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

1.1. Product identifier

Product form : Substance
Trade name/designation : STRAIGHT RUN GASOLINE
EC Index : 649-270-00-7
EC-No. : 271-727-0
CAS-No. : 68606-11-1
REACH registration No. : 01-2119494191-38-0010
Product group : Trade product

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

1.2.1. Relevant identified uses

Main use category : Industrial use,Professional use
Use of the substance/mixture : Fuels
see attached exposure scenario.

Title	Use descriptors
Use as an intermediate (ES Ref.: 02e (Benz 20%-79%))	SU8, SU9, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC6a, ESVOC SPERC 6.1a.v1
Distribution (ES Ref.: 03e (Benz 20%-79%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1
Use as an intermediate (ES Ref.: 02e (Benz 20%-79%))	SU3, SU8, SU9, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC6a, ESVOC SPERC 6.1a.v1
Distribution (ES Ref.: 03e (Benz 20%-79%))	SU3, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1
Distribution (ES Ref.: 03e (Benz 20%-79%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1
Distribution (ES Ref.: 03e (Benz 20%-79%))	SU3, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1
Use as an intermediate (ES Ref.: 02b (Benz 0%-1%))	SU8, SU9, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, PROC28, ERC6a, ESVOC SPERC 6.1a.v1
Use as an intermediate Classified as: (H350, H340, H361f and/or H361d) Benzene content : 1% - 5%. (ES Ref.: 02c (Benz 1%-5%))	SU8, SU9, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, PROC28, ERC6a, ESVOC SPERC 6.1a.v1
Use as an intermediate (ES Ref.: 02d (Benz 5%-20%))	SU8, SU9, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC6a, ESVOC SPERC 6.1a.v1
Distribution (ES Ref.: 03b (Benz 0%-1%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1
Distribution of substance Classified as: (H350, H340, H361f and/or H361d) Benzene content : 1% - 5%. (ES Ref.: 03c (Benz 1%-5%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1
Distribution (ES Ref.: 03d (Benz 5%-20%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1
Uses in coatings (ES Ref.: 05b (Benz 0%-1%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC4, ESVOC SPERC 4.3a.v1
Use in cleaning agents (ES Ref.: 07b (Benz 0%-1%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, ERC4, ESVOC SPERC 4.4a.v1
Use as a fuel	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16, ERC7, ESVOC SPERC

(ES Ref.: 10b (Benz 0%-1%))	7.12a.v1
Use in rubber production and processing (ES Ref.: 13b (Benz 0%-1%))	SU10, SU11, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15, ERC4, ERC6d, ESVOC SPERC 4.19.v1
Use as a fuel (ES Ref.: 11b (Benz 0%-1%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16, ERC9a, ERC9b, ESVOC SPERC 9.12b.v1
Use as a fuel (ES Ref.: 12b (Benz 0%-1%))	PC13, ERC9a, ERC9b, ESVOC SPERC 9.12c.v1
Formulation & (re)packing of substances and mixtures (ES Ref.: 04 (Benz 20%-79%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC2, ESVOC SPERC 2.2.v1
Formulation & (re)packing of substances and mixtures (ES Ref.: 04 (Benz 20%-79%))	SU3, SU10, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC2, ESVOC SPERC 2.2.v1
Formulation & (re)packing of substances and mixtures (ES Ref.: 04b (Benz 0%-1%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC2, ESVOC SPERC 2.2.v1
Formulation & (re)packing of substances and mixtures (ES Ref.: 04c (Benz 1%-5%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC2, ESVOC SPERC 2.2.v1
Formulation & (re)packing of substances and mixtures (ES Ref.: 04d (Benz 5%-20%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC2, ESVOC SPERC 2.2.v1

Full text of use descriptors: see section 16

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

Supplier
NIS a.d. Novi Sad
Narodnog Fronta 12
21000 Novi Sad
Serbia
T + 381 (0) 21 481 1111
REACHNIS@nis.rs

Only Representative
BENS Consulting d.o.o.
Špruha 19
1236 Trzin
Slovenija
T +386 41 979 800
info@bens-consulting.eu

1.4. Emergency telephone number

Emergency number : + 381 (0) 21 481 1111
Only available during office hours.

Country/Area	Organisation/Company	Address	Emergency number	Comment
Ireland	National Poisons Information Centre Beaumont Hospital	PO Box 1297 Beaumont Road 9 Dublin	+353 1 809 2566 (Healthcare professionals-24/7) +353 1 809 2166 (public, 8am - 10pm, 7/7)	

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Flammable liquids, Category 1 H224

Skin corrosion/irritation, Category 2	H315
Germ cell mutagenicity, Category 1B	H340
Carcinogenicity, Category 1B	H350
Reproductive toxicity, Category 2	H361fd
Specific target organ toxicity – Single exposure, Category 3, Narcosis	H336
Aspiration hazard, Category 1	H304
Hazardous to the aquatic environment – Chronic Hazard, Category 2	H411

Full text of H- and EUH-statements: see section 16

Adverse physicochemical, human health and environmental effects

No additional information available

2.2. Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP) :

GHS02 GHS07 GHS08 GHS09

Signal word : Danger

Hazard statements (CLP) :
H224 - Extremely flammable liquid and vapour.
H304 - May be fatal if swallowed and enters airways.
H315 - Causes skin irritation.
H336 - May cause drowsiness or dizziness.
H340 - May cause genetic defects.
H350 - May cause cancer.
H361fd - Suspected of damaging fertility. Suspected of damaging the unborn child.
H411 - Toxic to aquatic life with long lasting effects.

Precautionary statements (CLP) :
P201 - Obtain special instructions before use.
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P235 - Keep cool.
P273 - Avoid release to the environment.
P280 - Wear protective gloves, protective clothing, eye protection, face protection.
P301+P310+P331 - IF SWALLOWED: Immediately call a POISON CENTER, a doctor. Do NOT induce vomiting.
P308+P313 - IF exposed or concerned: Get medical advice/attention.
P391 - Collect spillage.
P403+P233 - Store in a well-ventilated place. Keep container tightly closed.
P501 - Dispose of contents and container to an approved waste disposal plant.

Listed on CLP Annex VI : EC Index-No.: 649-270-00-7

2.3. Other hazards

Other hazards : Vapours can form explosive mixtures with air. Results of PBT and vPvB assessment : This substance does not meet the PBT/vPvB criteria of REACH, annex XIII. as appropriate : Product may release Hydrogen Sulphide: A specific assessment of inhalation risks from the presence of hydrogen sulphide in tank headspaces, confined spaces, product residue, tank waste and waste water, and unintentional releases should be made to help determine controls appropriate to local circumstances.

The substance is not included in the list established in accordance with Article 59(1) of REACH for having endocrine disrupting properties, or is not identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605

SECTION 3: Composition/information on ingredients

3.1. Substances

Substance name : STRAIGHT RUN GASOLINE
CAS-No. : 68606-11-1
EC-No. : 271-727-0
EC Index : 649-270-00-7

Substance name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
Gasoline, straight run, topping plant	CAS-No.: 68606-11-1 EC-No.: 271-727-0 EC Index: 649-270-00-7	≤ 100	Flam. Liq. 1, H224 Skin Irrit. 2, H315 Muta. 1B, H340 Carc. 1B, H350 Repr. 2, H361f STOT SE 3, H336 Asp. Tox. 1, H304 Aquatic Chronic 2, H411
toluene	CAS-No.: 108-88-3 EC-No.: 203-625-9 EC Index: 601-021-00-3	≥ 3	Flam. Liq. 2, H225 Skin Irrit. 2, H315 Repr. 2, H361d STOT SE 3, H336 STOT RE 2, H373 Asp. Tox. 1, H304
n-hexane	CAS-No.: 110-54-3 EC-No.: 203-777-6 EC Index: 601-037-00-0	≥ 3	Flam. Liq. 2, H225 Skin Irrit. 2, H315 Repr. 2, H361f STOT SE 3, H336 STOT RE 2, H373 Asp. Tox. 1, H304 Aquatic Chronic 2, H411

Substance name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
benzene	CAS-No.: 71-43-2 EC-No.: 200-753-7 EC Index: 601-020-00-8	≥ 1	Flam. Liq. 2, H225 Skin Irrit. 2, H315 Eye Irrit. 2, H319 Muta. 1B, H340 Carc. 1A, H350 STOT RE 1, H372 Asp. Tox. 1, H304

Specific concentration limits:

Substance name	Product identifier	Specific concentration limits (%)
n-hexane	CAS-No.: 110-54-3 EC-No.: 203-777-6 EC Index: 601-037-00-0	(5 ≤ C < 100) STOT RE 2; H373

Full text of H- and EUH-statements: see section 16

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

Additional advice : First aider: Pay attention to self-protection!. Concerning personal protective equipment to use, see section 8. Never give anything by mouth to an unconscious person. In case of doubt or persistent symptoms, consult always a physician. Show this safety data sheet to the doctor in attendance.

Inhalation : Remove casualty to fresh air and keep warm and at rest. Give oxygen or artificial respiration if necessary. In case of doubt or persistent symptoms, consult always a physician.

Skin contact : Remove contaminated clothing and shoes. Gently wash with plenty of soap and water. Wash contaminated clothing before reuse. In case of doubt or persistent symptoms, consult always a physician.

Eyes contact : Rinse immediately carefully and thoroughly with eye-bath or water. Remove contact lenses, if present and easy to do. Continue rinsing. In case of doubt or persistent symptoms, consult always a physician.

Ingestion : Rinse mouth thoroughly with water. Never give anything by mouth to an unconscious person. Do NOT induce vomiting. Get immediate medical advice/attention.

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

Inhalation : May cause drowsiness or dizziness. The following symptoms may occur: Mental confusion. Cough. Headache.

Skin contact : Causes skin irritation. The following symptoms may occur: Redness, pain. Repeated exposure may cause skin dryness or cracking.

Eyes contact : Contact with eyes may cause irritation. The following symptoms may occur: Redness, pain.

Ingestion : May be fatal if swallowed and enters airways.

Chronic symptoms : May cause genetic defects. May cause cancer. Suspected of damaging fertility. Suspected of damaging the unborn child.

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

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : carbon dioxide (CO2), powder, alcohol-resistant foam, water spray.

Unsuitable extinguishing media : Strong water jet.

5.2. Special hazards arising from the substance or mixture

Specific hazards : Extremely flammable liquid and vapour. Vapours may form explosive mixture with air. Vapours are heavier than air and may spread along floors. Vapours are heavier than air and may travel considerable distance to an ignition source and flash back to source of vapours. Heating will cause a rise in pressure with a risk of bursting.

Hazardous decomposition products in case of fire : Carbon oxides (CO, CO2). Sulphur oxides. sulphuric acid. Hydrogen sulfide.

5.3. Advice for firefighters

Firefighting instructions : Evacuate area. Use water spray or fog for cooling exposed containers. Contain the extinguishing fluids by bunding. Prevent fire fighting water from entering the environment.

Protection during firefighting : Do not attempt to take action without suitable protective equipment. Self-contained breathing apparatus.

Other information : Do not allow run-off from fire-fighting to enter drains or water courses. Dispose of waste in accordance with environmental legislation.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

For non-emergency personnel : Evacuate unnecessary personnel. Keep upwind. Provide adequate ventilation. Wear recommended personal protective equipment. Concerning personal protective equipment to use, see section 8. Do not breathe vapours. Avoid contact with skin, eyes and clothing. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Ensure equipment is adequately earthed. Use explosion-proof equipment. Use only non-sparking tools. Product may release Hydrogen Sulphide: A specific assessment of inhalation risks from the presence of hydrogen sulphide in tank headspaces, confined spaces, product residue, tank waste and waste water, and unintentional releases should be made to help determine controls appropriate to local circumstances.

6.1.2. For emergency responders

For emergency responders : Ensure procedures and training for emergency decontamination and disposal are in place. Concerning personal protective equipment to use, see section 8.

6.2. Environmental precautions

Do not allow to enter into surface water or drains. Notify authorities if product enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

Methods for cleaning up : Stop leak if safe to do so. Dam up the liquid spill. Small quantities of liquid spill: take up in non-combustible absorbent material and shovel into container for disposal. Recover large spills by pumping (use an explosion proof or hand pump). Place in a suitable container for disposal in accordance with the waste regulations (see Section 13). This material and its container must be disposed of in a safe way, and as per local legislation. Cover the spilled liquid product with foam to slow down evaporation.

6.4. Reference to other sections

Concerning personal protective equipment to use, see section 8 . Concerning disposal elimination after cleaning, see section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Provide adequate ventilation. Use personal protective equipment as required. Concerning personal protective equipment to use, see section 8. Do not breathe vapours. Avoid contact with skin, eyes and clothing. Take any precaution to avoid mixing with Incompatible materials, Refer to Section 10 on Incompatible Materials. Ensure proper process control to avoid excess waste discharge (temperature, concentration, pH, time). Avoid release to the environment. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Ground/bond container and receiving equipment. Use explosion-proof equipment. Use only non-sparking tools. Product may release Hydrogen Sulphide: A specific assessment of inhalation risks from the presence of hydrogen sulphide in tank headspaces, confined spaces, product residue, tank waste and waste water, and unintentional releases should be made to help determine controls appropriate to local circumstances.

Hygiene measures : Keep good industrial hygiene. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Do not eat, drink or smoke when using this product. Keep away from food, drink and animal feedingstuffs. Remove contaminated clothes. Separate working clothes from town clothes. Launder separately. Wash contaminated clothing before reuse.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Storage of flammable liquids. Keep container tightly closed. Store in a dry, cool and well-ventilated place. Do not store near or with any of the incompatible materials listed in section 10. Bund storage facilities to prevent soil and water pollution in the event of spillage.

Incompatible materials : Strong acids and oxidizing agents. Strong bases. Halogenated compounds.

Heat and ignition sources : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Protect from sunlight.

Special rules on packaging : Containers which are opened should be properly resealed and kept upright to prevent leakage. Keep in properly labelled containers.

Packaging materials : Keep only in the original container. Suitable material: Mild steel, Stainless steel. Unsuitable material: Synthetic material.

Germany

German storage class (LGK) : LGK 3 - Flammable liquids

Switzerland

Storage class (LK) : LK 3 - Flammable liquids

7.3. Specific end use(s)

see attached exposure scenario.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

8.1.1 National occupational exposure and biological limit values

benzene (71-43-2)	
EU - Indicative Occupational Exposure Limit (IOEL)	
IOEL TWA	0,66 mg/m³ (limit value after 5 April 2026) 1,65 mg/m³ (limit value from 5 April 2024 until 5 April 2026) 3,25 mg/m³ (limit value until 5 April 2024)
	0,2 ppm (limit value after 5 April 2026) 0,5 ppm (limit value from 5 April 2024 until 5 April 2026) 1 ppm (limit value until 5 April 2024)
Remark	Present (Substantial contribution to the total body burden via dermal exposure possible)
EU - Binding Occupational Exposure Limit (BOEL)	
Local name	Benzene
BOEL TWA	0,66 mg/m³ (Limit value from 5 April 2026) 1,65 mg/m³ (Limit value until 5 April 2026)
	0,2 ppm (Limit value from 5 April 2026) 0,5 ppm (Limit value until 5 April 2026)
Notes	Skin (Substantial contribution to the total body burden via dermal exposure possible)
Regulatory reference	DIRECTIVE (EU) 2022/431 (amending Directive 2004/37/EC)
EU - Biological Limit Value (BLV)	
Local name	Benzene
BLV	28 µg/l Parameter: benzene - Medium: blood - Sampling time: immediately end of shift 46 µg/g creatinine Parameter: phenylmercapturic - Medium: urine - Sampling time: end of exposure/shift
Regulatory reference	SCOEL List of recommended health-based BLVs and BGVs
Albania - Occupational Exposure Limits	
Local name	Benzeni

benzene (71-43-2)	
OEL TWA	3,25 mg/m³
	1 ppm
Remark	Lëkurë (Kontribut thelbësor në barrën e përgjithshme të trupit nëpërmjet ekspozimit të mundshëm përmes lëkurës)
Regulatory reference	VENDIM Nr. 520, datë 6.8.2014 PËR MIRATIMIN E RREGULLORES "PËR MBROJTJEN E SIGURISË DHE SHËNDETIT TË PUNËMARRËSVE NGA RISQET E LIDHURA ME KANCEROGJENËT DHE MUTAGJENËT NË PUNË"
Austria - Occupational Exposure Limits	
Local name	Benzol
TRK (OEL TWA)	3,2 mg/m³
	1 ppm
TRK (OEL STEL)	12,8 mg/m³ (4x 15(Miw) min)
	4 ppm (4x 15(Miw) min)
Remark	H. Krebserzeugend: III A1
OEL chemical category	Skin notation, Group A1 Carcinogen
Regulatory reference	BGBl. II Nr. 156/2021
Austria - Biological limit values	
Local name	Benzol
BLV	10 g/dl Parameter: Hämoglogin - Untersuchungsmaterial: Blut - Mitarbeiter/innen: Frauen 12 g/dl Parameter: Hämoglogin - Untersuchungsmaterial: Blut - Mitarbeiter/innen: Männer 1,6 mg/l Parameter: t,t-Muconsäure - Untersuchungsmaterial: Harn
Remark	Eignung: Blut: MCV: 79-97 fl; Erythrozyten: 3,2 Millionen/µl für Frauen, 3,8 Millionen/µl für Männer; Leukozyten: unterer Grenzwert: 4.000/µl (davon 2.000 Granulozyten) bzw. 3.700/µl bei nicht pathologischem Differentialblutbild, oberer Grenzwert: 13.000/µl; Thrombozyten: 150.000 bzw. 130.000/µl bei nicht pathologischem Differentialblutbild Eignung mit vorzeitiger Folgeuntersuchung: Bei Unterschreiten bzw. Überschreiten der Grenzwerte im Blut (ausgenommen Differentialblutbild) oder im Harn sowie bei atypischen Morphologien im Blut. Der Zeitabstand zwischen den Untersuchungen beträgt bei Eignung: ein Jahr; bei Arbeiten in Kokereien: drei Monate, für die Blutuntersuchung sechs Monate; bei Eignung mit vorzeitiger Folgeuntersuchung: drei Monate; bei Arbeiten in Kokereien: sechs Wochen
Regulatory reference	Verordnung über die Gesundheitsüberwachung am Arbeitsplatz 2017 (VGÜ 2017)
Belgium - Occupational Exposure Limits	
Local name	Benzène # Benzeen
OEL TWA	0,66 mg/m³ (à partir du 5 avril 2026) # (vanaf 5 april 2026) 1,65 mg/m³ (jusqu'au 5 avril 2026) # (tot 5 april 2026)
	0,2 ppm (à partir du 5 avril 2026) # (vanaf 5 april 2026) 0,5 ppm (jusqu'au 5 avril 2026) # (tot 5 april 2026)

benzene (71-43-2)	
Remark	C: la mention “C” signifie que l’agent en question relève du champ d’application du titre 2 relatif aux agents cancérigènes, mutagènes et reprotoiques du livre VI du code de bien-être au travail, D: la mention “D” signifie que la résorption de l’agent, via la peau, les muqueuses ou les yeux, constitue une partie importante de l’exposition totale. Cette résorption peut se faire tant par contact direct que par présence de l’agent dans l’air. # C: de vermelding “C” betekent dat het betrokken agens valt onder het toepassingsgebied van titel 2 betreffende kankerverwekkende, mutagene en reprotoxische agentia van boek VI van de codex over het welzijn op het werk, D: de vermelding “D” betekent dat de opname van het agens via de huid, de slijmvliezen of de ogen een belangrijk deel van de totale blootstelling vormt. Deze opname kan het gevolg zijn van zowel direct contact als zijn aanwezigheid in de lucht.
OEL chemical category	Skin, Carcinogen, Skin notation significant contribution to the total accumulation in the body through skin exposure is possible
Regulatory reference	Koninklijk besluit/Arrêté royal 16/11/2023
Bulgaria - Occupational Exposure Limits	
Local name	Бензен
OEL TWA	0,66 mg/m³ (Измерено като елементарен въглерод)
	0,2 ppm (Измерено като елементарен въглерод)
Remark	Кожа (Възможен е значителен принос за общото натрупване в тялото чрез кожна експозиция)
Regulatory reference	Наредба № 10 от 26.09.2003 г. за защита на работещите от рискове, свързани с експозиция на канцерогени и мутагени при работа (изм. и доп. ДВ. бр. 28 от 2 Април 2024г.)
Bulgaria - Biological limit values	
Local name	Бензен
BLV	2 mg/l Parameter: Trans, trans-Muconic acid - Medium: urine - Sampling time: at the end of exposure or end of work shift (possible significant absorption through the skin) 0,045 mg/g creatinine Parameter: S-Phenyl Mercapturic acid - Medium: urine - Sampling time: at the end of exposure or end of work shift (possible significant absorption through the skin)
Regulatory reference	Наредба № 10 от 26.09.2003 г. за защита на работещите от рискове, свързани с експозиция на канцерогени и мутагени при работа (изм. и доп. ДВ. бр. 28 от 2 Април 2024г.)
Croatia - Occupational Exposure Limits	
Local name	Benzen
GVI (OEL TWA)	1,65 mg/m³ do 5. travnja 2026. 0,66 mg/m³
	0,5 ppm do 5. travnja 2026. 0,2 ppm
Remark	Direktiva: 2022/431/EU. Napomena: Koža (razvrstana kao tvar koja nadražuje kožu (H315)), Karc 1A, Muta 1B

