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

1.1. Product identifier

Product form : Substance
Trade name/designation : MOLTEN SULFUR
EC Index : 016-094-00-1
EC-No. : 231-722-6
CAS-No. : 7704-34-9
REACH registration No. : 01-2119487295-27-0120
Formula : S
Product group : Trade product

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

1.2.1. Relevant identified uses

Intended for general public
Main use category : Industrial use,Professional use,Consumer use
Use of the substance/mixture : see attached exposure scenario.

Title	Use descriptors
Manufacture of substance (ES Ref.: 01)	SU3, SU8, SU9, PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC15, ERC1, ERC4, ESVOC SPERC 1.1.v1
Use as an intermediate (ES Ref.: 02)	SU3, SU8, SU9, PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC15, PROC22, PROC23, ERC6a, ESVOC SPERC 6.1a.v1
Distribution (ES Ref.: 03)	SU3, PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PROC15, ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1
Formulation & (re)packing of substances and mixtures (ES Ref.: 04)	SU3, SU10, PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15, PROC23, PROC24, ERC2, ESVOC SPERC 2.2.v1
Use as binders and release agents (ES Ref.: 05)	SU3, PROC1, PROC2, PROC3, PROC4, PROC6, PROC8a, PROC8b, PROC10, PROC13, PROC14, ERC4, ESVOC SPERC 4.10a.v1
Use in rubber production and processing (ES Ref.: 10)	SU3, SU10, SU11, PROC1, PROC2, PROC3, PROC4, PROC5, PROC6, PROC7, PROC8a, PROC8b, PROC9, PROC13, PROC14, PROC15, PROC21, ERC1, ERC4, ERC6d, ESVOC SPERC 4.19.v1
Use as a fuel (ES Ref.: 11)	SU3, PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC16, ERC7, ESVOC SPERC 7.12a.v1
Use as binders and release agents (ES Ref.: 06)	SU22, PROC1, PROC2, PROC3, PROC4, PROC6, PROC8a, PROC8b, PROC10, PROC13, PROC14, ERC8a, ERC8d, ESVOC SPERC 8.10b.v1
Use in agrochemicals (ES Ref.: 07)	SU22, PROC1, PROC4, PROC8a, PROC8b, PROC11, PROC13, ERC8a, ERC8d, ESVOC SPERC 8.11a.v1
Road and construction applications (ES Ref.: 09)	SU22, PROC8a, PROC8b, PROC9, PROC10, PROC11, PROC13, ERC8d, ERC8f, ESVOC SPERC 8.15.v1
Explosives manufacture & use (ES Ref.: 12)	SU22, PROC1, PROC3, PROC5, PROC8a, PROC8b, ERC8e
Use in agrochemicals (ES Ref.: 08)	SU21, PC12, PC22, PC27, ERC8a, ERC8d, ESVOC SPERC 8.11b.v1
Use in matches (ES Ref.: 13)	SU21, PC11, ERC8e
Use in fireworks (ES Ref.: 14)	SU21, PC11, ERC8e

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]

Skin corrosion/irritation, Category 2 H315

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) :

GHS07

Signal word : Warning
Hazard statements (CLP) : H315 - Causes skin irritation.
Precautionary statements (CLP) : P101 - If medical advice is needed, have product container or label at hand.
P102 - Keep out of reach of children.
P280 - Wear protective gloves, protective clothing/eye protection/face protection.
P302+P352 - IF ON SKIN: Wash with plenty of soap and water.
P332+P313 - If skin irritation occurs: Get medical advice/attention.
Listed on CLP Annex VI : EC Index-No.: 016-094-00-1
Child-resistant fastening : Not applicable

Tactile warning : Not applicable

2.3. Other hazards

Other hazards : Results of PBT and vPvB assessment : This substance does not meet the PBT/vPvB criteria of REACH, annex XIII.

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 : MOLTEN SULFUR
CAS-No. : 7704-34-9
EC-No. : 231-722-6
EC Index : 016-094-00-1

Substance name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
sulfur	CAS-No.: 7704-34-9 EC-No.: 231-722-6;231-984-1 EC Index: 016-094-00-1 REACH-no: 01-2119487295-27-0120	≤ 100	Skin Irrit. 2, H315
hydrogen sulphide	CAS-No.: 7783-06-4 EC-No.: 231-977-3 EC Index: 016-001-00-4	< 0,001	Flam. Gas 1A, H220 Press. Gas (Comp.), H280 Acute Tox. 2 (Inhalation), H330 (ATE=440 ppm/4h) Aquatic Acute 1, H400

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. 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. Do NOT induce vomiting. Get medical advice/attention.

