) under typical ventilation [ConsOC10]; covers use in room size of 34m ³ [ConsOC11]; for each use event, covers exposure up to 0.17hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES13	PC24: Lubricants, greases, and release products-- Pastes	Unless otherwise stated, covers concentrations up to 20% [ConsOC1]; covers use up to 10 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 468.00 cm ² [ConsOC5]; for each use event, covers use amounts up to 34g [ConsOC2]; covers use in room size of 20m ³ [ConsOC11];	No specific RMMs identified beyond those OCs stated.
ES13	PC24: Lubricants, greases, and release products-- Sprays	Unless otherwise stated, covers concentrations up to 8% [ConsOC1]; covers use up to 6 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428.75 cm ² [ConsOC5]; for each use event, covers use amounts up to 73g [ConsOC2]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 0.17hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES13	PC31:Polishes and wax blends--Polishes, wax / cream (floor, furniture, shoes)	Unless otherwise stated, covers concentrations up to 5% [ConsOC1]; covers use up to 29 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 430.00 cm ² [ConsOC5]; for each use event, covers use amounts up to 142g [ConsOC2]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 1.23hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES13	PC31:Polishes and wax blends--Polishes, spray (furniture, shoes)	Unless otherwise stated, covers concentrations up to 18% [ConsOC1]; covers use up to 8 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 430.00 cm ² [ConsOC5]; for each use event, covers use amounts up to 35g [ConsOC2]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 0.33hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES17	PC12:Fertilizers--Lawn and	Unless otherwise stated, covers concentrations up to 4.5% [ConsOC1]; covers use up to 365	No specific RMMs identified

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	garden preparations	days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 857.50 cm ² [ConsOC5]; for each use event, assumes swallowed amount of 0.3g [ConsOC13]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 2.00hr/event[ConsOC14];	beyond those OCs stated.
ES17	PC27_n: Plant protection products	Unless otherwise stated, covers concentrations up to 4.5% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 857.50 cm ² [ConsOC5]; for each use event, assumes swallowed amount of 0.3g [ConsOC13]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 2.00hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES20	PC13:Fuels--Liquid - subcategories added: Automotive Refuelling	Unless otherwise stated, covers concentrations up to 38% [ConsOC1]; covers use up to 52 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 210.00 cm ² [ConsOC5]; for each use event, covers use amounts up to 37500g [ConsOC2]; covers outdoor use [ConsOC12]; covers use in room size of 100m ³ [ConsOC11]; for each use event, covers exposure up to 0.05hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES20	PC13:Fuels--Liquid - subcategories added: Scooter Refuelling	Unless otherwise stated, covers concentrations up to 38% [ConsOC1]; covers use up to 52 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 210.00 cm ² [ConsOC5]; for each use event, covers use amounts up to 3750g [ConsOC2]; covers outdoor use [ConsOC12]; covers use in room size of 100m ³ [ConsOC11]; for each use event, covers exposure up to 0.03hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES20	PC13:Fuels--Liquid - subcategories added: Garden Equipment - Use	Unless otherwise stated, covers concentrations up to 100% [ConsOC1]; covers use up to 26 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 750g [ConsOC2]; covers outdoor use [ConsOC12]; covers use in room size of 100m ³ [ConsOC11]; for each use event, covers exposure up to 2.00hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES20	PC13:Fuels--Liquid (subcategories added): Garden Equipment - Refueling	Unless otherwise stated, covers concentrations up to 38% [ConsOC1]; covers use up to 26 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 420.00 cm ² [ConsOC5]; for each use event, covers use amounts up to 750g [ConsOC2]; Covers use in a one car garage (34m ³) under typical ventilation [ConsOC10]; covers use in room size of 34m ³ [ConsOC11]; for each use event, covers exposure up to 0.03hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES20	PC13:Fuels--Liquid - subcategories added: Lamp oil	Unless otherwise stated, covers concentrations up to 100% [ConsOC1]; covers use up to 52 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 210.00 cm ² [ConsOC5]; for each use event, covers use amounts up to 100g [ConsOC2]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 0.01hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES26	PC16_n: Heat transfer fluids--Liquids	Unless otherwise stated, covers concentrations up to 50% [ConsOC1]; covers use up to 4 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 468.00 cm ² [ConsOC5]; for each use event, covers use amounts up to 2200g [ConsOC2]; Covers use in a one car garage (34m ³) under typical ventilation [ConsOC10]; covers use in room size of 34m ³ [ConsOC11]; for each use event, covers exposure up to 0.17hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.
ES26	PC17_n: Hydraulic fluids--Liquids	Unless otherwise stated, covers concentrations up to 50% [ConsOC1]; covers use up to 4 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 468.00 cm ² [ConsOC5]; for each use event, covers use amounts up to 2200g [ConsOC2]; Covers use in a one car garage (34m ³) under typical ventilation [ConsOC10]; covers use in room size of 34m ³ [ConsOC11]; for each use event, covers exposure up to 0.17hr/event[ConsOC14];	No specific RMMs identified beyond those OCs stated.

³the number in the exposure scenario corresponds to the numbering in the CSR

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