benzene (71-43-2)	
OEL chemical category	Carcinogen Category 1A, Skin notation significant contribution to the total body load possible exposure through the skin, Mutagen Category 1B
Regulatory reference	Pravilnik o zaštiti radnika od izloženosti opasnim kemikalijama na radu, graničnim vrijednostima izloženosti i biološkim graničnim vrijednostima (NN 148/2023)
Croatia - Biological limit values	
Local name	Benzen
BLV	28 µg/l Parameter: Benzene - Medium: blood - Sampling time: right at the end of the work shift 46 µg/g creatinine Parameter: S-Phenylmercapturic acid - Medium: urine - Sampling time: at the end of the work shift (calculated on the average Creatinine value of 1.2 g/L urine)
Regulatory reference	Pravilnik o zaštiti radnika od izloženosti opasnim kemikalijama na radu, graničnim vrijednostima izloženosti i biološkim graničnim vrijednostima (NN 91/2018)
Cyprus - Occupational Exposure Limits	
Local name	Βενζόλιο
OEL TWA	0,66 mg/m³ 1,65 mg/m³ (Οριακή τιμή έως την 5η Απριλίου 2026)
	0,2 ppm 0,5 ppm (Οριακή τιμή έως την 5η Απριλίου 2026)
OEL chemical category	Skin-potential for cutaneous absorption
Remark	Δέρμα. Καρκινογόνοι και Μεταλλαξιογόνοι Παράγοντες
Regulatory reference	Κανονισμοί του 2023 (Κ.Δ.Π. 220/2023)
Czech Republic - Occupational Exposure Limits	
Local name	Benzen
PEL (OEL TWA)	3,25 mg/m³ 0,66 mg/m³ (od 5. 4. 2026)
	1 ppm 0,2 ppm (od 5. 4. 2026)
NPK-P (OEL C)	10 mg/m³
	3,08 ppm
Remark	B - u látky je zaveden biologický expoziční test (BET) v moči nebo krvi, D - při expozici se významně uplatňuje pronikání faktoru kůží, I - dráždí sliznice (oči, dýchací cesty) resp. kůži, K - karcinogen kategorie 1A a 1B (s větou H350, H350i), M - mutagen v zárodečných buňkách kategorie 1A a 1B (s větou H340), P - u látky nelze vyloučit závažné pozdní účinky (s větou H372, H373).
OEL chemical category	Potential for cutaneous absorption
Regulatory reference	Nařízení vlády č. 361/2007 Sb. (Předpis 330/2023 Sb.)
Czech Republic - Biological limit values	
Local name	Benzen

benzene (71-43-2)	
BLV	0,024 µmol/mmol Creatinine Parameter: S-Phenylmercapturic acid - Medium: urine - Sampling time: end of shift 0,05 mg/g creatinine Parameter: S-Phenylmercapturic acid - Medium: urine - Sampling time: end of shift 1,2 µmol/mmol Creatinine Parameter: trans,trans-Muconic acid - Medium: urine - Sampling time: end of shift 1,5 mg/g creatinine Parameter: trans,trans-Muconic acid - Medium: urine - Sampling time: end of shift
Regulatory reference	Vyhláška č. 107/2013 Sb. (kterou se mění vyhláška č. 432/2003 Sb.)
Denmark - Occupational Exposure Limits	
Local name	Benzen
OEL TWA	0,66 mg/m³ Fra den 5. april 2026 1,6 mg/m³
	0,2 ppm Fra den 5. april 2026 0,5 ppm
OEL STEL	3,2 mg/m³
	1 ppm
Remark	E (betyder, at stoffet har en EF-grænseværdi); H (betyder, at stoffet kan optages gennem huden); K (betyder, at stoffet anses for at kunne være kræftfremkaldende)
OEL chemical category	Potential for cutaneous absorption
Regulatory reference	BEK nr 291 af 19/03/2024
Estonia - Occupational Exposure Limits	
Local name	Benseen
OEL TWA	0,66 mg/m³ (kehtib alates 06.04.2026) 1,5 mg/m³ (kehtib kuni 05.04.2026)
	0,2 ppm (kehtib alates 06.04.2026) 0,5 ppm (kehtib kuni 05.04.2026)
OEL STEL	9 mg/m³ (kehtib kuni 05.04.2026)
	3 ppm (kehtib kuni 05.04.2026)
Remark	A (Naha kaudu kergesti imenduv aine), C (Kantserogeenne aine)
OEL chemical category	Skin notation, Carcinogenic substance
Regulatory reference	Vabariigi Valitsuse 20. märtsi 2001. a määruse nr 105 (RT I, 02.04.2024, 13)
Finland - Occupational Exposure Limits	
Local name	Bentseeni
HTP (OEL TWA)	3,25 mg/m³ (Työssä tapahtuvan altistumisen sitovat raja-arvot)
	1 ppm (Työssä tapahtuvan altistumisen sitovat raja-arvot)
BOEL TWA	0,66 mg/m³ (Raja-arvoa sovelletaan 5 päivästä huhtikuuta 2026) 1,65 mg/m³
	0,2 ppm (Raja-arvoa sovelletaan 5 päivästä huhtikuuta 2026) 0,5 ppm

benzene (71-43-2)	
Remark	Iho. Syöpäsairauden vaaraa aiheuttavat ja perimää vaurioittavat tekijät
OEL chemical category	Potential for cutaneous absorption
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveysministeriö). Valtioneuvoston asetus (113/2024)
France - Occupational Exposure Limits	
Local name	Benzène
VME (OEL TWA)	0,66 mg/m³ (À partir du 5 avril 2026) 1,65 mg/m³
	0,2 ppm (À partir du 5 avril 2026) 0,5 ppm
Remark	Valeurs règlementaires contraignantes. Cancérogène de catégorie 1A, Mutagène de catégorie 1B, Risque de pénétration percutanée
OEL chemical category	Carcinogen category 1A, Mutagen category 1B, Risk of cutaneous absorption
Regulatory reference	Article R4412-149 du Code du travail (réf.: INRS ED 6443, 2022; Outil65; Décret n° 2019-1487; Décret n° 2020-1546; Décret n° 2021-434; Décret n° 2021-1849; Décret n° 2024-307)
France - Biological limit values	
BLV	Parameter: Muconic acid - Medium: urine - Sampling time: end of shift (per the Authority, the values for this substance must be decided and/or determined on a case by case basis. Guidance for the calculation of and interpretation of values is provided in the source)
Germany - Occupational Exposure Limits (TRGS 910)	
Local name	Benzol
Acceptable concentration (Volume conc.)	0,06 ppm
Acceptable concentration (Weight conc.)	0,2 mg/m³
Notes	b) Akzeptanzkonzentration assoziiert mit Risiko 4:10000
Tolerance concentration (Volume conc.)	0,6 ppm
Tolerance concentration (Weight conc.)	1,9 mg/m³
Tolerance concentration excess factor	8
Remark	H - Hautresorptiv
Equivalence value for acceptable concentration	0,8 µg/l (3) 3 µg/g creatinine (3)
Equivalence value for tolerance concentration	5 µg/l 500 µg/g creatinine 25 µg/g creatinine
Parameter	Benzol Trans, trans-Muconsäure S-Phenylmerkaptursäure
Testing material	U - Urin
Testing time	b - Expositionsende bzw. Schichtende

benzene (71-43-2)	
Regulatory reference	TRGS 910
Gibraltar - Occupational Exposure Limits	
Local name	Benzene
OEL TWA	3,25 mg/m³
	1 ppm
Remark	Skin
Regulatory reference	Factories (Control of Carcinogens and mutagens at Work) Regulations 2003 (LN. 2020/47)
Greece - Occupational Exposure Limits	
Local name	Βενζόλιο
OEL TWA	3,25 mg/m³
	1 ppm
OEL chemical category	skin - potential for cutaneous absorption
Remark	Δέρμα (Είναι πιθανή η σημαντική αύξηση της συνολικής επιβάρυνσης του λόγω δερνατικής έκθεσης)
Regulatory reference	Π.Δ. 26/2020 - Σχετικά με την προστασία των εργαζομένων από τους κινδύνους που συνδέονται με την έκθεση σε καρκινογόνους ή μεταλλαξιγόνους παράγοντες κατά την εργασία
Hungary - Occupational Exposure Limits	
Local name	BENZOL
AK (OEL TWA)	1,65 mg/m³
Remark	k(1A) (rákkeltő), b (Bőrön át is felszívódik), i (ingerlő anyag, amely izgatja a bőrt, nyálkahártyát, szemet vagy mindhármat), BEM (biológiai expozíciós mutató); EU6 (2019/130 EU irányelvben közölt érték); T (Azok az anyagok, amelyek egészségkárosító hatása TARTÓS expozíciót követően jelentkezik)
OEL chemical category	Potential for cutaneous absorption, Carc. 1A - Known Carcinogen, Muta1B
Regulatory reference	5/2020. (II. 6.) ITM rendelet - A kémiai kóroki tényezők hatásának kitett munkavállalók egészségének és biztonságának védelméről
Hungary - Biological Exposure Indices	
Local name	Benzol
BEI	0,04 mg/g creatinine Biológiai expozíciós (hatás) mutató: S-fenilmerkaptursav - Biológiai minta: vizeletben - Mintavétel ideje: m.v. (műszak végén) 0,22 µmol/mmol Creatinine Biológiai expozíciós (hatás) mutató: S-fenilmerkaptursav - Biológiai minta: vizeletben - Mintavétel ideje: m.v. (műszak végén)
Regulatory reference	5/2020. (II. 6.) ITM rendelet - A kémiai kóroki tényezők hatásának kitett munkavállalók egészségének és biztonságának védelméről
Ireland - Occupational Exposure Limits	
Local name	Benzene

benzene (71-43-2)	
OEL TWA	0,66 mg/m³ LImit value from 5th April 2026 1,65 mg/m³ Limit value until 5th April 2026
	0,2 ppm LImit value from 5th April 2026 0,5 ppm Limit value until 5th April 2026
OEL STEL	9,75 mg/m³ (calculated)
	3 ppm (calculated)
Remark	BOELV (Binding Occupational Exposure Limit Values), Skin (Substances which have the capacity to penetrate intact skin when they come in contact with it and be absorbed into the body. A substantial contribution to the total body burden via dermal exposure is possible), Carc.1A (Substances known to have carcinogenic potential for humans), Muta.1B (Substances which should be regarded as if they induce heritable mutations in the germ cells of humans)
OEL chemical category	Carc1A, Potential for cutaneous absorption
Regulatory reference	Chemical Agents Code of Practice 2024
Ireland - Biological limit values	
Local name	Benzene
BMGV	25 µg/g creatinine Parameter: S-Phenylmercapturic acid - Medium: urine - Sampling time: End of shift - Notations: B (Background) 50 µg/g creatinine Parameter: t,t-Muconic acid - Medium: urine - Sampling time: End of shift - Notations: B (Background)
Regulatory reference	Biological Monitoring Guidelines (HSA, 2011)
Italy - Occupational Exposure Limits	
Local name	Benzene
OEL TWA	0,66 mg/m³ 1,65 mg/m³ Valore limite fino al 5 aprile 2026
	0,2 ppm 0,5 ppm Valore limite fino al 5 aprile 2026
Remark	Cute
OEL chemical category	skin - potential for cutaneous absorption
Regulatory reference	Allegato XLIII del Decreto Legislativo 4 settembre 2024, n. 135 - Protezione da agenti cancerogeni, mutageni o da sostanze tossiche per la riproduzione
Latvia - Occupational Exposure Limits	
Local name	Benzols
OEL TWA	0,66 mg/m³ 1,65 mg/m³ AER līdz 2026.gada 5.aprīlim.
	0,2 ppm
Remark	Āda. Carc. 1A; Muta. 1B
OEL chemical category	skin - potential for cutaneous exposure
Regulatory reference	Ministru kabineta 2008. gada 29. septembra noteikumi Nr. 803 (Grozījumi Ministru kabineta 2024. gada 26. martā noteikumiem Nr. 190).

benzene (71-43-2)	
Latvia - Biological Exposure Indices	
Local name	Benzols
BEI	46 µg/g creatinine Parameter: Phenol - Medium: urine - Sampling time: end of shift 28 µg/l Medium: blood - Sampling time: end of shift
Regulatory reference	Ministru kabineta 2008. gada 29. septembra noteikumi Nr. 803 (Grozījumi Ministru kabineta 2024. gada 26. martā noteikumiem Nr. 190).
Lithuania - Occupational Exposure Limits	
Local name	Benzenas (benzolas)
IPRV (OEL TWA)	0,66 mg/m³ (įsigalioja 2026 m. balandžio 5 d.) 1,65 mg/m³
	0,2 ppm (įsigalioja 2026 m. balandžio 5 d.) 0,5 ppm
TPRV (OEL STEL)	19 mg/m³
	6 ppm
Remark	K (kancerogeninis poveikis); M (mutageninis poveikis); O (medžiaga į organizmą gali prasiskverbti pro nepažeistą odą)
OEL chemical category	Mutagen, Carcinogen, Skin notation
Regulatory reference	LIETUVOS HIGIENOS NORMA HN 23:2011 (Nr. V-82/A1-57, 2024-01-23)
Luxembourg - Occupational Exposure Limits	
Local name	Benzène
OEL TWA	3,25 mg/m³
	1 ppm
Remark	Peau
Regulatory reference	Mémorial A N° 223 de 2021 concernant la protection des salariés contre les risques liés à l'exposition à des agents cancérigènes ou mutagènes au travail
Malta - Occupational Exposure Limits	
Local name	Benzene # Benżen
OEL TWA	1,65 mg/m³ (Limit value until 5 April 2026 # Valur limitu sal-5 ta' April 2026)
	0,5 ppm (Limit value until 5 April 2026 # Valur limitu sal-5 ta' April 2026)
Remark	Skin # Ġilda
Regulatory reference	S.L. 424.22 - Exposure to Carcinogens, Mutagens or Reprotoxic Substances at Work Regulations (L.N. 102 of 2024) # L.S. 424.22 - Regolamenti dwar Espożizzjoni għall-Carcinogens, Mutagens jew Reprotoxic Substances fuq il-Post tax-Xogħol (A.L. 102 tal-2024)
Netherlands - Occupational Exposure Limits	
Local name	Benzeen
TGG-8u (OEL TWA)	0,7 mg/m³
	0,2 ppm

benzene (71-43-2)	
Remark	Kankerverwekkende stof. H (Huidopname) Stoffen die relatief gemakkelijk door de huid kunnen worden opgenomen, hetgeen een substantiële bijdrage kan betekenen aan de totale inwendige blootstelling, hebben in de lijst een H-aanduiding. Bij deze stoffen moeten naast maatregelen tegen inademing ook adequate maatregelen ter voorkoming van huidcontact worden genomen.
MAC chemical category	Skin notation
Regulatory reference	Arbeidsomstandighedenregeling 2024
Poland - Occupational Exposure Limits	
Local name	Benzen
NDS (OEL TWA)	0,66 mg/m³
Remark	Skóra (Oznakowanie substancji notacją „skóra” oznacza, że wchłanianie substancji przez skórę może być tak samo istotne jak przy narażeniu drogą oddechową).
Regulatory reference	Dz. U. 2024 poz. 1017 wraz z późn. zm.
Portugal - Occupational Exposure Limits	
Local name	Benzeno
OEL TWA	3,25 mg/m³ (indicative limit value)
	0,5 ppm
OEL STEL	2,5 ppm
OEL chemical category	A1 - Confirmed Human Carcinogen, skin - potential for cutaneous exposure
Remark	P (Toxicidade percutânea); A1 (Agente carcinogénico confirmado no Homem); IBE (Índice biológico de exposição)
Regulatory reference	Norma Portuguesa NP 1796:2014
Portugal - Biological Exposure Indices	
Local name	Benzeno
BEI	25 µg/g creatinine Parâmetro: Ácido s-fenilmercaptúrico - Meio: urina - Momento da amostragem: Fim do turno - Notaçao: Vb (Valor basal) 500 µg/g creatinine Parâmetro: Ácido t,t-mucónico - Meio: urina - Momento da amostragem: Fim do turno - Notaçao: Vb (Valor basal)
Regulatory reference	Norma Portuguesa NP 1796:2014
Romania - Occupational Exposure Limits	
Local name	Benzen
OEL TWA	0,66 mg/m³ 1,65 mg/m³ Valoare-limită până la 5 aprilie 2026
	0,2 ppm 0,5 ppm Valoare-limită până la 5 aprilie 2026
OEL chemical category	C1A, Skin notation it is possible that regulation regarding inhaling could be added to a dermal absorption
Remark	P - posibilitatea unei penetrări cutanate importante; C1A - poate provoca apariția cancerului; M1B - poate provoca anomalii genetice

benzene (71-43-2)	
Regulatory reference	Hotărârea Guvernului nr. 1.218/2006 (Hotărârea nr. 179/2024)
Romania - Biological limit values	
Local name	Benzen
BLV	25 µg/g creatinine Parameter: S-Phenylmercapturic acid - Medium: urine - Sampling time: end of shift 500 µg/g creatinine Parameter: trans,trans-Muconic acid - Medium: urine - Sampling time: end of shift 50 mg/l Parameter: total Phenols - Medium: urine - Sampling time: end of shift
Regulatory reference	Hotărârea Guvernului nr. 1.218/2006 (Hotărârea nr. 179/2024)
Serbia - Occupational Exposure Limits	
Local name	бензен
OEL TWA	3 mg/m³
	1 ppm
Remark	ЕУ0 – напомена да се ради о хемијским материјама за које су утврђене обавезујуће граничне вредности изложености према Директиви 1999/38/ЕЗ и Директиви 98/24/ЕЗ
Regulatory reference	ПРАВИЛНИК о превентивним мерама за безбедан и здрав рад при излагању хемијским материјама („Службени гласник РС”, бр. 106/09, 117/17 и 107/21)
Slovakia - Occupational Exposure Limits	
Local name	Benzén
NPHV (OEL TWA)	0,66 mg/m³ NPEL sa uplatňuje od 6. apríla 2026 1,65 mg/m³ NPEL sa uplatňuje do 5. apríla 2026
	0,2 ppm NPEL sa uplatňuje od 6. apríla 2026 0,5 ppm NPEL sa uplatňuje do 5. apríla 2026
Remark	Kategória karcinogénnych faktorov 1A – Dokázaný karcinogén pre ľudí; Kategória mutagénnych faktorov 1B – Mutagén cicavčích zárodočných buniek; K – prienik cez kožu: K celkovému zaťaženiu organizmu môže významne prispieť expozícia cez kožu.
Regulatory reference	Nariadenie vlády č. 356/2006 Z. z. (121/2024 Z. z.)
Slovenia - Occupational Exposure Limits	
Local name	benzen
OEL TWA	3,25 mg/m³
	1 ppm
Remark	Rakotvorne snovi – kategorija 1A, Mutagene snovi za zarodne celice – kategorija 1B. EU, K (Lastnost lažjega prehajanja snovi v organizem skozi kožo), BAT (Biološka mejna vrednost), EKA (Zveza med koncentracijo rakotvornih snovi v zraku na delovnem mestu in količino snovi in/ali njenih metabolitov v organizmu)
OEL chemical category	Category 1B, Category 1A, Potential for cutaneous absorption
Regulatory reference	Uradni list RS, št. 29/2024 z dne 4.4.2024 - Pravilnik o varovanju delavcev pred tveganji zaradi izpostavljenosti rakotvornim ali mutagenim snovem

benzene (71-43-2)	
Slovenia - Biological limit values	
Local name	benzen
BLV	5 µg/l Parameter: benzen - Biološki vzorec: urin - Čas vzorčenja: ob koncu delovne izmene 0,025 mg/g creatinine Parameter: S-fenilmerkaptonska kislina - Biološki vzorec: urin - Čas vzorčenja: ob koncu delovne izmene 500 µg/g creatinine Parameter: trans, trans-mukonska kislina - Biološki vzorec: urin - Čas vzorčenja: ob koncu delovne izmene
Remark	BAT vrednosti za rakotvorne ali mutagene snovi
Regulatory reference	Uradni list RS, št. 29/2024 z dne 4.4.2024 - Pravilnik o varovanju delavcev pred tveganji zaradi izpostavljenosti rakotvornim ali mutagenim snovem
Spain - Occupational Exposure Limits	
Local name	Benceno
VLA-ED (OEL TWA)	3,25 mg/m³
	1 ppm
Remark	C1A (Carcinógeno para el hombre), M1B (Sustancias de las que se considera que inducen mutaciones hereditarias en las células germinales humanas), vía dérmica (Indica que, en las exposiciones a esta sustancia, la aportación por la vía cutánea puede resultar significativa para el contenido corporal total si no se adoptan medidas para prevenir la absorción. En estas situaciones, es aconsejable la utilización del control biológico para poder cuantificar la cantidad global absorbida del contaminante), VLB® (Agente químico que tiene Valor Límite Biológico), v (Real Decreto 1124/2000, de 16 de junio (BOE nº 145 de 17 de junio de 2000), por el que se modifica el Real Decreto 665/1997, de 12 de mayo, sobre la protección de los trabajadores contra los riesgos relacionados con la exposición a agentes cancerígenos durante el trabajo), r (Esta sustancia tiene establecidas restricciones a la fabricación, la comercialización o el uso en los términos especificados en el "Reglamento (CE) nº 1907/2006 sobre Registro, Evaluación, Autorización y Restricción de sustancias y preparados químicos" (REACH) de 18 de diciembre de 2006 (DOUE L 369 de 30 de diciembre de 2006). Las restricciones de una sustancia pueden aplicarse a todos los usos o sólo a usos concretos. El anexo XVII del Reglamento REACH contiene la lista de todas las sustancias restringidas y especifica los usos que se han restringido), (Ω) Sujeto a la transposición de la Directiva (UE) 2022/431 del Parlamento Europeo y del Consejo de 9 de marzo de 2022.
OEL chemical category	C1A, M1B, skin - potential for cutaneous absorption
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2024. INSHT
Spain - Biological limit values	
Local name	Benceno
BLV	0,045 mg/g creatinine Parameter: S-Phenyl mercapturic acid - Medium: urine - Sampling time: end of exposure or end of shift 2 mg/l Parameter: trans, trans-Muconic acid - Medium: urine - Sampling time: end of exposure or end of shift

benzene (71-43-2)	
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2024. INSHT
Sweden - Occupational Exposure Limits	
Local name	Bensen
NGV (OEL TWA)	0,66 mg/m³ (Gränsvärdet träder i kraft den 5 april 2026) 1,5 mg/m³
	0,2 ppm (Gränsvärdet träder i kraft den 5 april 2026) 0,5 ppm
KGV (OEL STEL)	9 mg/m³
	3 ppm
Remark	C (Ämnet är cancerframkallande. Risk för cancer finns även vid annan exponering än via inandning. För vissa cancerframkallande ämnen som inte har gränsvärden gäller förbud eller tillståndskrav enligt föreskrifterna om kemiska arbetsmiljörisker); H (Ämnet kan lätt upptas genom huden. Det föreskrivna gränsvärdet bedöms ge tillräckligt skydd endast under förutsättning att huden är skyddad mot exponering för ämnet ifråga)
OEL chemical category	Skin notation, Carcinogen
Regulatory reference	Hygieniska gränsvärden (AFS 2022:5)
United Kingdom - Occupational Exposure Limits	
Local name	Benzene
WEL TWA (OEL TWA)	3,25 mg/m³
	1 ppm
WEL STEL (OEL STEL)	9,75 mg/m³ (calculated)
	3 ppm (calculated)
Remark	Carc (Capable of causing cancer and/or heritable genetic damage), Sk (Can be absorbed through the skin. The assigned substances are those for which there are concerns that dermal absorption will lead to systemic toxicity)
WEL chemical category	Potential for cutaneous absorption, Capable of causing cancer and/or heritable genetic damage
Regulatory reference	EH40/2005 (Fourth edition, 2020). HSE
Iceland - Occupational Exposure Limits	
Local name	Bensen
OEL TWA	0,66 mg/m³
	0,2 ppm
Remark	H (efnið getur auðveldlega borist inn í líkamann gegnum húð), K (efnið er krabbameinsvaldandi)
Regulatory reference	Reglugerð um mengunarmörk og aðgerðir til að draga úr mengun á vinnustöðum (Nr. 1309/2023)
Norway - Occupational Exposure Limits	
Local name	Benzen