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

Inhalation	:	May cause respiratory irritation. The following symptoms may occur: Shortness of breath. Cough.
Skin contact	:	Causes skin irritation. Hot product (liquid) can cause thermal burns.
Eyes contact	:	Hot product (liquid) can cause thermal burns. May cause eye irritation.
Ingestion	:	May cause gastrointestinal irritation, nausea, vomiting and diarrhoea.

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	:	Water spray, Alcohol resistant foam, Carbon dioxide, Dry extinguishing powder.
Unsuitable extinguishing media	:	Strong water jet.

5.2. Special hazards arising from the substance or mixture

Specific hazards	:	Combustible. Vapours may form explosive mixture with air. Dust may form explosive mixture in air.
Hazardous decomposition products in case of fire	:	Sulphur oxides. 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. Do not breathe vapours, dust. Avoid contact with skin, eyes and clothing. Wear recommended personal protective equipment. Concerning personal protective equipment to use, see section 8. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Ensure equipment is adequately earthed.

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 solid spill. Take up mechanically (sweeping, shovelling) and collect in suitable container for disposal. Large spills: scoop solid spill into closing containers. This material and its container must be disposed of in a safe way, and as per local legislation. Hose down gases, fumes and/or dust with water.

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 dust, 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. Take precautionary measures against static discharges. Ensure equipment is adequately earthed. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. 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

Technical measures : Keep out of reach of children.

Storage conditions : 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.

Incompatible materials : Oxidising substances. Acids. Alkali.

Storage temperature : 127 – 149 °C
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. Keep in insulated tanks to maintain the product in the liquid state.

Germany

German storage class (LGK) : LGK 11 - Combustible solids

Switzerland

Storage class (LK) : LK 11/13 - Solids

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

sulfur (7704-34-9)	
Latvia - Occupational Exposure Limits	
Local name	Sērs
OEL TWA	6 mg/m³
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	Siera
IPRV (OEL TWA)	6 mg/m³
Remark	F (fibrogeninis poveikis)
OEL chemical category	Fibrogenic substance
Regulatory reference	LIETUVOS HIGIENOS NORMA HN 23:2011 (Nr. V-695/A1-272, 2018-06-12)
Romania - Occupational Exposure Limits	
Local name	Sulf
OEL STEL	15 mg/m³ (dust)
Regulatory reference	Hotărârea Guvernului nr. 1.218/2006 (Hotărârea nr. 179/2024)

hydrogen sulphide (7783-06-4)	
EU - Indicative Occupational Exposure Limit (IOEL)	
Local name	Hydrogen sulphide
IOEL TWA	7 mg/m³

hydrogen sulphide (7783-06-4)	
	5 ppm
IOEL STEL	14 mg/m³
	10 ppm
Regulatory reference	COMMISSION DIRECTIVE 2009/161/EU
Austria - Occupational Exposure Limits	
MAK (OEL TWA)	7 mg/m³
	5 ppm
MAK (OEL STEL)	7 mg/m³
	5 ppm
OEL C	7 mg/m³
	5 ppm
Belgium - Occupational Exposure Limits	
Local name	Hydrogène (sulfure d') # Waterstofsulfide
OEL TWA	2,3 mg/m³
	1,64 ppm
OEL STEL	5,61 mg/m³
	4 ppm
Regulatory reference	Koninklijk besluit/Arrêté royal 16/11/2023
Bulgaria - Occupational Exposure Limits	
OEL TWA	7 mg/m³
	5 ppm
OEL STEL	14 mg/m³
	10 ppm
Croatia - Occupational Exposure Limits	
GVI (OEL TWA)	7 mg/m³
	5 ppm
KGVI (OEL STEL)	14 mg/m³
	10 ppm
Cyprus - Occupational Exposure Limits	
OEL TWA	7 mg/m³
	5 ppm
OEL STEL	14 mg/m³ (vapor)
	10 ppm (vapor)
Czech Republic - Occupational Exposure Limits	
PEL (OEL TWA)	7 mg/m³