benzene (71-43-2)	
Grenseverdi (OEL TWA)	0,33 mg/m³ Fra april 2028 0,66 mg/m³ Fram til april 2028
	0,1 ppm Fra april 2028 0,2 ppm Fram til april 2028
Korttidsverdi (OEL STEL)	1,98 mg/m³ (value calculated)
	0,6 ppm (value calculated)
Remark	H: Kjemikalier som kan tas opp gjennom huden; K: Kjemikalier som skal betraktes som kreftfremkallende; M: Kjemikalier som skal betraktes som mutagene; G: EU har fastsatt en bindende grenseverdi og/eller anmerkning for stoffet.
OEL chemical category	Skin notation, Carcinogen, Potential mutagen
Regulatory reference	FOR-2024-04-05-581
North Macedonia - Occupational Exposure Limits	
Local name	Бензен
OEL TWA	3,25 mg/m³
	1 ppm
KTV	4
Short time value [mg/m³]	13 mg/m³
Short time value	4 ppm
Remark	(KTV) краткотрајна вредност (КТВ) значи концентрација на опасни хемиски супстанци во воздухот на работното место внатре во зона на дишење, на која работникот без опасност по здравјето може да е изложен на покусо време. Изложеноста на краткотрајни вредности може да трае највеќе 15 минути и не смее да се повтори повеќе од четирипати во работната смена, при што меѓу две изложености на оваа концентрација мора да измине најмалку 60 минути. Краткотрајната вредност е изразена во mg/m3 или во ml/m3(ppm) а е дадена како многукратни дозволени пречекорувања на граничната вредност; (K) својство на полесно пренесување на супстанците во организмот преку кожата; (TDK) техничко достигнување на концентрацијата – е дадено за канцерогените супстанци и значи концентрација на супстанци во воздухот на работното место, кои можат да се достигнат со достапните техники; (EKA) поврзаноста помеѓу концентрацијата на канцерогени супстанци во воздухот на работното место и износ на количината на канцерогените супстанци и/или нивните метаболити во организмот – дадена за канцерогени супстанци (канцерогени); (BAT) биолошка гранична вредност – праг на биолошка гранична вредност, што значи предупредување на опасна хемиска супстанца и нејзини метаболити во ткивата, телесните течности или издишувањето на воздухот, без оглед на тоа, дали опасната хемиска супстанца е внесена во организмот со вдишување, голтање или преку кожата; (EU) European Union – гранична вредност, определена на ниво на Европската унија

benzene (71-43-2)	
Regulatory reference	Правилник за минималните барања за безбедност и здравје при работа на вработени од ризици поврзани со изложување на хемиски супстанци („Службен весник на Република Македонија" бр.46/10) и Правилник за минималните барања за безбедност и здравје при работа на вработени од ризици поврзани со изложување на канцерогени, мутагени или супстанци („Службен весник на Република Македонија" бр.110/10)
Switzerland - Occupational Exposure Limits	
Local name	Benzène / Benzol
MAK (OEL TWA)	0,7 mg/m³
	0,2 ppm
Notation	R, C1$_A$, M1$_B$, B / H, C1$_A$, M1$_B$, B
Remark	HSE, NIOSH, DFG, BG
OEL chemical category	Skin notation, Category C1A carcinogen, Category 1B mutagen
Regulatory reference	www.suva.ch, 01.01.2024
Switzerland - BAT	
Local name	Benzène / Benzol
BAT	8 µg/g creatinine Parameter: S-Phenyl-mercapturic acid - Medium: urine - Sampling time: end of shift Parameter: S-Phenyl-mercapturic acid - Medium: urine - Sampling time: end of shift
Remark	Influence de l'environnement. / Umwelteinflüsse.
Regulatory reference	Ordonnance 832.30 (OPA), article 50 al. 3, www.suva.ch/valeurs-limites / Verordnung 832.30 (VUV), Art. 50 Abs. 3, www.suva.ch/grenzwerte
USA - ACGIH - Occupational Exposure Limits	
Local name	Benzene
ACGIH® TLV® TWA	0,02 ppm
ACGIH® TLV® STEL	2,5 ppm
Remark (ACGIH)	TLV® Basis: Myelodysplastic syndrome; acute myeloid leukemia; leukemia; hematologic eff; chromosomal dam. Notations: Skin; A1 (Confirmed Human Carcinogen); BEI
ACGIH chemical category	Confirmed Human Carcinogen, Skin - potential significant contribution to overall exposure by the cutaneous route
Regulatory reference	ACGIH 2024
USA - ACGIH - Biological Exposure Indices	
Local name	Benzene
BEI	25 µg/g creatinine Parameter: S-Phenylmercapturic acid - Medium: urine - Sampling time: end of shift (background) 500 µg/g creatinine Parameter: t,t-Muconic acid - Medium: urine - Sampling time: end of shift (background)
Regulatory reference	ACGIH 2024

toluene (108-88-3)	
EU - Indicative Occupational Exposure Limit (IOEL)	
Local name	Toluene
IOEL TWA	192 mg/m³
	50 ppm
IOEL STEL	384 mg/m³
	100 ppm
Remark	Skin
Regulatory reference	COMMISSION DIRECTIVE 2006/15/EC
Albania - Occupational Exposure Limits	
Local name	Toluen
OEL TWA	192 mg/m³
	50 ppm
OEL STEL	384 mg/m³
	100 ppm
Remark	Lëkurë (tregon mundësinë e një marrjeje të rëndësishme nëpërmjet lëkurës)
Regulatory reference	VENDIM Nr. 522, datë 6.8.2014 PËR MIRATIMIN E RREGULLORES "PËR MBROJTJEN E SIGURISË DHE SHËNDETIT TË PUNËMARRËSVE NGA RISQET E LIDHURA ME AGJENTËT KIMIKË NË PUNË"
Austria - Occupational Exposure Limits	
Local name	Toluol
MAK (OEL TWA)	190 mg/m³
	50 ppm
MAK (OEL STEL)	380 mg/m³ (4x 15(Miw) min)
	100 ppm (4x 15(Miw) min)
Remark	H. Fortpflanzungsgefährdend: d
Regulatory reference	BGBl. II Nr. 156/2021
Austria - Biological limit values	
Local name	Toluol
BLV	10 g/dl Parameter: Hämoglogin - Untersuchungsmaterial: Blut - Mitarbeiter/innen: Frauen 12 g/dl Parameter: Hämoglogin - Untersuchungsmaterial: Blut - Mitarbeiter/innen: Männer 250 µg/l Parameter: Hämoglogin - Untersuchungsmaterial: Blut - Probenahmezeitpunkt: Bei wiederholt erhöhten o-Cresolwerten ist zusätzlich Toluol im Blut am Ende eines Arbeitstages zu bestimmen (der Zeitpunkt der Untersuchung ist anzugeben) 0,8 mg/l Parameter: o-Cresol - Untersuchungsmaterial: Harn

toluene (108-88-3)	
Remark	Eignung: Blut: Erythrozyten: 3,2 Millionen/µl für Frauen, 3,8 Millionen/µl für Männer; Leukozyten: unterer Grenzwert: 4.000/µl (davon 2.000 Granulozyten) bzw. 3.700/µl bei nicht pathologischem Differentialblutbild, oberer Grenzwert: 13.000/µl; Thrombozyten: 150.000 bzw. 130.000/µl bei nicht pathologischem Differentialblutbild Eignung mit vorzeitiger Folgeuntersuchung: Bei Unterschreiten bzw. Überschreiten der Grenzwerte im Blut (ausgenommen Differentialblutbild) oder im Harn sowie bei atypischen Morphologien im Blut. Der Zeitabstand zwischen den Untersuchungen beträgt bei Eignung: ein Jahr; bei Eignung mit vorzeitiger Folgeuntersuchung: drei Monate.
Regulatory reference	Verordnung über die Gesundheitsüberwachung am Arbeitsplatz 2017 (VGÜ 2017)
Belgium - Occupational Exposure Limits	
Local name	Toluène # Tolueen
OEL TWA	77 mg/m³
	20 ppm
OEL STEL	384 mg/m³
	100 ppm
Remark	D: la mention “D” signifie que la résorption de l’agent, via la peau, les muqueuses ou les yeux, constitue une partie importante de l’exposition totale. Cette résorption peut se faire tant par contact direct que par présence de l’agent dans l’air. # D: de vermelding “D” betekent dat de opname van het agens via de huid, de slijmvliezen of de ogen een belangrijk deel van de totale blootstelling vormt. Deze opname kan het gevolg zijn van zowel direct contact als zijn aanwezigheid in de lucht.
Regulatory reference	Koninklijk besluit/Arrêté royal 16/11/2023
Bulgaria - Occupational Exposure Limits	
Local name	Толуен
OEL TWA	192 mg/m³
	50 ppm
OEL STEL	384 mg/m³
	100 ppm
Remark	Кожа (възможна е значителна резорбция чрез кожата); • (Химични агенти, за които са определени гранични стойности във въздуха на работната среда за Европейската общност)
Regulatory reference	Наредба № 13 от 30.12.2003 г. за защита на работещите от рискове, свързани с експозиция на химични агенти при работа (изм. и доп. ДВ. бр. 28 от 2024 г., в сила от 05.04.2024 г.)
Bulgaria - Biological limit values	
Local name	Толуен
BLV	1,6 mmol/mmol Creatinine Parameter: Hippuric acid - Medium: urine - Sampling time: at the end of exposure or end of work shift

toluene (108-88-3)	
Regulatory reference	Наредба № 13 от 30.12.2003 г. за защита на работещите от рискове, свързани с експозиция на химични агенти при работа (изм. и доп. ДВ. бр. 28 от 2024 г., в сила от 05.04.2024 г.)
Croatia - Occupational Exposure Limits	
Local name	Toluen
GVI (OEL TWA)	192 mg/m³
	50 ppm
KGVI (OEL STEL)	384 mg/m³
	100 ppm
Remark	Direktiva: 2006/15/EZ. Napomena: Koža (razvrstana kao tvar koja nadražuje kožu (H315))
Regulatory reference	Pravilnik o zaštiti radnika od izloženosti opasnim kemikalijama na radu, graničnim vrijednostima izloženosti i biološkim graničnim vrijednostima (NN 148/2023)
Croatia - Biological limit values	
Local name	Toluen
BLV	1 mg/l Parameter: Toluene - Medium: blood - Sampling time: at the end of the work shift 20 ppm Parameter: Toluene - Medium: final exhaled air - Sampling time: during exposure 2,5 g/g creatinine Parameter: Hippuric acid - Medium: urine - Sampling time: at the end of the work shift (calculated on the average Creatinine value of 1.2 g/L urine) 1 mg/g creatinine Parameter: o-Cresol - Medium: urine - Sampling time: at the end of the work shift (calculated on the average Creatinine value of 1.2 g/L urine)
Regulatory reference	Pravilnik o zaštiti radnika od izloženosti opasnim kemikalijama na radu, graničnim vrijednostima izloženosti i biološkim graničnim vrijednostima (NN 91/2018)
Cyprus - Occupational Exposure Limits	
Local name	Τολουόλιο
OEL TWA	192 mg/m³
	50 ppm
OEL STEL	384 mg/m³
	100 ppm
Remark	δέρμα
Regulatory reference	Κανονισμοί του 2007 (Κ.Δ.Π. 295/2007)
Czech Republic - Occupational Exposure Limits	
Local name	Toluen (Methylbenzen)
PEL (OEL TWA)	192 mg/m³
	50 ppm

toluene (108-88-3)	
NPK-P (OEL C)	384 mg/m³
	100 ppm
Remark	B - u látky je zaveden biologický expoziční test (BET) v moči nebo krvi, D - při expozici se významně uplatňuje pronikání faktoru kůží, I - dráždí sliznice (oči, dýchací cesty) resp. kůži, P - u látky nelze vyloučit závažné pozdní účinky (s větou H372, H373).
Regulatory reference	Nařízení vlády č. 361/2007 Sb. (Předpis 330/2023 Sb.)
Czech Republic - Biological limit values	
Local name	Toluen (Methylbenzen)
BLV	1,6 µmol/mmol Creatinine Parameter: o-Cresol - Medium: urine - Sampling time: end of shift (after hydrolysis) 1000 µmol/mmol Creatinine Parameter: Hippuric acid - Medium: urine - Sampling time: end of shift (exposure testing using the o-Cresol parameter to precisely measure Toluene exposure is needed if the value of Hippuric acid is between 1600 and 2500 mg/g of Creatinine, no additional testing is needed if the Hippuric acid value is >2500 mg/g of Creatinine as work exposure to Toluene will have highly exceeded the PEL value.) 1,5 mg/g creatinine Parameter: o-Cresol - Medium: urine - Sampling time: end of shift (after hydrolysis) 1600 mg/g creatinine Parameter: Hippuric acid - Medium: urine - Sampling time: end of shift (exposure testing using the o-Cresol parameter to precisely measure Toluene exposure is needed if the value of Hippuric acid is between 1600 and 2500 mg/g of Creatinine, no additional testing is needed if the Hippuric acid value is >2500 mg/g of Creatinine as work exposure to Toluene will have highly exceeded the PEL value.)
Remark	Je-li hodnota při nálezu kyseliny hippurové vyšší než 1600 mg/g, av šak nepřesahuje 2500 mg/g kreatininu, použije se ke zpřesnění expozice toluenu biologický expoziční test podle ukazatele o-Kresol. Je-li hodnota při nálezu kyseliny hippurové vyšší než 2500 mg/g, považuje se za hodnotu prokazující, že jde o pracovní expozici toluenu, jehož hodnota PEL je překračována a biologický expoziční test podle ukazatele o-Kresol se již neprovádí.
Regulatory reference	Vyhláška č. 107/2013 Sb. (kterou se mění vyhláška č. 432/2003 Sb.)
Denmark - Occupational Exposure Limits	
Local name	Toluen (Methylbenzen; Phenylmethan)
OEL TWA	94 mg/m³
	25 ppm
OEL STEL	384 mg/m³
	100 ppm
Remark	E (betyder, at stoffet har en EF-grænseværdi); H (betyder, at stoffet kan optages gennem huden)
OEL chemical category	Potential for cutaneous absorption
Regulatory reference	BEK nr 291 af 19/03/2024
Estonia - Occupational Exposure Limits	
Local name	Tolueen (metüülbenseen)

toluene (108-88-3)	
OEL TWA	192 mg/m³
	50 ppm
OEL STEL	384 mg/m³
	100 ppm
Remark	A (Naha kaudu kergesti imenduv aine)
Regulatory reference	Vabariigi Valitsuse 20. märtsi 2001. a määruse nr 105 (RT I, 02.04.2024, 13)
Finland - Occupational Exposure Limits	
Local name	Tolueeni
HTP (OEL TWA)	81 mg/m³
	25 ppm
HTP (OEL STEL)	380 mg/m³
	100 ppm
Remark	Iho, melu
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveysministeriö)
Finland - Biological limit values	
Local name	Tolueeni
BLV	500 nmol/L Parameter: Toluene - Medium: blood - Sampling time: in the morning after a working day
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveysministeriö)
France - Occupational Exposure Limits	
Local name	Toluène
VME (OEL TWA)	76,8 mg/m³
	20 ppm
VLE (OEL C/STEL)	384 mg/m³
	100 ppm
Remark	Valeurs règlementaires contraignantes. Toxique pour la reproduction de catégorie 2, Risque de pénétration percutanée. Ces valeurs sont assortie de la mention "bruit" indiquant la possibilité d'une atteinte auditive en cas de co-exposition au bruit.
Regulatory reference	Article R4412-149 du Code du travail (réf.: INRS ED 6443, 2022; Outil65; Décret n° 2019-1487; Décret n° 2020-1546; Décret n° 2021-434; Décret n° 2021-1849; Décret n° 2024-307)
France - Biological limit values	
BLV	20 µg/l Parameter: Toluene - Medium: blood - Sampling time: end of workweek (Semi-quantitative (ambiguous interpretation)) Parameter: Hippuric acid - Medium: urine - Sampling time: end of shift (per the Authority, the values for this substance must be decided and/or determined on a case by case basis. Guidance for the calculation of and interpretation of values is provided in the source)

toluene (108-88-3)	
Germany - Occupational Exposure Limits (TRGS 900)	
Local name	Toluol
Occupational exposure limit value (mg/m³) (TRGS900)	190 mg/m³
Occupational exposure limit value (ppm) (TRGS900)	50 ppm
Peak exposure limitation factor	2(II)
Remark	DFG - Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe der DFG (MAK-Kommission); EU - Europäische Union (Von der EU wurde ein Luftgrenzwert festgelegt: Abweichungen bei Wert und Spitzenbegrenzung sind möglich); H - hautresorptiv; Y - Ein Risiko der Fruchtschädigung braucht bei Einhaltung des Arbeitsplatzgrenzwertes und des biologischen Grenzwertes (BGW) nicht befürchtet zu werden
Regulatory reference	TRGS900
Germany - Biological limit values (TRGS 903)	
Local name	Toluol
Biological limit value	75 µg/l Parameter: Toluol - Untersuchungsmaterial: U = Urin - Probenahmezeitpunkt: b) Expositionsende, bzw. Schichtende - Festlegung/Begründung: 05/2024 DFG 600 µg/l Parameter: Toluol - Untersuchungsmaterial: B = Vollblut - Probenahmezeitpunkt: g) unmittelbar nach Exposition - Festlegung/Begründung: 05/2024 DFG 1,5 mg/l Parameter: o-Kresol (nach Hydrolyse) - Untersuchungsmaterial: U = Urin - Probenahmezeitpunkt: c) am Schichtende, bei Langzeitexposition nach mehreren vorangegangenen Schichten - Festlegung/Begründung: 05/2024 DFG
Regulatory reference	TRGS 903
Gibraltar - Occupational Exposure Limits	
Local name	Toluene
OEL TWA	192 mg/m³
	50 ppm
OEL STEL	384 mg/m³
	100 ppm
Remark	Skin
Regulatory reference	Factories (Control of Chemical Agents at Work) Regulations 2003 (LN. 2018/181)
Greece - Occupational Exposure Limits	
Local name	Τολουόλιο
OEL TWA	192 mg/m³
	50 ppm
OEL STEL	384 mg/m³
	100 ppm

toluene (108-88-3)	
Remark	Η ένδειξη «δέρμα» στις οριακές τιμές επαγγελματικής έκθεσης επισημαίνει το ενδεχόμενο σημαντικής διείσδυσης μέσω του δέρματος.
Regulatory reference	Π.Δ. 162/2007 - Προστασία της υγείας των εργαζομένων που εκτίθενται σε ορισμένους χημικούς παράγοντες κατά τη διάρκεια της εργασίας τους
Hungary - Occupational Exposure Limits	
Local name	TOLUOL
AK (OEL TWA)	192 mg/m³
CK (OEL STEL)	384 mg/m³
Remark	b (Bőrön át is felszívódik), i (ingerlő anyag, amely izgatja a bőrt, nyálkahártyát, szemet vagy mindhármat); BEM (biológiai expozíciós mutató); EU2 (2006/15/EK irányelvben közölt érték); R+T (Azok az anyagok, amelyek RÖVID és TARTÓS expozíciója is egészségkárosodást okoz)
Regulatory reference	5/2020. (II. 6.) ITM rendelet - A kémiai kóroki tényezők hatásának kitett munkavállalók egészségének és biztonságának védelméről
Hungary - Biological Exposure Indices	
Local name	Toluol
BEI	1 mg/g creatinine Biológiai expozíciós (hatás) mutató: o-krezol - Biológiai minta: vizeletben - Mintavétel ideje: m.v. (műszak végén) 1 µmol/mmol Creatinine Biológiai expozíciós (hatás) mutató: o-krezol - Biológiai minta: vizeletben - Mintavétel ideje: m.v. (műszak végén)
Regulatory reference	5/2020. (II. 6.) ITM rendelet - A kémiai kóroki tényezők hatásának kitett munkavállalók egészségének és biztonságának védelméről
Ireland - Occupational Exposure Limits	
Local name	Toluene
OEL TWA	192 mg/m³
	50 ppm
OEL STEL	384 mg/m³
	100 ppm
Remark	IOELV (Indicative Occupational Exposure Limit Values), Skin (Substances which have the capacity to penetrate intact skin when they come in contact with it and be absorbed into the body. A substantial contribution to the total body burden via dermal exposure is possible)
Regulatory reference	Chemical Agents Code of Practice 2024
Ireland - Biological limit values	
Local name	Toluene
BMGV	0,03 mg/l Parameter: toluene - Medium: urine - Sampling time: End of shift 0,3 mg/g creatinine Parameter: o-cresol - Medium: urine - Sampling time: End of shift - Notations: B (Background) 0,02 mg/l Parameter: toluene - Medium: blood - Sampling time: Prior to last shift of workweek
Regulatory reference	Biological Monitoring Guidelines (HSA, 2011)

toluene (108-88-3)	
Italy - Occupational Exposure Limits	
Local name	Toluene
OEL TWA	192 mg/m³
	50 ppm
Remark	Cute
Regulatory reference	Allegato XXXVIII del Decreto Legislativo 4 settembre 2024, n. 135
Latvia - Occupational Exposure Limits	
Local name	Toluols (metilbenzols)
OEL TWA	50 mg/m³
	14 ppm
OEL STEL	150 mg/m³
	40 ppm
Remark	Āda; ietekme uz dzirdi
Regulatory reference	Ministru kabineta 2007. gada 15. maija noteikumiem Nr. 325 (Grozījumi Ministru kabineta 2024. gada 26. martā noteikumiem Nr. 191).
Latvia - Biological Exposure Indices	
Local name	Toluols (metilbenzols)
BEI	1,6 g/g creatinine Parameter: Hippuric acid - Medium: urine - Sampling time: end of shift 0,05 mg/l Parameter: Toluene - Medium: blood - Sampling time: end of shift
Remark	Ilgstošas iedarbības novērtēšanai paraugus iegūst maiņas beigās pēc vairākām iepriekšējām maiņām.
Regulatory reference	Ministru kabineta 2007. gada 15. maija noteikumiem Nr. 325 (Grozījumi Ministru kabineta 2024. gada 26. martā noteikumiem Nr. 191).
Lithuania - Occupational Exposure Limits	
Local name	Toluenas
IPRV (OEL TWA)	192 mg/m³
	50 ppm
TPRV (OEL STEL)	384 mg/m³
	100 ppm
Remark	R (reprodukcijai toksiškas poveikis); O (medžiaga į organizmą gali prasiskverbti pro nepažeistą odą)
Regulatory reference	LIETUVOS HIGIENOS NORMA HN 23:2011 (Nr. V-695/A1-272, 2018-06-12)
Luxembourg - Occupational Exposure Limits	
Local name	Toluène
OEL TWA	192 mg/m³
	50 ppm

toluene (108-88-3)	
OEL STEL	384 mg/m³
	100 ppm
Remark	Peau
Regulatory reference	Mémorial A N° 226 de 2021 concernant la protection de la sécurité et de la santé des salariés contre les risques liés à des agents chimiques sur le lieu de travail
Malta - Occupational Exposure Limits	
Local name	Toluene
OEL TWA	192 mg/m³
	50 ppm
OEL STEL	384 mg/m³
	100 ppm
Remark	Skin # Ġilda
Regulatory reference	S.L. 424.24 - Chemical Agents at Work Regulations (L.N. 356 of 2021) # L.S. 424.24 - Regolamenti dwar Aġenti Kimiċi fuq il-Post tax-Xogħol (A.L. 356 tal-2021)
Netherlands - Occupational Exposure Limits	
Local name	Tolueen
TGG-8u (OEL TWA)	150 mg/m³
	39 ppm
TGG-15min (OEL STEL)	384 mg/m³
	100 ppm
Regulatory reference	Arbeidsomstandighedenregeling 2024
Poland - Occupational Exposure Limits	
Local name	Toluen
NDS (OEL TWA)	100 mg/m³
NDSCh (OEL STEL)	200 mg/m³
Remark	Skóra (Oznakowanie substancji notacją „skóra” oznacza, że wchłanianie substancji przez skórę może być tak samo istotne jak przy narażeniu drogą oddechową).
Regulatory reference	Dz. U. 2024 poz. 1017 wraz z późn. zm.
Portugal - Indicative Occupational Exposure Limit (IOEL)	
Local name	Tolueno
IOEL TWA	192 mg/m³
	50 ppm
IOEL STEL	384 mg/m³
	100 ppm
Remark	Cutânea.

toluene (108-88-3)	
Regulatory reference	Decreto-Lei n.º 1/2021 de 6 de janeiro
Portugal - Occupational Exposure Limits	
Local name	Tolueno
OEL TWA	20 ppm
Remark	A4 (Agente não classificável como carcinogénico no Homem); IBE (Índice biológico de exposição)
Regulatory reference	Norma Portuguesa NP 1796:2014
Portugal - Biological Exposure Indices	
Local name	Tolueno
BEI	0,03 mg/l Parâmetro: Tolueno - Meio: urina - Momento da amostragem: Fim do turno 0,3 mg/g creatinine Parâmetro: o-Cresol - Meio: urina - Momento da amostragem: Fim do turno - Notaçao: Vb (Valor basal), Com hidrólise 0,02 mg/l Parâmetro: Tolueno - Meio: sangue - Momento da amostragem: Antes do último turno da semana de trabalho
Regulatory reference	Norma Portuguesa NP 1796:2014
Romania - Occupational Exposure Limits	
Local name	Toluen
OEL TWA	192 mg/m³
	50 ppm
OEL STEL	384 mg/m³
	100 ppm
Remark	P - posibilitatea unei penetrări cutanate importante; R2 - susceptibil de a dăuna fertilității
Regulatory reference	Hotărârea Guvernului nr. 1.218/2006 (Hotărârea nr. 179/2024)
Romania - Biological limit values	
Local name	Toluen
BLV	2 g/l Parameter: Hippuric acid - Medium: urine - Sampling time: end of shift 3 mg/l Parameter: o-Cresol - Medium: urine - Sampling time: end of shift
Regulatory reference	Hotărârea Guvernului nr. 1.218/2006 (Hotărârea nr. 179/2024)
Serbia - Occupational Exposure Limits	
Local name	толуен
OEL TWA	192 mg/m³
	50 ppm
OEL STEL	384 mg/m³
	100 ppm
Remark	ЕУ** – напомена да се ради о хемијским материјама за које су утврђене индикативне граничне вредности изложености према Директиви 2006/15/ЕЗ (друга листа); К – напомена да хемијска материја може штетно деловати на кожу

toluene (108-88-3)	
Regulatory reference	ПРАВИЛНИК о превентивним мерама за безбедан и здрав рад при излагању хемијским материјама („Службени гласник РС”, бр. 106/09, 117/17 и 107/21)
Slovakia - Occupational Exposure Limits	
Local name	Toluén
NPHV (OEL TWA)	192 mg/m³
	50 ppm
NPHV (OEL STEL)	384 mg/m³
	100 ppm
Remark	K – znamená, že faktor môže byť ľahko absorbovaný kožou
Regulatory reference	Nariadenie vlády č. 355/2006 Z. z. (122/2024 Z. z.)
Slovakia - Biological limit values	
Local name	Toluén
BLV	600 µg/l Parameter: Toluene - Medium: blood - Sampling time: end of exposure or work shift 1,5 mg/l Parameter: o-Cresol - Medium: urine - Sampling time: after all work shifts (for long-term exposure) 1,5 mg/l Parameter: o-Cresol - Medium: urine - Sampling time: end of exposure or work shift 1600 mg/g creatinine Parameter: Hippuric acid - Sampling time: end of exposure or work shift
Regulatory reference	Nariadenie vlády č. 355/2006 Z. z. (122/2024 Z. z.)
Slovenia - Occupational Exposure Limits	
Local name	toluen
OEL TWA	192 mg/m³
	50 ppm
OEL STEL	384 mg/m³
	100 ppm
Remark	K (Lastnost lažjega prehajanja snovi v organizem skozi kožo), Y (Snovi, pri katerih ni nevarnosti za zarodek ob upoštevanju mejnih vrednosti in bat vrednosti), BAT (Biološka mejna vrednost), EU
Regulatory reference	Uradni list RS, št. 29/2024 z dne 4. 4. 2024 - Pravilnik o varovanju delavcev pred tveganji zaradi izpostavljenosti kemičnim snovem pri delu
Slovenia - Biological limit values	
Local name	toluen
BLV	600 µg/l Parameter: toluen - Biološki vzorec: kri - Čas vzorčenja: takoj po izpostavljenosti ob koncu delovne izmene 1,5 mg/l Parameter: o-krezol (po hidrolizi) - Biološki vzorec: urin - Čas vzorčenja: ob koncu delovne izmene, pri dolgotrajni izpostavljenosti: ob koncu delovne izmene po več zaporednih delavnikih 75 µg/l Parameter: toluen - Biološki vzorec: urin - Čas vzorčenja: takoj po izpostavljenosti ob koncu delovne izmene

toluene (108-88-3)	
Regulatory reference	Uradni list RS, št. 29/24 z dne 4. 4. 2024 - Pravilnik o varovanju delavcev pred tveganji zaradi izpostavljenosti kemičnim snovem pri delu
Spain - Occupational Exposure Limits	
Local name	Tolueno
VLA-ED (OEL TWA)	192 mg/m³
	50 ppm
VLA-EC (OEL STEL)	384 mg/m³
	100 ppm
Remark	Vía dérmica (Indica que, en las exposiciones a esta sustancia, la aportación por la vía cutánea puede resultar significativa para el contenido corporal total si no se adoptan medidas para prevenir la absorción. En estas situaciones, es aconsejable la utilización del control biológico para poder cuantificar la cantidad global absorbida del contaminante), VLB® (Agente químico que tiene Valor Límite Biológico), VLI (Agente químico para el que la U.E. estableció en su día un valor límite indicativo), r (Esta sustancia tiene establecidas restricciones a la fabricación, la comercialización o el uso en los términos especificados en el "Reglamento (CE) nº 1907/2006 sobre Registro, Evaluación, Autorización y Restricción de sustancias y preparados químicos" (REACH) de 18 de diciembre de 2006 (DOUE L 369 de 30 de diciembre de 2006). Las restricciones de una sustancia pueden aplicarse a todos los usos o sólo a usos concretos. El anexo XVII del Reglamento REACH contiene la lista de todas las sustancias restringidas y especifica los usos que se han restringido).
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2024. INSHT
Spain - Biological limit values	
Local name	Tolueno
BLV	0,6 mg/l Parameter: o-Cresol - Medium: urine - Sampling time: end of shift 0,05 mg/l Parameter: Toluene - Medium: blood - Sampling time: start of last shift of workweek 0,08 mg/l Parameter: Toluene - Medium: urine - Sampling time: end of shift
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2024. INSHT
Sweden - Occupational Exposure Limits	
Local name	Toluen
NGV (OEL TWA)	192 mg/m³
	50 ppm
KGV (OEL STEL)	384 mg/m³
	100 ppm
Remark	B (Ämnet kan orsaka hörselskada. Exponering för ämnet nära det befintliga yrkeshygieniska gränsvärdet och vid samtidig exponering för buller nära insatsvärdet 80 dB kan orsaka hörselskada); H (Ämnet kan lätt upptas genom huden. Det föreskrivna gränsvärdet bedöms ge tillräckligt skydd endast under förutsättning att huden är skyddad mot exponering för ämnet ifråga)

toluene (108-88-3)	
Regulatory reference	Hygieniska gränsvärden (AFS 2018:1)
United Kingdom - Occupational Exposure Limits	
Local name	Toluene
WEL TWA (OEL TWA)	191 mg/m³
	50 ppm
WEL STEL (OEL STEL)	384 mg/m³
	100 ppm
Remark	Sk (Can be absorbed through the skin. The assigned substances are those for which there are concerns that dermal absorption will lead to systemic toxicity)
Regulatory reference	EH40/2005 (Fourth edition, 2020). HSE
Iceland - Occupational Exposure Limits	
Local name	Tólúen (fenýlmetan, metýlbensen)
OEL TWA	94 mg/m³
	25 ppm
OEL STEL	188 mg/m³
	50 ppm
Remark	H (efnið getur auðveldlega borist inn í líkamann gegnum húð)
Regulatory reference	Reglugerð um mengunarmörk og aðgerðir til að draga úr mengun á vinnustöðum (Nr. 390/2009)
Norway - Occupational Exposure Limits	
Local name	Toluen
Grenseverdi (OEL TWA)	94 mg/m³
	25 ppm
Remark	H: Kjemikalier som kan tas opp gjennom huden; E: EU har en veiledende grenseverdi og/eller anmerkning for stoffet.
Regulatory reference	FOR-2024-04-05-581
North Macedonia - Occupational Exposure Limits	
Local name	Толуен
OEL TWA	192 mg/m³
	50 ppm
KTV	2
Short time value [mg/m³]	384 mg/m³
Short time value	100 ppm

toluene (108-88-3)	
Remark	(KTV) краткотрајна вредност (КТВ) значи концентрација на опасни хемиски супстанци во воздухот на работното место внатре во зона на дишење, на која работникот без опасност по здравјето може да е изложен на покусо време. Изложеноста на краткотрајни вредности може да трае највеќе 15 минути и не смее да се повтори повеќе од четирипати во работната смена, при што меѓу две изложености на оваа концентрација мора да измине најмалку 60 минути. Краткотрајната вредност е изразена во mg/m3 или во ml/m3(ppm) а е дадена како многукратни дозволени пречекорувања на граничната вредност; (K) својство на полесно пренесување на супстанците во организмот преку кожата; (BAT) биолошка гранична вредност – праг на биолошка гранична вредност, што значи предупредување на опасна хемиска супстанца и нејзини метаболити во ткивата, телесните течности или издишувањето на воздухот, без оглед на тоа, дали опасната хемиска супстанца е внесена во организмот со вдишување, голтање или преку кожата; (EU) European Union – гранична вредност, определена на ниво на Европската унија
Regulatory reference	Правилник за минималните барања за безбедност и здравје при работа на вработени од ризици поврзани со изложување на хемиски супстанци („Службен весник на Република Македонија” бр.46/10)
Switzerland - Occupational Exposure Limits	
Local name	Toluène / Toluol
MAK (OEL TWA)	190 mg/m³
	50 ppm
KZGW (OEL STEL)	760 mg/m³
	200 ppm
Notation	R, R2, SS_C, O^B, B / H, R2, SS_C, O^L, B
Remark	INRS, HSE, NIOSH, DFG
Regulatory reference	www.suva.ch, 01.01.2024
Switzerland - BAT	
Local name	Toluène / Toluol
BAT	600 µg/l Parameter: Toluene - Medium: whole blood - Sampling time: end of shift 6,48 µmol/l Parameter: Toluene - Medium: whole blood - Sampling time: end of shift 2 g/g creatinine Parameter: Hippuric acid - Medium: urine - Sampling time: end of shift, and after several shifts (for long-term exposures) Parameter: Hippuric acid - Medium: urine - Sampling time: end of shift, and after several shifts (for long-term exposures) 0,5 mg/l Parameter: o-Cresol - Medium: urine - Sampling time: end of shift, and after several shifts (for long-term exposures) 4,62 µmol/l Parameter: o-Cresol - Medium: urine - Sampling time: end of shift, and after several shifts (for long-term exposures) 75 µg/l Parameter: Toluol - Medium: urine - Sampling time: end of shift
Regulatory reference	Ordonnance 832.30 (OPA), article 50 al. 3, www.suva.ch/valeurs-limites / Verordnung 832.30 (VUV), Art. 50 Abs. 3, www.suva.ch/grenzwerte

toluene (108-88-3)	
USA - ACGIH - Occupational Exposure Limits	
Local name	Toluene
ACGIH® TLV® TWA	20 ppm
Remark (ACGIH)	TLV® Basis: CNS, visual & hearing impair; female repro system eff; pregnancy loss. Notations: OTO; A4 (Not classifiable as a Human Carcinogen); BEI
Regulatory reference	ACGIH 2024
USA - ACGIH - Biological Exposure Indices	
Local name	Toluene
BEI	0,02 mg/l Parameter: Toluene - Medium: blood - Sampling time: prior to last shift of workweek 0,03 mg/l Parameter: Toluene - Medium: urine - Sampling time: end of shift 0,3 mg/g creatinine Parameter: o-Cresol with hydrolysis - Medium: urine - Sampling time: end of shift (background)
Regulatory reference	ACGIH 2024

n-hexane (110-54-3)	
EU - Indicative Occupational Exposure Limit (IOEL)	
Local name	n-Hexane
IOEL TWA	72 mg/m³
	20 ppm
Regulatory reference	COMMISSION DIRECTIVE 2006/15/EC
Albania - Occupational Exposure Limits	
Local name	n-Hekzan
OEL TWA	72 mg/m³
	20 ppm
Regulatory reference	VENDIM Nr. 522, datë 6.8.2014 PËR MIRATIMIN E RREGULLORES “PËR MBROJTJEN E SIGURISË DHE SHËNDETIT TË PUNËMARRËSVE NGA RISQET E LIDHURA ME AGJENTËT KIMIKË NË PUNË”
Austria - Occupational Exposure Limits	
Local name	n-Hexan
MAK (OEL TWA)	72 mg/m³
	20 ppm
MAK (OEL STEL)	288 mg/m³ (4x 15(Miw) min)
	80 ppm (4x 15(Miw) min)
Remark	Fortpflanzungsgefährdend: f
Regulatory reference	BGBl. II Nr. 156/2021
Belgium - Occupational Exposure Limits	
Local name	n-Hexane # n-Hexaan

n-hexane (110-54-3)	
OEL TWA	72 mg/m³
	20 ppm
Regulatory reference	Koninklijk besluit/Arrêté royal 16/11/2023
Bulgaria - Occupational Exposure Limits	
Local name	n-Хексан
OEL TWA	72 mg/m³
	20 ppm
Remark	• (Химични агенти, за които са определени гранични стойности във въздуха на работната среда за Европейската общност)
Regulatory reference	Наредба № 13 от 30.12.2003 г. за защита на работещите от рискове, свързани с експозиция на химични агенти при работа (изм. и доп. ДВ. бр. 28 от 2024 г., в сила от 05.04.2024 г.)
Croatia - Occupational Exposure Limits	
Local name	n-Heksan
GVI (OEL TWA)	72 mg/m³
	20 ppm
Remark	Direktiva: 2006/15/EZ. Napomena: Koža (razvrstana kao tvar koja nadražuje kožu (H315))
Regulatory reference	Pravilnik o zaštiti radnika od izloženosti opasnim kemikalijama na radu, graničnim vrijednostima izloženosti i biološkim graničnim vrijednostima (NN 148/2023)
Croatia - Biological limit values	
Local name	n-Heksan
BLV	150 µg/l Parameter: n-Hexane - Medium: blood - Sampling time: during exposure 40 ppm Parameter: n-Hexane - Medium: final exhaled air - Sampling time: during exposure 0,2 mg/g creatinine Parameter: 2-Hexanol - Medium: urine - Sampling time: at the end of the work shift (calculated on the average Creatinine value of 1.2 g/L urine) 5,3 mg/g creatinine Parameter: 2,5-Hexanedione - Medium: urine - Sampling time: at the end of the work shift (calculated on the average Creatinine value of 1.2 g/L urine)
Regulatory reference	Pravilnik o zaštiti radnika od izloženosti opasnim kemikalijama na radu, graničnim vrijednostima izloženosti i biološkim graničnim vrijednostima (NN 91/2018)
Cyprus - Occupational Exposure Limits	
Local name	n-εξάνιο
OEL TWA	72 mg/m³
	20 ppm
Regulatory reference	Κανονισμοί του 2007 (Κ.Δ.Π. 295/2007)

n-hexane (110-54-3)	
Czech Republic - Occupational Exposure Limits	
Local name	n-Hexan
PEL (OEL TWA)	70 mg/m³
	19,5 ppm
NPK-P (OEL C)	200 mg/m³
	55,8 ppm
Remark	I - dráždí sliznice (oči, dýchací cesty) resp. kůži, D - při expozici se významně uplatňuje pronikání faktoru kůží, P - u látky nelze vyloučit závažné pozdní účinky (s větou H372, H373).
Regulatory reference	Nařízení vlády č. 361/2007 Sb. (Předpis 330/2023 Sb.)
Denmark - Occupational Exposure Limits	
Local name	n-Hexan
OEL TWA	72 mg/m³
	20 ppm
OEL STEL	144 mg/m³
	40 ppm
Remark	E (betyder, at stoffet har en EF-grænseværdi)
Regulatory reference	BEK nr 291 af 19/03/2024
Estonia - Occupational Exposure Limits	
Local name	n-heksaan
OEL TWA	72 mg/m³
	20 ppm
Regulatory reference	Vabariigi Valitsuse 20. märtsi 2001. a määruse nr 105 (RT I, 02.04.2024, 13)
Finland - Occupational Exposure Limits	
Local name	n-Heksaani
HTP (OEL TWA)	72 mg/m³
	20 ppm
Remark	Iho
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveysministeriö)
France - Occupational Exposure Limits	
Local name	n-Hexane
VME (OEL TWA)	72 mg/m³
	20 ppm
Remark	Valeurs règlementaires contraignantes. Toxique pour la reproduction de catégorie 2
Regulatory reference	Article R4412-149 du Code du travail (réf.: INRS ED 6443, 2022; Outil65; Décret n° 2019-1487; Décret n° 2020-1546; Décret n° 2021-434; Décret n° 2021-1849)

n-hexane (110-54-3)	
France - Biological limit values	
BLV	Parameter: 2,5-Hexanedione - Medium: urine - Sampling time: end of shift (per the Authority, the values for this substance must be decided and/or determined on a case by case basis. Guidance for the calculation of and interpretation of values is provided in the source)
Germany - Occupational Exposure Limits (TRGS 900)	
Local name	n-Hexan
Occupational exposure limit value (mg/m³) (TRGS900)	180 mg/m³
Occupational exposure limit value (ppm) (TRGS900)	50 ppm
Peak exposure limitation factor	8(II)
Remark	DFG - Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe der DFG (MAK-Kommission); EU - Europäische Union (Von der EU wurde ein Luftgrenzwert festgelegt: Abweichungen bei Wert und Spitzenbegrenzung sind möglich); Y - Ein Risiko der Fruchtschädigung braucht bei Einhaltung des Arbeitsplatzgrenzwertes und des biologischen Grenzwertes (BGW) nicht befürchtet zu werden
Regulatory reference	TRGS900
Germany - Biological limit values (TRGS 903)	
Local name	Hexan (n-Hexan)
Biological limit value	5 mg/l Parameter: 2,5-Hexandion plus 4,5-Dihydroxy-2-hexanon (nach Hydrolyse) - Untersuchungsmaterial: U = Urin - Probenahmezeitpunkt: b) Expositionsende, bzw. Schichtende - Festlegung/Begründung: 05/2013 DFG
Regulatory reference	TRGS 903
Gibraltar - Occupational Exposure Limits	
Local name	n-Hexane
OEL TWA	72 mg/m³
	20 ppm
Regulatory reference	Factories (Control of Chemical Agents at Work) Regulations 2003 (LN. 2018/181)
Greece - Occupational Exposure Limits	
Local name	Εξάνιο, n− (n− εξάνιο)
OEL TWA	72 mg/m³
	20 ppm
Regulatory reference	Π.Δ. 162/2007 - Προστασία της υγείας των εργαζομένων που εκτίθενται σε ορισμένους χημικούς παράγοντες κατά τη διάρκεια της εργασίας τους
Hungary - Occupational Exposure Limits	
Local name	n-HEXÁN
AK (OEL TWA)	72 mg/m³

n-hexane (110-54-3)	
Remark	b (Bőrön át is felszívódik), i (ingerlő anyag, amely izgatja a bőrt, nyálkahártyát, szemet vagy mindhármat), BEM (biológiai expozíciós mutató); EU2 (2006/15/EK irányelvben közölt érték); T (Azok az anyagok, amelyek egészségkárosító hatása TARTÓS expozíciót követően jelentkezik)
Regulatory reference	5/2020. (II. 6.) ITM rendelet - A kémiai kóroki tényezők hatásának kitett munkavállalók egészségének és biztonságának védelméről
Hungary - Biological Exposure Indices	
Local name	n-Hexán
BEI	2 mg/l Biológiai expozíciós (hatás) mutató: 2,5-hexán-dion (hidrolízis után) - Biológiai minta: vizeletben - Mintavétel ideje: m.v. (műszak végén) 18 µmol/l Biológiai expozíciós (hatás) mutató: 2,5-hexán-dion (hidrolízis után) - Biológiai minta: vizeletben - Mintavétel ideje: m.v. (műszak végén)
Regulatory reference	5/2020. (II. 6.) ITM rendelet - A kémiai kóroki tényezők hatásának kitett munkavállalók egészségének és biztonságának védelméről
Ireland - Occupational Exposure Limits	
Local name	n-Hexane
OEL TWA	72 mg/m³
	20 ppm
Remark	IOELV (Indicative Occupational Exposure Limit Values), Skin (Substances which have the capacity to penetrate intact skin when they come in contact with it and be absorbed into the body. A substantial contribution to the total body burden via dermal exposure is possible)
Regulatory reference	Chemical Agents Code of Practice 2024
Ireland - Biological limit values	
Local name	Hexane
BMGV	0,4 mg/l Parameter: 2,5-Hexanedion - Medium: urine - Sampling time: End of shift at end of workweek
Regulatory reference	Biological Monitoring Guidelines (HSA, 2011)
Italy - Occupational Exposure Limits	
Local name	n-Esano
OEL TWA	72 mg/m³
	20 ppm
Regulatory reference	Allegato XXXVIII del Decreto Legislativo 4 settembre 2024, n. 135
Latvia - Occupational Exposure Limits	
Local name	n-Heksāns
OEL TWA	72 mg/m³
	20 ppm
Remark	Ietekme uz dzirdi
Regulatory reference	Ministru kabineta 2007. gada 15. maija noteikumiem Nr. 325 (Grozījumi Ministru kabineta 2024. gada 26. martā noteikumiem Nr. 191).