hydrogen sulphide (7783-06-4)	
Denmark - Occupational Exposure Limits	
OEL TWA	7 mg/m³
	5 ppm
OEL STEL	14 mg/m³
	10 ppm
Estonia - Occupational Exposure Limits	
OEL TWA	7 mg/m³
	5 ppm
OEL STEL	14 mg/m³
	10 ppm
Finland - Occupational Exposure Limits	
HTP (OEL TWA)	7 mg/m³
	5 ppm
HTP (OEL STEL)	14 mg/m³
	10 ppm
France - Occupational Exposure Limits	
VME (OEL TWA)	7 mg/m³ (restrictive limit)
	5 ppm (restrictive limit)
VLE (OEL C/STEL)	14 mg/m³ (restrictive limit)
	10 ppm (restrictive limit)
Germany - Occupational Exposure Limits (TRGS 900)	
Occupational exposure limit value (mg/m³) (TRGS900)	2(I) 7,1 mg/m³ peak limitation : 2(I)
Occupational exposure limit value (ppm) (TRGS900)	5 ppm Y= There is no fertility risk if the threshold limit as well as the biological threshold limit (BGW) is met
Gibraltar - Occupational Exposure Limits	
OEL TWA	7 mg/m³
	5 ppm
OEL STEL	14 mg/m³
	10 ppm
Greece - Occupational Exposure Limits	
OEL TWA	7 mg/m³
	5 ppm
OEL STEL	14 mg/m³
	10 ppm

hydrogen sulphide (7783-06-4)	
Hungary - Occupational Exposure Limits	
AK (OEL TWA)	7 mg/m³
CK (OEL STEL)	14 mg/m³
Ireland - Occupational Exposure Limits	
OEL TWA	7 mg/m³
	5 ppm
OEL STEL	14 mg/m³
	10 ppm
Italy - Occupational Exposure Limits	
OEL TWA	7 mg/m³
	5 ppm
OEL STEL	14 mg/m³
	10 ppm
Latvia - Occupational Exposure Limits	
OEL TWA	7 mg/m³
	5 ppm
Lithuania - Occupational Exposure Limits	
IPRV (OEL TWA)	7 mg/m³
	5 ppm
TPRV (OEL STEL)	14 mg/m³
	10 ppm
NRV (OEL C)	20 mg/m³
	15 ppm
Luxembourg - Occupational Exposure Limits	
OEL TWA	7 mg/m³
	5 ppm
OEL STEL	14 mg/m³
	10 ppm
Malta - Occupational Exposure Limits	
OEL TWA	7 mg/m³
	5 ppm
OEL STEL	14 mg/m³
	10 ppm
Netherlands - Occupational Exposure Limits	
TGG-8u (OEL TWA)	2,3 mg/m³
	1,64 ppm

hydrogen sulphide (7783-06-4)	
Poland - Occupational Exposure Limits	
NDS (OEL TWA)	7 mg/m³
NDSCh (OEL STEL)	14 mg/m³
Portugal - Occupational Exposure Limits	
OEL TWA	7 mg/m³ (indicative limit value)
	5 ppm (indicative limit value)
OEL STEL	14 mg/m³ (indicative limit value)
	10 ppm (indicative limit value)
Romania - Occupational Exposure Limits	
OEL TWA	7 mg/m³
	5 ppm
OEL STEL	14 mg/m³
	10 ppm
Slovakia - Occupational Exposure Limits	
NPHV (OEL TWA)	7 mg/m³
	5 ppm
NPHV (OEL C)	14 mg/m³
Slovenia - Occupational Exposure Limits	
OEL TWA	7 mg/m³
	5 ppm
OEL STEL	14 mg/m³
	10 ppm
Spain - Occupational Exposure Limits	
VLA-ED (OEL TWA)	7 mg/m³
	5 ppm
VLA-EC (OEL STEL)	14 mg/m³
	10 ppm
Sweden - Occupational Exposure Limits	
NGV (OEL TWA)	7 mg/m³
	5 ppm
KGV (OEL STEL)	14 mg/m³
	10 ppm
United Kingdom - Occupational Exposure Limits	
WEL TWA (OEL TWA)	7 mg/m³
	5 ppm
WEL STEL (OEL STEL)	14 mg/m³

hydrogen sulphide (7783-06-4)	
	10 ppm
Norway - Occupational Exposure Limits	
Grenseverdi (OEL TWA)	7 mg/m³
	5 ppm
Takverdi (OEL C)	14 mg/m³
	10 ppm
Switzerland - Occupational Exposure Limits	
MAK (OEL TWA)	7,1 mg/m³
	5 ppm
KZGW (OEL STEL)	14,2 mg/m³
	10 ppm
USA - ACGIH - Occupational Exposure Limits	
ACGIH® TLV® TWA	1 ppm
ACGIH® TLV® STEL	5 ppm

8.1.2. Recommended monitoring procedures

Monitoring methods	
Monitoring methods	Personal air monitoring. Concentration measurement in air. Personal air monitoring. Room air monitoring.