n-hexane (110-54-3)	
Lithuania - Occupational Exposure Limits	
Local name	n-heksanas
IPRV (OEL TWA)	72 mg/m³
	20 ppm
Remark	R (reprodukcijai toksiškas poveikis)
Regulatory reference	LIETUVOS HIGIENOS NORMA HN 23:2011 (Nr. V-695/A1-272, 2018-06-12)
Luxembourg - Occupational Exposure Limits	
Local name	n-Hexane
OEL TWA	72 mg/m³
	20 ppm
Regulatory reference	Mémorial A N° 226 de 2021 concernant la protection de la sécurité et de la santé des salariés contre les risques liés à des agents chimiques sur le lieu de travail
Malta - Occupational Exposure Limits	
Local name	n-Hexane
OEL TWA	72 mg/m³
	20 ppm
Regulatory reference	S.L. 424.24 - Chemical Agents at Work Regulations (L.N. 356 of 2021) # L.S. 424.24 - Regolamenti dwar Aġenti Kimiċi fuq il-Post tax-Xogħol (A.L. 356 tal-2021)
Netherlands - Occupational Exposure Limits	
Local name	n-Hexaan
TGG-8u (OEL TWA)	72 mg/m³
	20 ppm
TGG-15min (OEL STEL)	144 mg/m³
	40 ppm
Regulatory reference	Arbeidsomstandighedenregeling 2024
Poland - Occupational Exposure Limits	
Local name	Heksan
NDS (OEL TWA)	72 mg/m³
Remark	Skóra (Oznakowanie substancji notacją „skóra” oznacza, że wchłanianie substancji przez skórę może być tak samo istotne jak przy narażeniu drogą oddechową).
Regulatory reference	Dz. U. 2024 poz. 1017 wraz z późn. zm.
Portugal - Indicative Occupational Exposure Limit (IOEL)	
Local name	n-Hexano
IOEL TWA	72 mg/m³
	20 ppm

n-hexane (110-54-3)	
Regulatory reference	Decreto-Lei n.º 1/2021 de 6 de janeiro
Portugal - Occupational Exposure Limits	
Local name	n-Hexano
OEL TWA	50 ppm
Remark	P (Toxicidade percutânea); IBE (Índice biológico de exposição)
Regulatory reference	Norma Portuguesa NP 1796:2014
Portugal - Biological Exposure Indices	
Local name	n-Hexano
BEI	0,4 mg/l Parâmetro: 2,5-Hexanodiona - Meio: urina - Momento da amostragem: Fim do turno no fim da semana de trabalho - Notaçao: Sem hidrólise
Regulatory reference	Norma Portuguesa NP 1796:2014
Romania - Occupational Exposure Limits	
Local name	n-Hexan
OEL TWA	72 mg/m³
	20 ppm
Remark	R2 - susceptibil de a dăuna fertilității
Regulatory reference	Hotărârea Guvernului nr. 1.218/2006 (Hotărârea nr. 179/2024)
Romania - Biological limit values	
Local name	N-hexan
BLV	5 mg/g creatinine Parameter: 2,5-Hexandion - Medium: urine - Sampling time: end of shift
Regulatory reference	Hotărârea Guvernului nr. 1.218/2006 (Hotărârea nr. 179/2024)
Serbia - Occupational Exposure Limits	
Local name	н-хексан
OEL TWA	72 mg/m³
	20 ppm
Remark	ЕУ** – напомена да се ради о хемијским материјама за које су утврђене индикативне граничне вредности изложености према Директиви 2006/15/ЕЗ (друга листа)
Regulatory reference	ПРАВИЛНИК о превентивним мерама за безбедан и здрав рад при излагању хемијским материјама („Службени гласник РС”, бр. 106/09, 117/17 и 107/21)
Slovakia - Occupational Exposure Limits	
Local name	n-Hexán
NPHV (OEL TWA)	72 mg/m³
	20 ppm
NPHV (OEL STEL)	140 mg/m³

n-hexane (110-54-3)	
	40 ppm
Regulatory reference	Nariadenie vlády č. 355/2006 Z. z. (122/2024 Z. z.)
Slovakia - Biological limit values	
Local name	n-Hexán
BLV	5 mg/l Parameter: 2,5-Hexanedione - Medium: urine - Sampling time: end of exposure or work shift 5 mg/l Parameter: 4,5-Dihydroxy-2-hexanone - Medium: urine - Sampling time: end of exposure or work shift
Regulatory reference	Nariadenie vlády č. 355/2006 Z. z. (122/2024 Z. z.)
Slovenia - Occupational Exposure Limits	
Local name	n-heksan
OEL TWA	72 mg/m³
	20 ppm
OEL STEL	576 mg/m³
	160 ppm
Remark	Y (Snovi, pri katerih ni nevarnosti za zarodek ob upoštevanju mejnih vrednosti in bat vrednosti), BAT (Biološka mejna vrednost), EU
Regulatory reference	Uradni list RS, št. 29/2024 z dne 4. 4. 2024 - Pravilnik o varovanju delavcev pred tveganji zaradi izpostavljenosti kemičnim snovem pri delu
Slovenia - Biological limit values	
Local name	n-heksan
BLV	5 mg/l Parameter: 2,5-heksandion in 4,5-dihidroksi-2-heksanon (po hidrolizi) - Biološki vzorec: urin - Čas vzorčenja: ob koncu delovne izmene
Regulatory reference	Uradni list RS, št. 29/24 z dne 4. 4. 2024 - Pravilnik o varovanju delavcev pred tveganji zaradi izpostavljenosti kemičnim snovem pri delu
Spain - Occupational Exposure Limits	
Local name	n-Hexano
VLA-ED (OEL TWA)	72 mg/m³
	20 ppm
Remark	VLB® (Agente químico que tiene Valor Límite Biológico), VLI (Agente químico para el que la U.E. estableció en su día un valor límite indicativo).
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2024. INSHT
Spain - Biological limit values	
Local name	n-Hexano
BLV	0,2 mg/l Parameter: 2,5-Hexanedione - Medium: urine - Sampling time: end of workweek (without hydrolysis)
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2024. INSHT

n-hexane (110-54-3)	
Sweden - Occupational Exposure Limits	
Local name	n-Hexan
NGV (OEL TWA)	72 mg/m³
	20 ppm
KGV (OEL STEL)	180 mg/m³
	50 ppm
Regulatory reference	Hygieniska gränsvärden (AFS 2018:1)
United Kingdom - Occupational Exposure Limits	
Local name	n-Hexane
WEL TWA (OEL TWA)	72 mg/m³
	20 ppm
Regulatory reference	EH40/2005 (Fourth edition, 2020). HSE
Iceland - Occupational Exposure Limits	
Local name	n-Hexan
OEL TWA	72 mg/m³
	20 ppm
Regulatory reference	Reglugerð um mengunarmörk og aðgerðir til að draga úr mengun á vinnustöðum (Nr. 390/2009)
Norway - Occupational Exposure Limits	
Local name	n-heksan
Grenseverdi (OEL TWA)	72 mg/m³
	20 ppm
Remark	R: Kjemikalier som skal betraktes som reproduksjonstoksiske; E: EU har en veiledende grenseverdi og/eller anmerkning for stoffet.
Regulatory reference	FOR-2024-04-05-581
North Macedonia - Occupational Exposure Limits	
Local name	n-хексан
OEL TWA	72 mg/m³
	20 ppm

n-hexane (110-54-3)	
Remark	(*) дополнување на граничната вредност заради донесената Директива на Комисијата 2006/15ES од 7 февруари 2006 за создавање на втора листа на индикативни гранични вредности за професионална изложеност според директивата 98/24/EC и за измените на директивата 91/322/EEC и директивата 2000/39/ EC (Сл. весник бр. 38 од ден 9.2.2006, стр. 36); (BAT) биолошка гранична вредност – праг на биолошка гранична вредност, што значи предупредување на опасна хемиска супстанца и нејзини метаболити во ткивата, телесните течности или издишувањето на воздухот, без оглед на тоа, дали опасната хемиска супстанца е внесена во организмот со вдишување, голтање или преку кожата; (EU) European Union – гранична вредност, определена на ниво на Европската унија
Regulatory reference	Правилник за минималните барања за безбедност и здравје при работа на вработени од ризици поврзани со изложување на хемиски супстанци („Службен весник на Република Македонија" бр.46/10)
Switzerland - Occupational Exposure Limits	
Local name	n-Hexane / n-Hexan
MAK (OEL TWA)	180 mg/m³
	50 ppm
KZGW (OEL STEL)	1440 mg/m³
	400 ppm
Notation	R, R2, SS_C, B / H, R2, SS_C, B
Remark	NIOSH
Regulatory reference	www.suva.ch, 01.01.2024
Switzerland - BAT	
Local name	n-Hexane / n-Hexan
BAT	5 mg/l Parameter: 2,5-Hexanedione plus 4,5-Dihydroxy-2-hexanone - Medium: urine - Sampling time: end of shift
Remark	Paramètre non spécifique. / Nicht spezifischer Parameter.
Regulatory reference	Ordonnance 832.30 (OPA), article 50 al. 3, www.suva.ch/valeurs-limites / Verordnung 832.30 (VUV), Art. 50 Abs. 3, www.suva.ch/grenzwerte
USA - ACGIH - Occupational Exposure Limits	
Local name	n-Hexane
ACGIH® TLV® TWA	50 ppm
Remark (ACGIH)	TLV® Basis: CNS impair; peripheral neuropathy; eye irr. Notations: Skin; BEI
Regulatory reference	ACGIH 2024
USA - ACGIH - Biological Exposure Indices	
Local name	n-Hexane
BEI	0,5 mg/l Parameter: 2,5-Hexanedione without hydrolysis - Medium: urine - Sampling time: end of shift
Regulatory reference	ACGIH 2024

8.1.2. Recommended monitoring procedures

Monitoring methods	
Monitoring methods	Personal air monitoring. Room air monitoring.

8.1.3. Air contaminants formed

No additional information available

8.1.4. DNEL and PNEC

STRAIGHT RUN GASOLINE (68606-11-1)	
DNEL/DMEL (workers)	
Acute - systemic effects, inhalation	(15min) 1300 mg/m³
Acute - local effects, inhalation	(15min) 1100 mg/m³
Long-term - local effects, inhalation	(8h) 840 mg/m³
DNEL/DMEL (general population)	
Acute - systemic effects, inhalation	(15min) 1200 mg/m³
Acute - local effects, inhalation	(15min) 640 mg/m³
Long-term - local effects, inhalation	(24h) 180 mg/m³

Additional information : Occupational Exposure Limits :. Not applicable. Recommended monitoring procedures :. Personal air monitoring. Room air monitoring

8.1.5. Control banding

No additional information available

8.2. Exposure controls

Engineering measure(s) : Provide adequate ventilation. Organisational measures to prevent/limit releases, dispersion and exposure. See Section 7 for information on safe handling. Use only outdoors or in a well-ventilated area. Handle substance within a closed system. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Take precautionary measures against static discharges. Ensure equipment is adequately earthed. Use explosion-proof machinery, apparatus, ventilation facilities, tools etc.

Personal protective equipment : The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hand protection	:	Wear chemically resistant gloves (tested to EN374) . Suitable material: rubber gloves, NBR (Nitrile rubber). Breakthrough time : > 360 minutes. Thickness of the glove material: Not determined. The quality of the protective gloves resistant to chemicals must be chosen as a function of the specific working place concentration and quantity of hazardous substances.
Eye protection	:	Use suitable eye protection (EN166): goggles
Body protection	:	Wear suitable coveralls to prevent exposure to the skin
Respiratory protection	:	In case of insufficient ventilation, wear suitable respiratory equipment. Self-contained open-circuit compressed air breathing apparatus (EN 137). Employees of the Processing Block full face mask with ABEK2 P3 filters; Other employees and contractors half mask with filters ABEK1 P2 . The filter class must be suitable for the maximum contaminant concentration (gas/vapour/aerosol/particulates) that may arise when handling the product. If the concentration is exceeded, self-contained breathing apparatus must be used.
Thermal hazard protection	:	Not required for normal conditions of use. Use dedicated equipment.
Environmental exposure controls	:	Do not allow to enter into surface water or drains. Comply with applicable Community environmental protection legislation. Avoid release to the environment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	:	Liquid
Colour	:	Colourless.
Appearance	:	Liquid.
Odour	:	petroleum hydrocarbon odour.
Odour threshold	:	No data available
Melting / freezing point	:	No data available
Freezing point	:	Not available
Initial boiling point and boiling range	:	30 (30 – 180) °C
Flammability	:	Extremely flammable liquid and vapour.
Explosive properties	:	Not applicable. The study does not need to be conducted because there are no chemical groups associated with explosive properties present in the molecule.
Oxidising properties	:	Not applicable. The classification procedure needs not to be applied because there are no chemical groups present in the molecule which are associated with oxidising properties.
Lower explosion limit	:	Not available
Upper explosion limit	:	Not available
Flash point	:	< -40 °C Literature data
Auto-ignition temperature	:	280 – 450 °C
Decomposition temperature	:	No data available
pH	:	Not applicable
Kinematic viscosity	:	< 20,5 mm^2/s (40 °C)
Dynamic viscosity	:	Not applicable
Solubility	:	No additional information available.
Partition coefficient n-octanol/water (Log Kow)	:	Substance is complex UVCB. No data available

Vapour pressure	:	80 kPa
Vapour pressure at 50°C	:	≤ 110 kPa
Density	:	Not available
Relative density	:	0,64 – 0,745 g/cm³ (15°C)
Vapour density	:	3 – 5 (Air=1)
Particle characteristics	:	Not applicable

9.2. Other information

9.2.1. Information with regard to physical hazard classes

Explosion limits : 1,4 – 7,6 vol %

9.2.2. Other safety characteristics

Relative evaporation rate (butylacetate=1) : < 1

SECTION 10: Stability and reactivity

10.1. Reactivity

Extremely flammable liquid and vapour. Reference to other sections: 10.4 & 10.5.

10.2. Chemical stability

The product is stable under storage at normal ambient temperatures.

10.3. Possibility of hazardous reactions

Vapours may form explosive mixture with air.

10.4. Conditions to avoid

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Protect from sunlight. See Section 7 for information on safe handling.

10.5. Incompatible materials

Strong acids. Strong bases. Strong oxidizing agents. Halogenated compounds. See Section 7 for information on safe handling.

10.6. Hazardous decomposition products

Does not decompose when used for intended uses. Thermal decomposition can lead to the escape of irritating gases and vapours. Carbon oxides (CO, CO2). Sulphur oxides. Sulphuric acid. Hydrogen sulfide. Reference to other sections 5.2.

SECTION 11: Toxicological information

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

Acute toxicity (oral)	:	Not classified (Based on available data, the classification criteria are not met)
Acute toxicity (dermal)	:	Not classified (Based on available data, the classification criteria are not met)
Acute toxicity (inhalation)	:	Not classified (Based on available data, the classification criteria are not met)

benzene (71-43-2)	
LD50/oral/rat	> 2000 mg/kg
LD50/dermal/rabbit	> 8200 mg/kg
LC50/inhalation/4h/rat	44,66 mg/l/4h

toluene (108-88-3)	
LD50/oral/rat	2600 mg/kg (Source: JAPAN_GHS)
LD50/dermal/rabbit	12000 mg/kg (Source: JAPAN_GHS)
LC50/inhalation/4h/rat	12,5 mg/l/4h

Gasoline, straight run, topping plant (68606-11-1)	
LD50/oral/rat	> 5000 mg/kg
LD50/dermal/rat	> 2000 mg/kg
LD50/dermal/rabbit	> 6000 mg/kg (Source: ECHA_API)
LC50/inhalation/4h/rat	> 5610 mg/m³

n-hexane (110-54-3)	
LD50/oral/rat	25 g/kg (Source: NLM_CIP)
LD50/dermal/rabbit	3000 mg/kg (Source: NLM_CIP)
LC50/inhalation/4h/rat (ppm)	48000 ppm/4h

Skin corrosion/irritation : Causes skin irritation.
pH: Not applicable

Serious eye damage/irritation : Not classified (Based on available data, the classification criteria are not met)
pH: Not applicable

Respiratory or skin sensitisation : Not classified (Based on available data, the classification criteria are not met)

Germ cell mutagenicity : May cause genetic defects.

Carcinogenicity : May cause cancer.

benzene (71-43-2)	
IARC group	1 - Carcinogenic to humans

toluene (108-88-3)	
IARC group	3 - Not classifiable

Reproductive toxicity : Suspected of damaging fertility. Suspected of damaging the unborn child.

STOT-single exposure : May cause drowsiness or dizziness.

toluene (108-88-3)	
STOT-single exposure	May cause drowsiness or dizziness.

Gasoline, straight run, topping plant (68606-11-1)	
STOT-single exposure	May cause drowsiness or dizziness.

Gasoline, straight run, topping plant (68606-11-1)	
LOAEL, male, acute, Inhalation, Rat, systemic	4320 mg/m³ (1 hours)

n-hexane (110-54-3)	
STOT-single exposure	May cause drowsiness or dizziness.

STOT-repeated exposure : Not classified (Based on available data, the classification criteria are not met)

benzene (71-43-2)	
STOT-repeated exposure	Causes damage to organs through prolonged or repeated exposure.

toluene (108-88-3)	
STOT-repeated exposure	May cause damage to organs through prolonged or repeated exposure.

n-hexane (110-54-3)	
STOT-repeated exposure	May cause damage to organs through prolonged or repeated exposure.

Aspiration hazard : May be fatal if swallowed and enters airways.

STRAIGHT RUN GASOLINE (68606-11-1)	
Kinematic viscosity	< 20,5 mm²/s (40 °C)

11.2. Information on other hazards

11.2.1. Endocrine disrupting properties

Adverse health effects caused by endocrine disrupting properties : The substance is not included in the list established in accordance with Article 59(1) of REACH for having endocrine disrupting properties, or is not identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605

11.2.2. Other information

Other information : Symptoms related to the physical, chemical and toxicological characteristics,For further information see section 4

SECTION 12: Ecological information

12.1. Toxicity

Environmental properties : Toxic to aquatic life with long lasting effects.

Hazardous to the aquatic environment, short–term (acute) : Not classified

Hazardous to the aquatic environment, long–term (chronic) : Toxic to aquatic life with long lasting effects.

benzene (71-43-2)	
LC50 - Fish [1]	10,7 – 14,7 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through])

benzene (71-43-2)	
LC50 - Fish [2]	5,3 mg/l (Exposure time: 96 h - Species: Oncorhynchus mykiss [flow-through])
EC50 - Crustacea [1]	8,76 – 15,6 mg/l (Exposure time: 48 h - Species: Daphnia magna [Static])
EC50 - Crustacea [2]	10 mg/l (Exposure time: 48 h - Species: Daphnia magna)
EC50 72h - Algae [1]	29 mg/l (Species: Pseudokirchneriella subcapitata)

toluene (108-88-3)	
LC50 - Fish [1]	15,22 – 19,05 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through] Source: EPA)
LC50 - Fish [2]	12,6 mg/l (Exposure time: 96 h - Species: Pimephales promelas [static] Source: EPA)
EC50 - Crustacea [1]	5,46 – 9,83 mg/l (Exposure time: 48 h - Species: Daphnia magna [Static])
EC50 - Crustacea [2]	11,5 mg/l (Exposure time: 48 h - Species: Daphnia magna)
EC50 72h - Algae [1]	12,5 mg/l (Species: Pseudokirchneriella subcapitata [static])
EC50 96h - Algae [1]	> 433 mg/l (Species: Pseudokirchneriella subcapitata)

Gasoline, straight run, topping plant (68606-11-1)	
EC50 72h - Algae [1]	4700 mg/l (Species: Pseudokirchneriella subcapitata)
LL50, fish, acute, Freshwater, Pimephales promelas (fathead minnow)	8.2 mg/l (96 hours, equivalent or similar to EPA 66013-75-009)
NOELR, fish, Chronic, Freshwater, Pimephales promelas (fathead minnow)	2.6 mg/l (14 days, OECD 204)
EL50, daphnia, acute, Freshwater, daphnia	4.5 mg/l (48 hours, OECD Test Guideline 202)
NOELR, daphnia, Chronic, Freshwater, daphnia	2.6 mg/l (21 days, OECD 211)
EL50, algae, Freshwater, Pseudokirchneriella subcapitata	3.1 mg/l (72 hours, OECD Test Guideline 201)
LL50, microorganisms, Freshwater, Tetrahymena pyrifomis	15.41 mg/l (72 hours, Quantitative structure-activity relationship (QSAR))

n-hexane (110-54-3)	
LC50 - Fish [1]	2,1 – 2,98 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through] Source: EPA)

12.2. Persistence and degradability

STRAIGHT RUN GASOLINE (68606-11-1)	
Persistence and degradability	Not applicable.

12.3. Bioaccumulative potential

STRAIGHT RUN GASOLINE (68606-11-1)	
Partition coefficient n-octanol/water (Log Kow)	Substance is complex UVCB. No data available
Bioaccumulative potential	No additional information available.

benzene (71-43-2)	
BCF - Fish [1]	3,5 – 4,4
Partition coefficient n-octanol/water	2,1

toluene (108-88-3)	
Partition coefficient n-octanol/water	2,73 (at 20 °C (at pH 7)

n-hexane (110-54-3)	
Partition coefficient n-octanol/water	4 (at 20 °C (at pH 7)

12.4. Mobility in soil

STRAIGHT RUN GASOLINE (68606-11-1)	
Mobility in soil	No data available
Ecology - soil	No data available.

12.5. Results of PBT and vPvB assessment

STRAIGHT RUN GASOLINE (68606-11-1)	
Results of PBT assessment	This substance does not meet the PBT/vPvB criteria of REACH, annex XIII.

12.6. Endocrine disrupting properties

Adverse effects on the environment caused by endocrine disrupting properties : The substance is not included in the list established in accordance with Article 59(1) of REACH for having endocrine disrupting properties, or is not identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605.

12.7. Other adverse effects

Other adverse effects : No data available.

SECTION 13: Disposal considerations

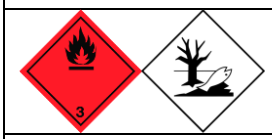
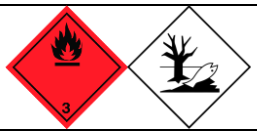
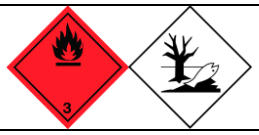
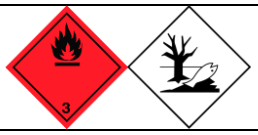
13.1. Waste treatment methods

Product/Packaging disposal recommendations : Avoid release to the environment. Dispose of empty containers and wastes safely. See Section 7 for information on safe handling. Refer to manufacturer/supplier for information on recovery/recycling. Recycling is preferred to disposal or incineration. If recycling is not possible, eliminate in accordance with local valid waste disposal regulations. Handle contaminated packages in the same way as the substance itself. Dispose of contaminated materials in accordance with current regulations. Packaging contaminated by the product : Do not pierce or burn, even after use. Never use pressure to empty container.

European waste catalogue (2001/573/EC, 75/442/EEC, 91/689/EEC) : This material and its container must be disposed of as hazardous waste
Waste codes should be assigned by the user, preferably in discussion with the waste disposal authorities
The following Waste Codes are only suggestions:
13 07 02* - petrol
15 01 10* - packaging containing residues of or contaminated by dangerous substances

SECTION 14: Transport information

In accordance with ADR / RID / IMDG / IATA / ADN

ADR	IMDG	IATA	ADN	RID
14.1. UN number or ID number				
1268	1268	1268	1268	1268
14.2. UN proper shipping name				
PETROLEUM DISTILLATES, N.O.S. (CONTAINS : STRAIGHT RUN GASOLINE)	PETROLEUM DISTILLATES, N.O.S. (CONTAINS : STRAIGHT RUN GASOLINE)	Petroleum distillates, n.o.s. (CONTAINS : STRAIGHT RUN GASOLINE)	PETROLEUM DISTILLATES, N.O.S. (CONTAINS : STRAIGHT RUN GASOLINE)	PETROLEUM DISTILLATES, N.O.S. (CONTAINS : STRAIGHT RUN GASOLINE)
Transport document description				
UN 1268 PETROLEUM DISTILLATES, N.O.S. (CONTAINS : STRAIGHT RUN GASOLINE), 3, I, (D/E), ENVIRONMENTALLY HAZARDOUS	UN 1268 PETROLEUM DISTILLATES, N.O.S. (CONTAINS : STRAIGHT RUN GASOLINE), 3, I, MARINE POLLUTANT/ENVIRONMENTALLY HAZARDOUS	UN 1268 Petroleum distillates, n.o.s. (CONTAINS : STRAIGHT RUN GASOLINE), 3, I, ENVIRONMENTALLY HAZARDOUS	UN 1268 PETROLEUM DISTILLATES, N.O.S. (CONTAINS : STRAIGHT RUN GASOLINE), 3, I, ENVIRONMENTALLY HAZARDOUS	UN 1268 PETROLEUM DISTILLATES, N.O.S. (CONTAINS : STRAIGHT RUN GASOLINE), 3, I, ENVIRONMENTALLY HAZARDOUS
14.3. Transport hazard class(es)				
3	3	3	3	3
				
14.4. Packing group				
I	I	I	I	I
14.5. Environmental hazards				
Dangerous for the environment : Yes	Dangerous for the environment : Yes	Dangerous for the environment : Yes	Dangerous for the environment : Yes	Dangerous for the environment : Yes

ADR	IMDG	IATA	ADN	RID
	Marine pollutant : Yes			
No supplementary information available				

14.6. Special precautions for user

Special precautions for user : No data available

- Overland transport

Classification code (ADR) : F1
Special provisions : 664
Limited quantities (ADR) : 500ml
Excepted quantities (ADR) : E3
Packing instructions (ADR) : P001
Mixed packing provisions (ADR) : MP7, MP17
Portable tank and bulk container instructions (ADR) : T11
Portable tank and bulk container special provisions (ADR) : TP1, TP8
Tank code (ADR) : L4BN
Vehicle for tank carriage : FL
Transport category (ADR) : 1
Special provisions for carriage - Operation (ADR) : S2, S20
Hazard identification number (Kemler No.) : 33
Orange plates :

Tunnel restriction code : D/E
EAC code : 3YE

- Transport by sea

Limited quantities (IMDG) : 500 ml
Excepted quantities (IMDG) : E3
Packing instructions (IMDG) : P001
Tank instructions (IMDG) : T11
Tank special provisions (IMDG) : TP1, TP8
EmS-No. (Fire) : F-E
EmS-No. (Spillage) : S-E
Stowage category (IMDG) : E
Properties and observations (IMDG) : Immiscible with water.

- Air transport

PCA Excepted quantities (IATA) : E3
PCA Limited quantities (IATA) : Forbidden
PCA limited quantity max net quantity (IATA) : Forbidden
PCA packing instructions (IATA) : 351

PCA max net quantity (IATA) : 1L
CAO packing instructions (IATA) : 361
CAO max net quantity (IATA) : 30L
Special provisions (IATA) : A3
ERG code (IATA) : 3H

- Inland waterway transport

Classification code (ADN) : F1
Limited quantities (ADN) : 500 ml
Excepted quantities (ADN) : E3
Carriage permitted (ADN) : T
Equipment required (ADN) : PP, EX, A
Ventilation (ADN) : VE01
Number of blue cones/lights (ADN) : 1

- Rail transport

Classification code (RID) : F1
Limited quantities (RID) : 500ml
Excepted quantities (RID) : E3
Packing instructions (RID) : P001
Mixed packing provisions (RID) : MP7, MP17
Portable tank and bulk container instructions (RID) : T11
Portable tank and bulk container special provisions (RID) : TP1, TP8
Tank codes for RID tanks (RID) : L4BN
Transport category (RID) : 1
Hazard identification number (RID) : 33

14.7. Maritime transport in bulk according to IMO instruments

Code: IBC : No data available.

SECTION 15: Regulatory information

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

15.1.1. EU-Regulations

REACH Annex XVII (Restriction List)

EU restriction list (REACH Annex XVII)		
Reference code	**Applicable on**	**Entry title or description**
5.	benzene	Benzene
28.	STRAIGHT RUN GASOLINE ; benzene ; Gasoline, straight run, topping plant	Substances which are classified as carcinogen category 1A or 1B in Part 3 of Annex VI to Regulation (EC) No 1272/2008 and are listed in Appendix 1 or Appendix 2, respectively.

EU restriction list (REACH Annex XVII)		
Reference code	**Applicable on**	**Entry title or description**
29.	STRAIGHT RUN GASOLINE ; benzene ; Gasoline, straight run, topping plant	Substances which are classified as germ cell mutagen category 1A or 1B in Part 3 of Annex VI to Regulation (EC) No 1272/2008 and are listed in Appendix 3 or Appendix 4, respectively.
3(a)	STRAIGHT RUN GASOLINE ; benzene ; toluene ; Gasoline, straight run, topping plant ; n-hexane	Substances or mixtures fulfilling the criteria for any of the following hazard classes or categories set out in Annex I to Regulation (EC) No 1272/2008: Hazard classes 2.1 to 2.4, 2.6 and 2.7, 2.8 types A and B, 2.9, 2.10, 2.12, 2.13 categories 1 and 2, 2.14 categories 1 and 2, 2.15 types A to F
3(b)	STRAIGHT RUN GASOLINE ; benzene ; toluene ; Gasoline, straight run, topping plant ; n-hexane	Substances or mixtures fulfilling the criteria for any of the following hazard classes or categories set out in Annex I to Regulation (EC) No 1272/2008: Hazard classes 3.1 to 3.6, 3.7 adverse effects on sexual function and fertility or on development, 3.8 effects other than narcotic effects, 3.9 and 3.10
3(c)	STRAIGHT RUN GASOLINE ; Gasoline, straight run, topping plant ; n-hexane	Substances or mixtures fulfilling the criteria for any of the following hazard classes or categories set out in Annex I to Regulation (EC) No 1272/2008: Hazard class 4.1
40.	STRAIGHT RUN GASOLINE ; benzene ; toluene ; Gasoline, straight run, topping plant ; n-hexane	Substances classified as flammable gases category 1 or 2, flammable liquids categories 1, 2 or 3, flammable solids category 1 or 2, substances and mixtures which, in contact with water, emit flammable gases, category 1, 2 or 3, pyrophoric liquids category 1 or pyrophoric solids category 1, regardless of whether they appear in Part 3 of Annex VI to Regulation (EC) No 1272/2008 or not.
48.	toluene	Toluene
72.	benzene	The substances listed in column 1 of the Table in Appendix 12

REACH Annex XIV (Authorisation List)

Not listed on REACH Annex XIV (Authorisation List)

REACH Candidate List (SVHC)

Contains no substance(s) listed on the REACH Candidate List

PIC Regulation (Prior Informed Consent)

Not listed on the PIC list (Regulation EU 649/2012)

POP Regulation (Persistent Organic Pollutants)

Not listed on the POP list (Regulation EU 2019/1021)

Ozone Regulation (2024/590)

Not listed on the Ozone Depletion list (Regulation EU 2024/590)

Council Regulation (EC) for the control of dual-use items

Contains no substance subject to the COUNCIL REGULATION (EC) for the control of dual-use items

Explosives Precursors Regulation (EU 2019/1148)

Contains no substance(s) listed on the Explosives Precursors list (Regulation EU 2019/1148 on the marketing and use of explosives precursors)

Drug Precursors Regulation (EC 273/2004)

Contains substance(s) listed on the Drug Precursors list (Regulation EC 273/2004 on the manufacture and the placing on market of certain substances used in the illicit manufacture of narcotic drugs and psychotropic substances)

Name	CN designation	CAS-No.	CN code	Category, Subcategory	Threshold	Annex
Toluene		108-88-3	2902 30 00	Category 3		Annex I

Detergent Regulation (648/2004/EC): Labelling of contents

Labelling for contents according to regulation (EC) No. 648/2004 : Not applicable

15.1.2. National regulations

France

Occupational diseases	
Code	Description
RG 4	Hematopathies caused by benzene and all products containing it
RG 4 BIS	Gastrointestinal disorders caused by benzene, toluene, xylenes and all products containing them
RG 59	Occupational poisoning by hexane
RG 84	Conditions caused by liquid organic solvents for professional use: saturated or unsaturated aliphatic or cyclic liquid hydrocarbons and mixtures thereof; liquid halogenated hydrocarbons; nitrated derivatives of aliphatic hydrocarbons; alcohols; glycols, glycol ethers; ketones; aldehydes; aliphatic and cyclic ethers, including tetrahydrofuran; esters; dimethylformamide and dimethylacetamine; acetonitrile and propionitrile; pyridine; dimethylsulfone and dimethylsulfoxide

Installations classées			
No ICPE	Désignation de la rubrique	Code Régime	Rayon
4734.text	Produits pétroliers spécifiques et carburants de substitution : essences et naphtas ; kérosènes (carburants d'aviation compris) ; gazoles (gazole diesel, gazole de chauffage domestique et mélanges de gazoles compris) ; fioul lourd ; carburants de substitution pour véhicules, utilisés aux mêmes fins et aux mêmes usages et présentant des propriétés similaires en matière d'inflammabilité et de danger pour l'environnement. La quantité totale susceptible d'être présente dans les installations y compris dans les cavités souterraines étant :		
4734.1a	1. Pour les cavités souterraines et les stockages enterrés : a) Supérieure ou égale à 2 500 t Quantité seuil bas au sens de l'article R. 511-10 : 2 500 t. Quantité seuil haut au sens de l'article R. 511-10 : 25 000 t.	A	
4734.1b	1. Pour les cavités souterraines et les stockages enterrés : b) Supérieure ou égale à 1 000 t mais inférieure à 2 500 t Quantité seuil bas au sens de l'article R. 511-10 : 2 500 t. Quantité seuil haut au sens de l'article R. 511-10 : 25 000 t.	E	2
4734.1c	1. Pour les cavités souterraines et les stockages enterrés : c) Supérieure ou égale à 50 t d'essence ou 250 t au total, mais inférieure à 1 000 t au total Quantité seuil bas au sens de l'article R. 511-10 : 2 500 t. Quantité seuil haut au sens de l'article R. 511-10 : 25 000 t.	DC	2
4734.2a	2. Pour les autres stockages : a) Supérieure ou égale à 1 000 t Quantité seuil bas au sens de l'article R. 511-10 : 2 500 t. Quantité seuil haut au sens de l'article R. 511-10 : 25 000 t.	A	2
4734.2b	2. Pour les autres stockages : b) Supérieure ou égale à 100 t d'essence ou 500 t au total, mais inférieure à 1 000 t au total Quantité seuil bas au sens de l'article R. 511-10 : 2 500 t. Quantité seuil haut au sens de l'article R. 511-10 : 25 000 t.	E	2

4734.2c	2. Pour les autres stockages : c) Supérieure ou égale à 50 t au total, mais inférieure à 100 t d'essence et inférieure à 500 t au total Quantité seuil bas au sens de l'article R. 511-10 : 2 500 t. Quantité seuil haut au sens de l'article R. 511-10 : 25 000 t.	DC	2

Germany

Water hazard class (WGK) : WGK 3, Highly hazardous to water (Classification according to AwSV; ID No. 9162).

Chemicals Prohibition Ordinance (ChemVerbotsV) : This product is subject to ChemVerbotsV Annex 2 Entry 1. The following requirements must be observed: authorization requirement (according to § 6 paragraph 1 sentence 1), basic requirements for carrying out the delivery (according to § 8 paragraph 1, 3 and 4), identification and documentation (according to § 9 paragraph 1 to 3) and exclusion of the shipping route (according to § 10).

Major Accidents Ordinance (12. BImSchV) : Listed in the 12. BImSchV (Annex I) under: 2.3.1
- Quantity threshold for operational area under § 1 para. 1
  - Sentence 1 :2500000 kg
  - Sentence 2 :25000000 kg

Netherlands

Waterbezwaarlijkheid : categorie Z(1) - niet-afbreekbare stoffen met gevaarlijke eigenschappen voor mens en milieu (carcinogeniteit/ mutageniteit/ reprotoxiciteit/ bioacumulerend vermogen/ toxiciteit of persistentie)

SZW-lijst van kankerverwekkende stoffen : STRAIGHT RUN GASOLINE is listed

SZW-lijst van mutagene stoffen : STRAIGHT RUN GASOLINE is listed

SZW-lijst van reprotoxische stoffen – Borstvoeding : The substance is not listed

SZW-lijst van reprotoxische stoffen – Vruchtbaarheid : The substance is not listed

SZW-lijst van reprotoxische stoffen – Ontwikkeling : The substance is not listed

Denmark

Class for fire hazard : Class I-1

Store unit : 1 liter

Classification remarks : F+ <Flam. Liq. 1>; Emergency management guidelines for the storage of flammable liquids must be followed

Danish National Regulations : Young people below the age of 18 years are not allowed to use the product
Pregnant/breastfeeding women working with the product must not be in direct contact with the product
The requirements from the Danish Working Environment Authorities regarding work with carcinogens must be followed during use and disposal

15.2. Chemical safety assessment

For this substance a chemical safety assessment has been carried out

SECTION 16: Other information

Indication of changes:

1.3	Details of the supplier of the safety data sheet	Modified	
2.2	Precautionary statements (CLP)	Update	
14	Packing group (ADR)	Update	
16	Other information	Added	

Abbreviations and acronyms:

	DNEL = Derived No Effect Level
	DMEL = Derived Minimal Effect level
	PNEC = Predicted No Effect Concentration
	OEL-STEL = Occupational Exposure Limits - Short Term Exposure Limits (STELs)
	TWA = time weighted average
	LC50 = Median lethal concentration
	LD50 = Median lethal dose
	LL50 = Median lethal level
	EC50 = Median Effective Concentration
	EL50 = Median effective level
	ErC50 = EC50 in terms of reduction of growth rate
	ErL50 = EL50 in terms of reduction of growth rate
	NOEL = no-observed-effect level
	NOEC = No observed effect concentration
	NOELR = No observed effect loading rate
	NOAEC = No observed adverse effect concentration
	NOAEL = No observed adverse effect level
	EWC = European waste catalogue
	NA = Not applicable
	N.O.S. = Not Otherwise Specified
	VOC = Volatile organic compounds
	mg/kg BW = mg/kg bodyweight
	QSAR = Quantitative structure-activity relationship (QSAR)
	ADN = Accord Européen relatif au Transport International des Marchandises Dangereuses par voie de Navigation du Rhin ADR = Accord européen relatif au transport international des marchandises Dangereuses par Route CLP = Classification, Labelling and Packaging Regulation according to 1272/2008/EC IATA = International Air Transport Association IMDG = International Maritime Dangerous Goods Code LEL = Lower Explosive Limit/Lower Explosion Limit UEL = Upper Explosion Limit/Upper Explosive Limit REACH = Registration, Evaluation, Authorisation and Restriction of Chemicals
	WGK = Wassergefährdungsklasse (Water Hazard Class under German Federal Water Management Act)
	ABM = Algemene beoordelingsmethodiek
	BTT = Breakthrough time (maximum wearing time)
	NOEL: no-observed-effect level
	STOT = Specific Target Organ Toxicity

Sources of key data used to compile the datasheet : ECHA (European Chemicals Agency). LOLI. Supplier information.

Training advice : Training staff on good practice. Manipulations are to be done only by qualified and authorised persons.

Other information : Hazard classification and labeling of petroleum substances in the European Economic Area, Concawe – 2025 (http://www.concawe.eu).

Full text of H- and EUH-statements:

Aquatic Chronic 2	Hazardous to the aquatic environment – Chronic Hazard, Category 2
Asp. Tox. 1	Aspiration hazard, Category 1
Carc. 1A	Carcinogenicity, Category 1A
Carc. 1B	Carcinogenicity, Category 1B
Eye Irrit. 2	Serious eye damage/eye irritation, Category 2

Flam. Liq. 1	Flammable liquids, Category 1
Flam. Liq. 2	Flammable liquids, Category 2
Muta. 1B	Germ cell mutagenicity, Category 1B
Repr. 2	Reproductive toxicity, Category 2
Skin Irrit. 2	Skin corrosion/irritation, Category 2
STOT RE 1	Specific target organ toxicity – Repeated exposure, Category 1
STOT RE 2	Specific target organ toxicity – Repeated exposure, Category 2
STOT SE 3	Specific target organ toxicity – Single exposure, Category 3, Narcosis
H224	Extremely flammable liquid and vapour.
H225	Highly flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
H340	May cause genetic defects.
H350	May cause cancer.
H361d	Suspected of damaging the unborn child.
H361f	Suspected of damaging fertility.
H361fd	Suspected of damaging fertility. Suspected of damaging the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H373	May cause damage to organs through prolonged or repeated exposure.
H411	Toxic to aquatic life with long lasting effects.