8.1.3. Air contaminants formed

No additional information available

8.1.4. DNEL and PNEC

Additional information : Recommended monitoring procedures :. Personal monitoring. Concentration measurement in air. 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. Use with local exhaust ventilation. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Take precautionary measures against static discharges. Use only explosion-proof equipment. Organisational measures to prevent/limit releases, dispersion and exposure. See Section 7 for information on safe handling.

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 : refer to the recommendations of the supplier. Thickness of the glove material: Not determined. The selection of specific gloves for a specific application and time of use in a working area, should also take into account other factors on the working space, such as (but not limited to): other chemicals that are possibly used, physical requirements (protection against cutting/drilling, skill, thermal protection), and the instructions/specification of the supplier of gloves.
Eye protection	:	Use suitable eye protection (EN166): Safety glasses. face shield
Body protection	:	Wear suitable protective clothing. Overalls, apron and boots recommended.
Respiratory protection	:	In case of insufficient ventilation, wear suitable respiratory equipment. Half-face mask (DIN EN 140). full face mask (DIN EN 136). Filter type: ABEK/P (EN14387). Self-contained open-circuit compressed air breathing apparatus (EN 137)
Thermal hazard protection	:	Use dedicated equipment. Heat resistant gloves (EN407).
Environmental exposure controls	:	Do not allow to enter into surface water or drains. Comply with applicable Community environmental protection legislation.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	:	Solid
Colour	:	Yellow.
Appearance	:	Solid. (Molten form).
Odour	:	Characteristic.
Odour threshold	:	No data available
Melting / freezing point	:	112 – 120 °C
Freezing point	:	Not available
Initial boiling point and boiling range	:	444 – 447 °C
Flammability	:	Combustible
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 applicable
Upper explosion limit	:	Not applicable
Flash point	:	207 °C Closed cup
Auto-ignition temperature	:	232 °C
Decomposition temperature	:	No data available
pH	:	Not applicable
pH solution	:	Not available
Kinematic viscosity	:	No additional information available
Dynamic viscosity	:	No additional information available
Solubility	:	No additional information available.
Partition coefficient n-octanol/water (Log Kow)	:	No data available

Vapour pressure	:	0,1333 Pa (20°C)
Vapour pressure at 50°C	:	Not available
Density	:	Not available
Relative density	:	1,811
Vapour density	:	3,64 (Air=1)
Particle size	:	Not available

9.2. Other information

9.2.1. Information with regard to physical hazard classes

Explosion limits : 35 – 1400 g sulfur dust/m3 air

9.2.2. Other safety characteristics

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

Combustible. Reference to other sections: 10.4 & 10.5.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

at high temperatures :H2S.

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

oxidising substances. Acids. Alkali. See Section 7 for information on safe handling.

10.6. Hazardous decomposition products

Sulphur oxides. Hydrogen sulfide (H2S). 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)

sulfur (7704-34-9)	
LD50/oral/rat	> 2000 mg/kg bodyweight
LD50/dermal/rat	> 2000 mg/kg bodyweight

sulfur (7704-34-9)	
LD50/dermal/rabbit	> 2000 mg/kg (Source: IUCLID)
LC50/inhalation/4h/rat	> 5430 mg/m³
LC50 Inhalation - Rat (Vapours)	5,43 mg/l/4h

hydrogen sulphide (7783-06-4)	
LC50/inhalation/4h/rat	0,99 mg/l (Exposure time: 1h)
LC50/inhalation/4h/rat (ppm)	501 ppm/4h

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

hydrogen sulphide (7783-06-4)	
pH	4,1 (conc: 0.1 N (aqueous solution)

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

hydrogen sulphide (7783-06-4)	
pH	4,1 (conc: 0.1 N (aqueous solution)

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

Germ cell mutagenicity : Not classified (Based on available data, the classification criteria are not met)

Carcinogenicity : Not classified (Based on available data, the classification criteria are not met)

Reproductive toxicity : Not classified (Based on available data, the classification criteria are not met)

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

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

sulfur (7704-34-9)	
NOAEL, subchronic, oral, Rat	1000 mg/kg bw/day
NOAEL, subacute, Dermal, Rat	400 mg/kg bw/day

Aspiration hazard : Not classified (Based on available data, the classification criteria are not met)

MOLTEN SULFUR (7704-34-9)	
Kinematic viscosity	No additional information available

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 : Ecological injuries are not known or expected under normal use.