Full text of use descriptors

ERC1	Manufacture of the substance
ERC2	Formulation into mixture
ERC3	Formulation into solid matrix
ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC5	Use at industrial site leading to inclusion into/onto article
ERC6a	Use of intermediate
ERC6b	Use of reactive processing aid at industrial site (no inclusion into or onto article)
ERC6c	Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC7	Use of functional fluid at industrial site
ERC9a	Widespread use of functional fluid (indoor)
ERC9b	Widespread use of functional fluid (outdoor)
ESVOC SPERC 1.1b.v1	Distribution: Industrial (SU3)
ESVOC SPERC 2.2.v1	Formulation & packing of preparations and mixtures: Industrial (SU10)
ESVOC SPERC 4.19.v1	Rubber production and processing: Industrial (SU10)
ESVOC SPERC 4.3a.v1	Uses in coatings: Industrial (Su3)

ESVOC SPERC 4.4a.v1	Use in cleaning agents: Industrial (SU3)
ESVOC SPERC 6.1a.v1	Manufacture of substances: Industrial (SU8, SU9)
ESVOC SPERC 7.12a.v1	Use as a fuel: Industrial (SU3)
ESVOC SPERC 9.12b.v1	Use as a fuel: Professional (SU22)
ESVOC SPERC 9.12c.v1	Use as a fuel: Consumer (SU21)
PC13	Fuels
PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC15	Use as laboratory reagent
PROC16	Use of fuels
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC28	Manual maintenance (cleaning and repair) of machinery
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
SU10	Formulation [mixing] of preparations and/or re-packaging (excluding alloys)
SU11	Manufacture of rubber products
SU3	Industrial uses: Uses of substances as such or in preparations at industrial sites
SU8	Manufacture of bulk, large scale chemicals (including petroleum products)
SU9	Manufacture of fine chemicals

According to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Classification according to Regulation (EC) No. 1272/2008 [CLP]
Labelling according to Regulation (EC) No. 1272/2008 [CLP]

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Annex to the safety data sheet

Annex : Identified uses

Title	Sector of use	Product category	Process category	Article category	Environmental release	SPERC
Use as an intermediate Classified as (H350, H340, H361f and/or H361d) Benzene content : 20% - 79%	SU8, SU9		PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC6a	ESVOC SPERC 6.1a.v1
Distribution Classified as (H350, H340, H361f and/or H361d) Benzene content : 20% - 79%			PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7	ESVOC SPERC 1.1b.v1
Formulation & (re)packing of substances and mixtures Classified as (H350, H340, H361f and/or H361d) Benzene content : 20% - 79%			PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC2	ESVOC SPERC 2.2.v1
Use as an intermediate Classified as (H350, H340, H361f and/or H361d) Benzene content : 20% - 79%	SU3, SU8, SU9		PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC6a	ESVOC SPERC 6.1a.v1
Distribution Classified as (H350, H340, H361f and/or H361d) Benzene content : 20% - 79%	SU3		PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7	ESVOC SPERC 1.1b.v1
Distribution Classified as (H350, H340,			PROC1, PROC2, PROC3,		ERC4, ERC5, ERC6a, ERC6b,	ESVOC SPERC

H361f and/or H361d) Benzene content : 20% - 79%			PROC8a, PROC8b, PROC15		ERC6c, ERC6d, ERC7	1.1b.v1
Distribution Classified as (H350, H340, H361f and/or H361d) Benzene content : 20% - 79%	SU3		PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7	ESVOC SPERC 1.1b.v1
Formulation & (re)packing of substances and mixtures Classified as (H350, H340, H361f and/or H361d) Benzene content : 20% - 79%	SU3, SU10		PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC2	ESVOC SPERC 2.2.v1
Use as an intermediate Classified as (H350, H340, H361f and/or H361d) Benzene content : 0% - 1%	SU8, SU9		PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, PROC28		ERC6a	ESVOC SPERC 6.1a.v1
Use as an intermediate Classified as: (H350, H340, H361f and/or H361d) Benzene content : 1% - 5%.	SU8, SU9		PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, PROC28		ERC6a	ESVOC SPERC 6.1a.v1
Use as an intermediate Classified as (H350, H340, H361f and/or H361d) Benzene content : 5% - 20%	SU8, SU9		PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC6a	ESVOC SPERC 6.1a.v1
Distribution Classified as (H350, H340, H361f and/or H361d) Benzene content			PROC1, PROC2, PROC3, PROC8a, PROC8b,		ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7	ESVOC SPERC 1.1b.v1

: 0% - 1%			PROC15			
Distribution of substance Classified as: (H350, H340, H361f and/or H361d) Benzene content : 1% - 5%.			PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7	ESVOC SPERC 1.1b.v1
Distribution Classified as (H350, H340, H361f and/or H361d) Benzene content : 5% - 20%			PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7	ESVOC SPERC 1.1b.v1
Formulation & (re)packing of substances and mixtures Classified as (H350, H340, H361f and/or H361d) Benzene content : 0% - 1%			PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC2	ESVOC SPERC 2.2.v1
Formulation & (re)packing of substances and mixtures Classified as (H350, H340, H361f and/or H361d) Benzene content : 1% - 5%			PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC2	ESVOC SPERC 2.2.v1
Formulation & (re)packing of substances and mixtures Classified as (H350, H340, H361f and/or H361d) Benzene content : 5% - 20%			PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC2	ESVOC SPERC 2.2.v1
Uses in coatings Classified as (H350, H340, H361f and/or H361d)			PROC1, PROC2, PROC3, PROC8a, PROC8b,		ERC4	ESVOC SPERC 4.3a.v1

Benzene content : 0% - 1%			PROC15			
Use in cleaning agents Classified as (H350, H340, H361f and/or H361d) Benzene content : 0% - 1%			PROC1, PROC2, PROC3, PROC8a, PROC8b		ERC4	ESVOC SPERC 4.4a.v1
Use as a fuel Classified as (H350, H340, H361f and/or H361d) Benzene content : 0% - 1%			PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16		ERC7	ESVOC SPERC 7.12a.v1
Use as a fuel Classified as (H350, H340, H361f and/or H361d) Benzene content : 0% - 1%			PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16		ERC9a, ERC9b	ESVOC SPERC 9.12b.v1
Use as a fuel Classified as (H350, H340, H361f and/or H361d) Benzene content : 0% - 1%		PC13			ERC9a, ERC9b	ESVOC SPERC 9.12c.v1
Use in rubber production and processing Classified as (H350, H340, H361f and/or H361d) Benzene content : 0% - 1%	SU10, SU11		PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15		ERC4, ERC6d	ESVOC SPERC 4.19.v1

1. Exposure scenario 02e (Benz 20%-79%)

Use as an intermediate

ES Ref.: 02e (Benz 20%-79%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15

	SU8, SU9 ERC6a ESVOC SPERC 6.1a.v1
Processes, tasks activities covered	Use as an intermediate within closed or contained systems (not related to Strictly Controlled Conditions). Includes incidental exposures during recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container). Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Operation is carried out at elevated temperature (> 20°C above ambient temperature),Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements	

	are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374,Ensure operation is undertaken outdoors,Avoid carrying out operation for more than 1 hour.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,PPE15 - Wear suitable gloves tested to EN374,Ensure operation is undertaken outdoors,Avoid carrying out activities involving exposure for more than 4 hours,E47 - Handle substance within a closed system.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure,Avoid carrying out activities involving exposure for more than 1 hour.	
CS14 - Bulk transfers	Ensure material transfers are under containment or extract ventilation,PPE16 - Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better,Ensure operation is undertaken outdoors,Provide a good standard of controlled ventilation (10 to 15 air changes per hour).	
Storage	E84 - Store substance within a closed system,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	

2.2 Contributing scenario controlling environmental exposure (ERC6a, ESVOC SPERC 6.1a.v1)

ERC6a	Use of intermediate
ESVOC SPERC 6.1a.v1	Manufacture of substances: Industrial (SU8, SU9)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	11000000
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	15000
	Maximum daily site tonnage (kg/day)	50000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	
	Release fraction to wastewater from process (initial release prior to RMM):	
	Release fraction to soil from process (initial release	

	prior to RMM):	

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by freshwater sediment,If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	80
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	98,2
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	57,4
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	98,2
	Maximum allowable site tonnage (MSafe)	50000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
Conditions and measures related to external treatment of waste for disposal	This substance is consumed during use and no waste of the substance is generated.	
Conditions and measures related to external recovery of waste	This substance is consumed during use and no waste of the substance is generated.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	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,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 03e (Benz 20%-79%)

Distribution

ES Ref.: 03e (Benz 20%-79%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7 ESVOC SPERC 1.1b.v1
Processes, tasks activities covered	Bulk loading (including marine vessel/barge, rail/road car and IBC loading) Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination;	

	wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours.	
CS2 - Process sampling	Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
Bulk closed loading	Ensure material transfers are under containment or extract ventilation,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	
Bulk closed loading and unloading	Ensure material transfers are under containment or extract ventilation,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better,Ensure operation is undertaken outdoors.	
Storage	PPE15 - Wear suitable gloves tested to EN374,E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC5	Use at industrial site leading to inclusion into/onto article
ERC6a	Use of intermediate
ERC6b	Use of reactive processing aid at industrial site (no inclusion into or onto article)
ERC6c	Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC7	Use of functional fluid at industrial site
ESVOC SPERC 1.1b.v1	Distribution: Industrial (SU3)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	25000000
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	51000
	Maximum daily site tonnage (kg/day)	170000
Frequency and duration of use	Continuous use/release.	

	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,001
	Release fraction to wastewater from process (initial release prior to RMM):	0,00001
	Release fraction to soil from process (initial release prior to RMM):	0,00001

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	90
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	83,3
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	95,8
	Maximum allowable site tonnage (MSafe)	670000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
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.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	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,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 04 (Benz 20%-79%)

Formulation & (re)packing of substances and mixtures

ES Ref.: 04 (Benz 20%-79%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 ERC2 ESVOC SPERC 2.2.v1
Processes, tasks activities covered	Formulation of the substance and its mixtures in batch or continuous operations within closed or contained systems, including incidental exposures during storage, materials transfers, mixing, maintenance, sampling and associated laboratory activities
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable	

	gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours,Ensure operation is undertaken outdoors.	
Storage	PPE15 - Wear suitable gloves tested to EN374,E84 - Store substance within a closed system,Avoid carrying out activities involving exposure for more than 4 hours.	
CS2 - Process sampling	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
CS14 - Bulk transfers	Ensure material transfers are under containment or extract ventilation,PPE15 - Wear suitable gloves tested to EN374.	
CS8 - Drum/batch transfers	Ensure material transfers are under containment or extract ventilation,PPE15 - Wear suitable gloves tested to EN374.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better,Ensure operation is undertaken outdoors.	

2.2 Contributing scenario controlling environmental exposure (ERC2, ESVOC SPERC 2.2.v1)

ERC2	Formulation into mixture
ESVOC SPERC 2.2.v1	Formulation & packing of preparations and mixtures: Industrial (SU10)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	14000000
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	30000
	Maximum daily site tonnage (kg/day)	100000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting	Release fraction to air from process (initial release prior to RMM):	

environmental exposure	Release fraction to wastewater from process (initial release prior to RMM):	
	Release fraction to soil from process (initial release prior to RMM):	

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	0
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	98,7
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	68
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	98,7
	Maximum allowable site tonnage (MSafe)	100000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
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.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	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,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet

	(http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 02e (Benz 20%-79%)

Use as an intermediate

ES Ref.: 02e (Benz 20%-79%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 SU3, SU8, SU9 ERC6a ESVOC SPERC 6.1a.v1
Processes, tasks activities covered	Use as an intermediate within closed or contained systems (not related to Strictly Controlled Conditions). Includes incidental exposures during recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container). Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Operation is carried out at elevated temperature (> 20°C above ambient temperature),Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is	

	potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374,Ensure operation is undertaken outdoors,Avoid carrying out operation for more than 1 hour.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,PPE15 - Wear suitable gloves tested to EN374,Ensure operation is undertaken outdoors,Avoid carrying out activities involving exposure for more than 4 hours,E47 - Handle substance within a closed system.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure,Avoid carrying out activities involving exposure for more than 1 hour.	
CS14 - Bulk transfers	Ensure material transfers are under containment or extract ventilation,PPE16 - Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better,Ensure operation is undertaken outdoors,Provide a good standard of controlled ventilation (10 to 15 air changes per hour).	
Storage	E84 - Store substance within a closed system,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	

2.2 Contributing scenario controlling environmental exposure (ERC6a, ESVOC SPERC 6.1a.v1)

ERC6a	Use of intermediate
ESVOC SPERC 6.1a.v1	Manufacture of substances: Industrial (SU8, SU9)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	2210000
	Fraction of regional tonnage used locally:	0,0068
	Annual site tonnage (tons/year):	15000
	Maximum daily site tonnage (kg/day)	50000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300

Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	
	Release fraction to wastewater from process (initial release prior to RMM):	
	Release fraction to soil from process (initial release prior to RMM):	

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by freshwater sediment,If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	80
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	92,9
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,5
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	95,5
	Maximum allowable site tonnage (MSafe)	78000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
Conditions and measures related to external treatment of waste for disposal	This substance is consumed during use and no waste of the substance is generated.	
Conditions and measures related to external recovery of waste	This substance is consumed during use and no waste of the substance is generated.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	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,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 03e (Benz 20%-79%)

Distribution

ES Ref.: 03e (Benz 20%-79%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7 ESVOC SPERC 1.1b.v1
Processes, tasks activities covered	Bulk loading (including marine vessel/barge, rail/road car and IBC loading) Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination;	

	wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours.	
CS2 - Process sampling	Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
Bulk closed loading	Ensure material transfers are under containment or extract ventilation,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	
Bulk closed loading and unloading	Ensure material transfers are under containment or extract ventilation,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better,Ensure operation is undertaken outdoors.	
Storage	PPE15 - Wear suitable gloves tested to EN374,E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC5	Use at industrial site leading to inclusion into/onto article
ERC6a	Use of intermediate
ERC6b	Use of reactive processing aid at industrial site (no inclusion into or onto article)
ERC6c	Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC7	Use of functional fluid at industrial site
ESVOC SPERC 1.1b.v1	Distribution: Industrial (SU3)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	25000000
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	51000
	Maximum daily site tonnage (kg/day)	170000
Frequency and duration of use	Continuous use/release.	

	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,001
	Release fraction to wastewater from process (initial release prior to RMM):	0,00001
	Release fraction to soil from process (initial release prior to RMM):	0,00001

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	90
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	83,3
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	95,8
	Maximum allowable site tonnage (MSafe)	670000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
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.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	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,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 03e (Benz 20%-79%)

Distribution

ES Ref.: 03e (Benz 20%-79%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7 ESVOC SPERC 1.1b.v1
Processes, tasks activities covered	Bulk loading (including marine vessel/barge, rail/road car and IBC loading) Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination;	

	wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours.	
CS2 - Process sampling	Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
Bulk closed loading	Ensure material transfers are under containment or extract ventilation,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	
Bulk closed loading and unloading	Ensure material transfers are under containment or extract ventilation,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better,Ensure operation is undertaken outdoors.	
Storage	PPE15 - Wear suitable gloves tested to EN374,E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC5	Use at industrial site leading to inclusion into/onto article
ERC6a	Use of intermediate
ERC6b	Use of reactive processing aid at industrial site (no inclusion into or onto article)
ERC6c	Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC7	Use of functional fluid at industrial site
ESVOC SPERC 1.1b.v1	Distribution: Industrial (SU3)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	25000000
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	51000
	Maximum daily site tonnage (kg/day)	170000
Frequency and duration of use	Continuous use/release.	

	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,001
	Release fraction to wastewater from process (initial release prior to RMM):	0,00001
	Release fraction to soil from process (initial release prior to RMM):	0,00001

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	90
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	83,3
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	95,8
	Maximum allowable site tonnage (MSafe)	670000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
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.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	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,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 03e (Benz 20%-79%)

Distribution

ES Ref.: 03e (Benz 20%-79%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 SU3 ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7 ESVOC SPERC 1.1b.v1
Processes, tasks activities covered	Bulk loading (including marine vessel/barge, rail/road car and IBC loading) Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable	

	gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours.	
CS2 - Process sampling	Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
Bulk closed loading	Ensure material transfers are under containment or extract ventilation,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	
Bulk closed loading and unloading	Ensure material transfers are under containment or extract ventilation,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better,Ensure operation is undertaken outdoors.	
Storage	PPE15 - Wear suitable gloves tested to EN374,E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC5	Use at industrial site leading to inclusion into/onto article
ERC6a	Use of intermediate
ERC6b	Use of reactive processing aid at industrial site (no inclusion into or onto article)
ERC6c	Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC7	Use of functional fluid at industrial site
ESVOC SPERC 1.1b.v1	Distribution: Industrial (SU3)

Product characteristics

Physical form	Substance is complex UVCB.
Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	18700000
	Fraction of regional tonnage used locally:	0,002
	Annual site tonnage (tons/year):	37500

	Maximum daily site tonnage (kg/day)	120000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,001
	Release fraction to wastewater from process (initial release prior to RMM):	0,00001
	Release fraction to soil from process (initial release prior to RMM):	0,00001

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	90
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	12
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,5
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	95,5
	Maximum allowable site tonnage (MSafe)	1100000
	Assumed domestic sewage treatment plant flow (m^3/d):	2000
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.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	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,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 04 (Benz 20%-79%)

Formulation & (re)packing of substances and mixtures

ES Ref.: 04 (Benz 20%-79%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 SU3, SU10 ERC2 ESVOC SPERC 2.2.v1
Processes, tasks activities covered	Formulation of the substance and its mixtures in batch or continuous operations within closed or contained systems, including incidental exposures during storage, materials transfers, mixing, maintenance, sampling and associated laboratory activities
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to	

	operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours,Ensure operation is undertaken outdoors.	
Storage	PPE15 - Wear suitable gloves tested to EN374,E84 - Store substance within a closed system,Avoid carrying out activities involving exposure for more than 4 hours.	
CS2 - Process sampling	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
CS14 - Bulk transfers	Ensure material transfers are under containment or extract ventilation,PPE15 - Wear suitable gloves tested to EN374.	
CS8 - Drum/batch transfers	Ensure material transfers are under containment or extract ventilation,PPE15 - Wear suitable gloves tested to EN374.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better,Ensure operation is undertaken outdoors.	

2.2 Contributing scenario controlling environmental exposure (ERC2, ESVOC SPERC 2.2.v1)

ERC2	Formulation into mixture
ESVOC SPERC 2.2.v1	Formulation & packing of preparations and mixtures: Industrial (SU10)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	16500000
	Fraction of regional tonnage used locally:	0,0018
	Annual site tonnage (tons/year):	30000
	Maximum daily site tonnage (kg/day)	100000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting	Release fraction to air from process (initial release	

environmental exposure	prior to RMM):	
	Release fraction to wastewater from process (initial release prior to RMM):	
	Release fraction to soil from process (initial release prior to RMM):	

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	56,5
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	94,7
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,5
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	95,58
	Maximum allowable site tonnage (MSafe)	100000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
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.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	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,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone

	or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 02b (Benz 0%-1%)

Use as an intermediate
Classified as: (H350, H340, H361f and/or H361d)
Benzene content : 0% - 1%

ES Ref.: 02b (Benz 0%-1%) ES Type: Worker Version: 2	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, PROC28 SU8, SU9 ERC6a ESVOC SPERC 6.1a.v1
Processes, tasks activities covered	Use as an intermediate within closed or contained systems (not related to Strictly Controlled Conditions). Includes incidental exposures during recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container). Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, PROC28)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent
PROC28	Manual maintenance (cleaning and repair) of machinery

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes a good basic standard of occupational hygiene is implemented,Assumes activities are at ambient temperature (unless stated differently).	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable	

	general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems)	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure.	
General exposures (closed systems),Batch process	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure,Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply,Put lids on containers immediately after use.	
CS14 - Bulk transfers,Closed systems,Loading and unloading	Ensure material transfers are under containment or extract ventilation.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply,Wear suitable coveralls to prevent exposure to the skin,Clear spills immediately	
Storage	E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC6a, ESVOC SPERC 6.1a.v1)

ERC6a	Use of intermediate
ESVOC SPERC 6.1a.v1	Manufacture of substances: Industrial (SU8, SU9)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	160000
	Fraction of regional tonnage used locally:	0,091
	Annual site tonnage (tons/year):	15000
	Maximum daily site tonnage (kg/day)	50000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	
	Release fraction to wastewater from process (initial release prior to RMM):	
	Release fraction to soil from process (initial release prior to RMM):	

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or	Risk from environmental exposure is driven by freshwater sediment,Prevent discharge of	

limit discharges, air emissions and releases to soil	undissolved substance to or recover from onsite wastewater,If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	80
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	94
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Not applicable as there is no release to wastewater	
	Estimated substance removal from wastewater via domestic sewage treatment (%):	95
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	95
	Maximum allowable site tonnage (MSafe)	59000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
Conditions and measures related to external treatment of waste for disposal	This substance is consumed during use and no waste of the substance is generated.	
Conditions and measures related to external recovery of waste	This substance is consumed during use and no waste of the substance is generated.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	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,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 02c (Benz 1%-5%)

Use as an intermediate
Classified as: (H350, H340, H361f and/or H361d)
Benzene content : 1% - 5%.

ES Ref.: 02c (Benz 1%-5%) ES Type: Worker Version: 2	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, PROC28 SU8, SU9 ERC6a ESVOC SPERC 6.1a.v1
Processes, tasks activities covered	Use as an intermediate within closed or contained systems (not related to Strictly Controlled Conditions). Includes incidental exposures during recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container). Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, PROC28)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent
PROC28	Manual maintenance (cleaning and repair) of machinery

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes a good basic standard of occupational hygiene is implemented,Assumes activities are at ambient temperature (unless stated differently).	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable	

	general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure.	
General exposures (closed systems),Batch process	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure,Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply,Put lids on containers immediately after use.	
CS14 - Bulk transfers,Closed systems,Loading and unloading	Ensure material transfers are under containment or extract ventilation.	
CS39 - Equipment cleaning and maintenance	Avoid carrying out operation for more than 4 hours,Drain down and flush system prior to equipment break-in or maintenance,Wear a respirator conforming to EN140,Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply,Wear suitable coveralls to prevent exposure to the skin,Clear spills immediately	
Storage	E84 - Store substance within a closed system.	
Storage	Provide extract ventilation to points where emissions occur,E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC6a, ESVOC SPERC 6.1a.v1)

ERC6a	Use of intermediate
ESVOC SPERC 6.1a.v1	Manufacture of substances: Industrial (SU8, SU9)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	580000
	Fraction of regional tonnage used locally:	0,026
	Annual site tonnage (tons/year):	15000
	Maximum daily site tonnage (kg/day)	50000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting	Release fraction to air from process (initial release prior to RMM):	

environmental exposure	Release fraction to wastewater from process (initial release prior to RMM):	
	Release fraction to soil from process (initial release prior to RMM):	

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by freshwater sediment,If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	80
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	94,2
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Not applicable as there is no release to wastewater	
	Estimated substance removal from wastewater via domestic sewage treatment (%):	95
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	95
	Maximum allowable site tonnage (MSafe)	58000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
Conditions and measures related to external treatment of waste for disposal	This substance is consumed during use and no waste of the substance is generated.	
Conditions and measures related to external recovery of waste	This substance is consumed during use and no waste of the substance is generated.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	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,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet

	(http://cefic.org/en/reach-for-industries-libraries.html),Maximum Risk Characterization Ratios for air emissions :0,08,Maximum Risk Characterization Ratios for wastewater emissions :0,91

1. Exposure scenario 02d (Benz 5%-20%)

Use as an intermediate

ES Ref.: 02d (Benz 5%-20%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 SU8, SU9 ERC6a ESVOC SPERC 6.1a.v1
Processes, tasks activities covered	Use as an intermediate within closed or contained systems (not related to Strictly Controlled Conditions). Includes incidental exposures during recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container). Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Operation is carried out at elevated temperature (> 20°C above ambient temperature),Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is	

	potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374,Ensure operation is undertaken outdoors.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system,PPE15 - Wear suitable gloves tested to EN374,Ensure operation is undertaken outdoors,Avoid carrying out activities involving exposure for more than 4 hours.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
CS14 - Bulk transfers	Ensure material transfers are under containment or extract ventilation,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better,Ensure operation is undertaken outdoors.	
Storage	E84 - Store substance within a closed system,PPE15 - Wear suitable gloves tested to EN374.	

2.2 Contributing scenario controlling environmental exposure (ERC6a, ESVOC SPERC 6.1a.v1)

ERC6a	Use of intermediate
ESVOC SPERC 6.1a.v1	Manufacture of substances: Industrial (SU8, SU9)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	11000000
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	15000
	Maximum daily site tonnage (kg/day)	50000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	
	Release fraction to wastewater from process (initial release prior to RMM):	
	Release fraction to soil from process (initial release prior to RMM):	

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by freshwater sediment,If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	80
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	98,2
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	57,4
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	98,2
	Maximum allowable site tonnage (MSafe)	50000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
Conditions and measures related to external treatment of waste for disposal	This substance is consumed during use and no waste of the substance is generated.	
Conditions and measures related to external recovery of waste	This substance is consumed during use and no waste of the substance is generated.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	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,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 03b (Benz 0%-1%)

Distribution
Classified as: (H350, H340, H361f and/or H361d)
Benzene content : 0% - 1%

ES Ref.: 03b (Benz 0%-1%) ES Type: Worker Version: 2	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7 ESVOC SPERC 1.1b.v1
Processes, tasks activities covered	Bulk loading (including marine vessel/barge, rail/road car and IBC loading) Loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums and small packs) of substance, including its sampling, storage, unloading, distribution and associated laboratory activities. Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking	

	containment. Clean/flush equipment, where possible, prior to maintenance. Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenarios; clear up spills immediately and dispose of wastes safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,Wear suitable gloves tested to EN374	
General exposures (closed systems),outdoor	Handle substance within a closed system	
CS2 - Process sampling	Sample via a closed loop or other system to avoid exposure.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
Bulk closed loading and unloading	Ensure material transfers are under containment or extract ventilation.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE16 - Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.	
Storage	Ensure operation is undertaken outdoors,E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC5	Use at industrial site leading to inclusion into/onto article
ERC6a	Use of intermediate
ERC6b	Use of reactive processing aid at industrial site (no inclusion into or onto article)
ERC6c	Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC7	Use of functional fluid at industrial site
ESVOC SPERC 1.1b.v1	Distribution: Industrial (SU3)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	11000000
	Fraction of regional tonnage used locally:	0,002
	Annual site tonnage (tons/year):	22000
	Maximum daily site tonnage (kg/day)	72000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,001
	Release fraction to wastewater from process (initial release prior to RMM):	0,00001
	Release fraction to soil from process (initial release prior to RMM):	0,00001

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk from environmental exposure is driven by the freshwater,No wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	90
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	0
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	96,1
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	96,1
	Maximum allowable site tonnage (MSafe)	2600000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
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.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	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,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 03c (Benz 1%-5%)

Distribution of substance
Classified as: (H350, H340, H361f and/or H361d)
Benzene content : 1% - 5%.

ES Ref.: 03c (Benz 1%-5%) ES Type: Worker Version: 2	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7 ESVOC SPERC 1.1b.v1
Processes, tasks activities covered	Bulk loading (including marine vessel/barge, rail/road car and IBC loading) Loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums and small packs) of substance, including its sampling, storage, unloading, distribution and associated laboratory activities. Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking	

	containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system.	
CS2 - Process sampling	Sample via a closed loop or other system to avoid exposure.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
Bulk closed loading and unloading	Ensure material transfers are under containment or extract ventilation.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls.	
Storage	Ensure operation is undertaken outdoors,E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC5	Use at industrial site leading to inclusion into/onto article
ERC6a	Use of intermediate
ERC6b	Use of reactive processing aid at industrial site (no inclusion into or onto article)
ERC6c	Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC7	Use of functional fluid at industrial site
ESVOC SPERC 1.1b.v1	Distribution: Industrial (SU3)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	11000000
	Fraction of regional tonnage used locally:	0,002
	Annual site tonnage (tons/year):	22000
	Maximum daily site tonnage (kg/day)	72000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,001
	Release fraction to wastewater from process (initial release prior to RMM):	0,00001

	Release fraction to soil from process (initial release prior to RMM):	0,00001

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk from environmental exposure is driven by the freshwater,No wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	90
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	0
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Not applicable as there is no release to wastewater	
	Estimated substance removal from wastewater via domestic sewage treatment (%):	96,1
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	96,1
	Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d):	2600000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
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.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	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,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html),Maximum Risk Characterization Ratios for air emissions :0,00033,Maximum Risk Characterization Ratios for wastewater emissions :0,0031

1. Exposure scenario 03d (Benz 5%-20%)

Distribution

ES Ref.: 03d (Benz 5%-20%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7 ESVOC SPERC 1.1b.v1
Processes, tasks activities covered	Bulk loading (including marine vessel/barge, rail/road car and IBC loading) Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination;	

	wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours.	
CS2 - Process sampling	Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
Bulk closed loading	Ensure material transfers are under containment or extract ventilation,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	
Bulk closed loading and unloading	Ensure material transfers are under containment or extract ventilation,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better,Ensure operation is undertaken outdoors.	
Storage	PPE15 - Wear suitable gloves tested to EN374,E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC5	Use at industrial site leading to inclusion into/onto article
ERC6a	Use of intermediate
ERC6b	Use of reactive processing aid at industrial site (no inclusion into or onto article)
ERC6c	Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC7	Use of functional fluid at industrial site
ESVOC SPERC 1.1b.v1	Distribution: Industrial (SU3)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	25000000
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	51000
	Maximum daily site tonnage (kg/day)	170000
Frequency and duration of use	Continuous use/release.	

	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,001
	Release fraction to wastewater from process (initial release prior to RMM):	0,00001
	Release fraction to soil from process (initial release prior to RMM):	0,00001

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	90
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	83,3
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	95,8
	Maximum allowable site tonnage (MSafe)	670000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
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.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	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,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 04b (Benz 0%-1%)

Formulation & (re)packing of substances and mixtures
Classified as: (H350, H340, H361f and/or H361d)
Benzene content : 0% - 1%

ES Ref.: 04b (Benz 0%-1%) ES Type: Worker Version: 2	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 ERC2 ESVOC SPERC 2.2.v1
Processes, tasks activities covered	Formulation of the substance and its mixtures in batch or continuous operations within closed or contained systems, including incidental exposures during storage, materials transfers, mixing, maintenance, sampling and associated laboratory activities
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where	

	possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
General exposures (closed systems),outdoor	E47 - Handle substance within a closed system.	
CS2 - Process sampling	Sample via a closed loop or other system to avoid exposure.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
CS14 - Bulk transfers	Ensure material transfers are under containment or extract ventilation.	
CS8 - Drum/batch transfers	Ensure material transfers are under containment or extract ventilation.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE16 - Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.	
Storage	E84 - Store substance within a closed system,PPE15 - Wear suitable gloves tested to EN374.	

2.2 Contributing scenario controlling environmental exposure (ERC2, ESVOC SPERC 2.2.v1)

ERC2	Formulation into mixture
ESVOC SPERC 2.2.v1	Formulation & packing of preparations and mixtures: Industrial (SU10)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	10000000
	Fraction of regional tonnage used locally:	0,003
	Annual site tonnage (tons/year):	30000
	Maximum daily site tonnage (kg/day)	100000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	
	Release fraction to wastewater from process (initial release prior to RMM):	
	Release fraction to soil from process (initial release prior to RMM):	

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by the freshwater,If	

	discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	0
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	95,7
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	96,1
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	96,1
	Maximum allowable site tonnage (MSafe)	110000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
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.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	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,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 04c (Benz 1%-5%)

Formulation & (re)packing of substances and mixtures

ES Ref.: 04c (Benz 1%-5%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 ERC2 ESVOC SPERC 2.2.v1
Processes, tasks activities covered	Formulation of the substance and its mixtures in batch or continuous operations within closed or contained systems, including incidental exposures during storage, materials transfers, mixing, maintenance, sampling and associated laboratory activities
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable	

	gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system.	
CS2 - Process sampling	Sample via a closed loop or other system to avoid exposure.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
CS14 - Bulk transfers	Ensure material transfers are under containment or extract ventilation.	
CS8 - Drum/batch transfers	Ensure material transfers are under containment or extract ventilation.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls.	
Storage	E84 - Store substance within a closed system,PPE15 - Wear suitable gloves tested to EN374.	

2.2 Contributing scenario controlling environmental exposure (ERC2, ESVOC SPERC 2.2.v1)

ERC2	Formulation into mixture
ESVOC SPERC 2.2.v1	Formulation & packing of preparations and mixtures: Industrial (SU10)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	14000000
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	30000
	Maximum daily site tonnage (kg/day)	100000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	
	Release fraction to wastewater from process (initial release prior to RMM):	
	Release fraction to soil from process (initial release prior to RMM):	

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite	

	wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	0
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	98,7
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	68
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	98,7
	Maximum allowable site tonnage (MSafe)	100000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
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.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	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,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 04d (Benz 5%-20%)

Formulation & (re)packing of substances and mixtures

ES Ref.: 04d (Benz 5%-20%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 ERC2 ESVOC SPERC 2.2.v1
Processes, tasks activities covered	Formulation of the substance and its mixtures in batch or continuous operations within closed or contained systems, including incidental exposures during storage, materials transfers, mixing, maintenance, sampling and associated laboratory activities
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable	

	gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours,Ensure operation is undertaken outdoors.	
Storage	PPE15 - Wear suitable gloves tested to EN374,E84 - Store substance within a closed system,Avoid carrying out activities involving exposure for more than 4 hours.	
CS2 - Process sampling	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
CS14 - Bulk transfers	Ensure material transfers are under containment or extract ventilation,PPE15 - Wear suitable gloves tested to EN374.	
CS8 - Drum/batch transfers	Ensure material transfers are under containment or extract ventilation,PPE15 - Wear suitable gloves tested to EN374.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better,Ensure operation is undertaken outdoors.	

2.2 Contributing scenario controlling environmental exposure (ERC2, ESVOC SPERC 2.2.v1)

ERC2	Formulation into mixture
ESVOC SPERC 2.2.v1	Formulation & packing of preparations and mixtures: Industrial (SU10)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	14000000
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	30000
	Maximum daily site tonnage (kg/day)	100000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting	Release fraction to air from process (initial release prior to RMM):	

environmental exposure	Release fraction to wastewater from process (initial release prior to RMM):	
	Release fraction to soil from process (initial release prior to RMM):	

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	0
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	98,7
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	68
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	98,7
	Maximum allowable site tonnage (MSafe)	100000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
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.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	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,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet

	(http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 05b (Benz 0%-1%)

Uses in coatings

ES Ref.: 05b (Benz 0%-1%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 ERC4 ESVOC SPERC 4.3a.v1
Processes, tasks activities covered	Covers the use in coatings (paints, inks, adhesives, etc) within closed or contained systems including incidental exposures during use (including materials receipt, storage, preparation and transfer from bulk and semi-bulk, application activities and film formation) and equipment cleaning, maintenance and associated laboratory activities. Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised	

	persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
Film formation - force drying, stoving and other technologies	Provide extract ventilation to points where emissions occur	
General exposures (closed systems)	E47 - Handle substance within a closed system,E1 - Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.	
CS3 - Material transfers	Ensure material transfers are under containment or extract ventilation.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE16 - Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.	
Storage	E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC4, ESVOC SPERC 4.3a.v1)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ESVOC SPERC 4.3a.v1	Uses in coatings: Industrial (Su3)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	210000
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	15000
	Maximum daily site tonnage (kg/day)	50000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,98
	Release fraction to wastewater from process (initial release prior to RMM):	0,007
	Release fraction to soil from process (initial release prior to RMM):	0

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	90
	Treat onsite wastewater (prior to receiving water	99,2

	discharge) to provide the required removal efficiency of ≥ (%):	
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	81,7
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	99,2
	Maximum allowable site tonnage (MSafe)	50000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
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.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	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,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 07b (Benz 0%-1%)

Use in cleaning agents

ES Ref.: 07b (Benz 0%-1%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b ERC4 ESVOC SPERC 4.4a.v1
Processes, tasks activities covered	Covers the use as a component of cleaning products within closed or contained systems including incidental exposures during transfer from storage, mixing/diluting in the preparatory phase and cleaning activities, related equipment cleaning and maintenance. Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop,Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying.	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where	

	possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
CS14 - Bulk transfers	Ensure material transfers are under containment or extract ventilation.	
CS38 - Use in contained systems,CS93 - Automated process with (semi) closed systems.	E47 - Handle substance within a closed system,PPE15 - Wear suitable gloves tested to EN374.	
CS45 - Filling/ preparation of equipment from drums or containers.	Ensure material transfers are under containment or extract ventilation.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE16 - Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.	
Storage	E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC4, ESVOC SPERC 4.4a.v1)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ESVOC SPERC 4.4a.v1	Use in cleaning agents: Industrial (SU3)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	410000
	Fraction of regional tonnage used locally:	0,2
	Annual site tonnage (tons/year):	100
	Maximum daily site tonnage (kg/day)	5000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	20
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	1
	Release fraction to wastewater from process (initial release prior to RMM):	0,00003
	Release fraction to soil from process (initial release prior to RMM):	0

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	70
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	82

	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	95,8
	Maximum allowable site tonnage (MSafe)	21000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
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.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	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,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 10b (Benz 0%-1%)

Use as a fuel
Classified as: (H350, H340, H361f and/or H361d)
Benzene content : 0% - 1%

ES Ref.: 10b (Benz 0%-1%) ES Type: Worker Version: 2	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16 ERC7 ESVOC SPERC 7.12a.v1
Processes, tasks activities covered	Covers the use as a fuel (or fuel additives and additive components) within closed or contained systems including incidental exposures during activities associated with its transfer, use, equipment maintenance and handling of waste. Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC16	Use of fuels

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where	

	possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
Bulk closed unloading	Ensure material transfers are under containment or extract ventilation.	
CS8 - Drum/batch transfers	Ensure material transfers are under containment or extract ventilation.	
refuelling	Ensure material transfers are under containment or extract ventilation.	
refuelling aircraft	Ensure material transfers are under containment or extract ventilation.	
General exposures (closed systems)	E47 - Handle substance within a closed system,E1 - Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.	
Use as a fuel,CS107 - (closed systems)	E47 - Handle substance within a closed system.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment opening or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,E1 - Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan,PPE16 - Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.	
Storage	E84 - Store substance within a closed system,E1 - Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.	

2.2 Contributing scenario controlling environmental exposure (ERC7, ESVOC SPERC 7.12a.v1)

ERC7	Use of functional fluid at industrial site
ESVOC SPERC 7.12a.v1	Use as a fuel: Industrial (SU3)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	1000000
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	1000000
	Maximum daily site tonnage (kg/day)	3300000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,05
	Release fraction to wastewater from process (initial release prior to RMM):	0,00001
	Release fraction to soil from process (initial release prior to RMM):	0

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	95
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	91,7
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Not applicable as there is no release to wastewater	
	Estimated substance removal from wastewater via domestic sewage treatment (%):	96,1
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	96,1
	Maximum allowable site tonnage (MSafe)	5300000
	Assumed domestic sewage treatment plant flow (m^3/d):	2000
Conditions and measures related to external treatment of waste for disposal	Combustion emissions limited by required exhaust emission controls,Combustion emissions considered in regional exposure assessment,External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	This substance is consumed during use and no waste of the substance is generated.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	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,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 11b (Benz 0%-1%)

Use as a fuel
Classified as: (H350, H340, H361f and/or H361d)
Benzene content : 0% - 1%

ES Ref.: 11b (Benz 0%-1%) ES Type: Worker Version: 2	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16 ERC9a, ERC9b ESVOC SPERC 9.12b.v1
Processes, tasks activities covered	Covers the use as a fuel (or fuel additives and additive components) within closed or contained systems including incidental exposures during activities associated with its transfer, use, equipment maintenance and handling of waste. Widespread use by professional workers (PW)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC16	Use of fuels

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where	

	possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),outdoor	E47 - Handle substance within a closed system.	
Bulk closed unloading	Ensure material transfers are under containment or extract ventilation.	
CS8 - Drum/batch transfers	Ensure material transfers are under containment or extract ventilation.	
refuelling	Ensure material transfers are under containment or extract ventilation.	
Use as a fuel,CS107 - (closed systems)	E47 - Handle substance within a closed system.	
CS5 - Equipment maintenance	Drain down and flush system prior to equipment opening or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,E1 - Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan,EI19 - Ensure operatives are trained to minimise exposures.	
Storage	E84 - Store substance within a closed system,E1 - Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.	

2.2 Contributing scenario controlling environmental exposure (ERC9a, ERC9b, ESVOC SPERC 9.12b.v1)

ERC9a	Widespread use of functional fluid (indoor)
ERC9b	Widespread use of functional fluid (outdoor)
ESVOC SPERC 9.12b.v1	Use as a fuel: Professional (SU22)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	950000
	Fraction of regional tonnage used locally:	0,0005
	Annual site tonnage (tons/year):	480
	Maximum daily site tonnage (kg/day)	1300
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	365
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,01
	Release fraction to wastewater from process (initial release prior to RMM):	0,00001
	Release fraction to soil from process (initial release prior to RMM):	0,00001

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or	Risk from environmental exposure is driven by the freshwater,No wastewater treatment required.	

limit discharges, air emissions and releases to soil	Treat air emission to provide a typical removal efficiency of (%):	Not applicable
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	0
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	96,1
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	96,1
	Maximum allowable site tonnage (MSafe)	64000
	Assumed domestic sewage treatment plant flow (m^3/d):	2000
Conditions and measures related to external treatment of waste for disposal	Combustion emissions limited by required exhaust emission controls,Combustion emissions considered in regional exposure assessment,External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	This substance is consumed during use and no waste of the substance is generated.	

3. Exposure estimation and reference to its source

3.1. Health

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	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,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 12b (Benz 0%-1%)

Use as a fuel
Classified as: (H350, H340, H361f and/or H361d)
Benzene content : 0% - 1%

ES Ref.: 12b (Benz 0%-1%) ES Type: Consumer Version: 2	

Use descriptors	PC13 ERC9a, ERC9b ESVOC SPERC 9.12c.v1
Processes, tasks activities covered	Covers consumer uses in liquid fuels. Consumer use (C)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario consumer end-use (PC13)

PC13	Fuels

Product characteristics

Physical form	Liquid
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently)
Vapour pressure	Liquid, vapour pressure > 10 kPa at STP

Operational conditions

Amount used	unless stated differently,Covers use up to 37500 g	37500 g
Frequency and duration of use	unless stated differently,Covers use up to	Uses per day
	Covers exposure up to	2 Hours/event
Human factors not influenced by risk management	Covers skin contact area up to	420 cm²
Other given operational conditions affecting consumers exposure	Covers use at ambient temperatures,Unless otherwise stated	
	Covers use in room size of 20 m3	
	Covers use under typical household ventilation.	
	Fuels,Liquid: Automotive Refuelling	Unless otherwise stated. Covers concentrations up to 1%. Covers use up to 52. days/year. covers use up to 1 time/on day of use. Covers skin contact area up to 210 cm2. For each use event, covers use amounts up to: 37500 g. Covers outdoor use. Covers use in room size of 100 m3. Covers exposure up to 0,05. Hours/event
	Fuels,Liquid Scooter Refuelling	Unless otherwise stated. Covers concentrations up to 1%. Covers use up to 52. days/year. covers use up to 1 time/on day of use. Covers skin contact area up to 210 cm2. For each use event, covers use amounts up to: 3750 g. Covers outdoor use. Covers use in room size of 100 m3. Covers exposure up to 0,03. Hours/event
	Fuels,Liquid, Garden equipment - Use	Unless otherwise stated.

		Covers concentrations up to 1%. Covers use up to 26. days/year. covers use up to 1 time/on day of use. For each use event, covers use amounts up to: 750 g. Covers outdoor use. Covers use in room size of 100 m3. Covers exposure up to 2,00. Hours/event
	Fuels,Liquid: Garden equipment - Refuelling	Unless otherwise stated. Covers concentrations up to 1%. Covers use up to 26. days/year. covers use up to 1 time/on day of use. Covers skin contact area up to 420 cm2. For each use event, covers use amounts up to: 750 g. Covers use in a one car garage (34m³) under typical ventilation. Covers use in room size of 34 m3. Covers exposure up to 0,03. Hours/event

Risk management measures

Other risk management measures:

Fuels,Liquid: Automotive Refuelling	No specific risk management measure identified beyond those operational conditions stated.	
Fuels,Liquid Scooter Refuelling	No specific risk management measure identified beyond those operational conditions stated.	
Fuels,Liquid, Garden equipment - Use	No specific risk management measure identified beyond those operational conditions stated.	
Fuels,Liquid: Garden equipment - Refuelling	No specific risk management measure identified beyond those operational conditions stated.	

2.2 Contributing scenario controlling environmental exposure (ERC9a, ERC9b, ESVOC SPERC 9.12c.v1)

ERC9a	Widespread use of functional fluid (indoor)
ERC9b	Widespread use of functional fluid (outdoor)
ESVOC SPERC 9.12c.v1	Use as a fuel: Consumer (SU21)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	8200000
	Fraction of regional tonnage used locally:	0,0005
	Annual site tonnage (tons/year):	4100
	Maximum daily site tonnage (kg/day)	11000
Frequency and duration of use	Continuous use/release.	
	Number of emission days per year	365
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,01
	Release fraction to wastewater from process (initial release prior to RMM):	0,00001
	Release fraction to soil from process (initial release prior to RMM):	0,00001

Risk management measures

Conditions and measures related to sewage treatment plant	Not applicable as there is no release to wastewater	
	Estimated substance removal from wastewater via domestic sewage treatment (%):	96,1

	Maximum allowable site tonnage (MSafe)	530000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
Conditions and measures related to external treatment of waste for disposal	Combustion emissions limited by required exhaust emission controls,Combustion emissions considered in regional exposure assessment,External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	This substance is consumed during use and no waste of the substance is generated.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate consumer exposures, consistent with the content of ECETOC report #107 and the Chapter R15 of the IR&CSA TGD. Where exposure determinants differ to these source, then they are indicated.

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the applicable consumer reference values when the operational conditions/risk management measures given in section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

4.2. Environment

Guidance - Environment	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,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 13b (Benz 0%-1%)

Use in rubber production and processing

ES Ref.: 13b (Benz 0%-1%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15 SU10, SU11 ERC4, ERC6d ESVOC SPERC 4.19.v1
Processes, tasks activities covered	Manufacture of tyres and general rubber articles within closed or contained systems, including incidental exposures during processing of raw (uncured) rubber, handling and mixing of rubber additives, calendaring, vulcanising, cooling and finishing as well as maintenance. Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Operation is carried out at elevated temperature (> 20°C above ambient temperature),Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where	

	possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
CS3 - Material transfers	E84 - Store substance within a closed system,Ensure material transfers are under containment or extract ventilation.	
General exposures (closed systems)	E47 - Handle substance within a closed system.	
CS3 - Material transfers	Ensure material transfers are under containment or extract ventilation.	
Bulk weighing	E47 - Handle substance within a closed system,PPE15 - Wear suitable gloves tested to EN374.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
CS5 - Equipment maintenance	Drain down and flush system prior to equipment opening or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,E1 - Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.	
Small scale weighing	E57 - Carry out in a vented booth or extracted enclosure.	
Storage,outdoor	E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC4, ERC6d, ESVOC SPERC 4.19.v1)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ESVOC SPERC 4.19.v1	Rubber production and processing: Industrial (SU10)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	680
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	680
	Maximum daily site tonnage (kg/day)	34000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	20
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,01
	Release fraction to wastewater from process (initial release prior to RMM):	0,003
	Release fraction to soil from process (initial release prior to RMM):	0,0001

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by humans via	

	indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	0
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	97,4
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	37,1
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Estimated substance removal from wastewater via domestic sewage treatment (%):	97,4
	Maximum allowable site tonnage (MSafe)	34000
	Assumed domestic sewage treatment plant flow (m^3/d):	2000
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.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	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,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).