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

Hazardous to the aquatic environment, long–term (chronic) : Not classified

sulfur (7704-34-9)	
LC50 - Fish [1]	866 mg/l (Exposure time: 96 h - Species: Brachydanio rerio [static] Source: IUCLID)
LC50 - Fish [2]	< 14 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [static] Source: EPA)

hydrogen sulphide (7783-06-4)	
LC50 - Fish [1]	0,0448 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [flow-through])
LC50 - Fish [2]	0,016 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through])
EC50 - Crustacea [1]	0,022 mg/l

12.2. Persistence and degradability

MOLTEN SULFUR (7704-34-9)	
Persistence and degradability	Expected to be biodegradable.

12.3. Bioaccumulative potential

MOLTEN SULFUR (7704-34-9)	
Partition coefficient n-octanol/water (Log Kow)	No data available
Bioaccumulative potential	Low.

hydrogen sulphide (7783-06-4)	
BCF - Fish [1]	(no bioaccumulation expected)
Partition coefficient n-octanol/water	0,45 (at 25 °C)

12.4. Mobility in soil

MOLTEN SULFUR (7704-34-9)	
Mobility in soil	No data available
Ecology - soil	No data available.

12.5. Results of PBT and vPvB assessment

MOLTEN SULFUR (7704-34-9)	
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. Never use pressure to empty container. Do not puncture or incinerate.

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

SECTION 14: Transport information

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

ADR	IMDG	IATA	ADN	RID
14.1. UN number or ID number				
2448	2448	2448	2448	2448
14.2. UN proper shipping name				
SULPHUR, MOLTEN	SULPHUR, MOLTEN	Sulphur, molten	SULPHUR, MOLTEN	SULPHUR, MOLTEN
Transport document description				
UN 2448 SULPHUR,	UN 2448 SULPHUR,	UN 2448 Sulphur,	UN 2448 SULPHUR,	UN 2448 SULPHUR,

ADR	IMDG	IATA	ADN	RID
MOLTEN, 4.1, III, (E)	MOLTEN, 4.1, III	molten, 4.1, III	MOLTEN, 4.1, III	MOLTEN, 4.1, III
14.3. Transport hazard class(es)				
4.1	4.1	4.1	4.1	4.1
		Not applicable		
14.4. Packing group				
III	III	III	III	III
14.5. Environmental hazards				
Dangerous for the environment : No	Dangerous for the environment : No Marine pollutant : No	Dangerous for the environment : No	Dangerous for the environment : No	Dangerous for the environment : No
No supplementary information available				

14.6. Special precautions for user

Special precautions for user : No data available

- Overland transport

Classification code (ADR) : F3
Special provisions : 538
Limited quantities (ADR) : 0
Excepted quantities (ADR) : E0
Portable tank and bulk container instructions (ADR) : T1
Portable tank and bulk container special provisions (ADR) : TP3
Tank code (ADR) : LGBV(+)
Tank special provisions (ADR) : TU27, TE4, TE6
Vehicle for tank carriage : AT
Transport category (ADR) : 3
Hazard identification number (Kemler No.) : 44
Orange plates :

Tunnel restriction code : E
EAC code : 1Y

- Transport by sea

Limited quantities (IMDG) : 0
Excepted quantities (IMDG) : E0
IBC packing instructions (IMDG) : IBC01
Tank instructions (IMDG) : T1
Tank special provisions (IMDG) : TP3
EmS-No. (Fire) : F-A

EmS-No. (Spillage)	:	S-H
Stowage category (IMDG)	:	C
Segregation (IMDG)	:	SG17
Properties and observations (IMDG)	:	Melting point: 119°C. Molten sulphur may contain hydrogen sulphide which is highly poisonous in low concentrations. When involved in a fire, evolves toxic, very irritating and suffocating gas. Forms explosive and extremely sensitive mixtures with oxidizing substances. Shipped molten above its melting point.

- Air transport

PCA Limited quantities (IATA)	:	Forbidden
PCA limited quantity max net quantity (IATA)	:	Forbidden
PCA packing instructions (IATA)	:	Forbidden
PCA max net quantity (IATA)	:	Forbidden
CAO packing instructions (IATA)	:	Forbidden
CAO max net quantity (IATA)	:	Forbidden
ERG code (IATA)	:	3L

- Inland waterway transport

Classification code (ADN)	:	F3
Special provisions (ADN)	:	538
Limited quantities (ADN)	:	0
Excepted quantities (ADN)	:	E0
Carriage permitted (ADN)	:	T
Equipment required (ADN)	:	PP
Number of blue cones/lights (ADN)	:	0

- Rail transport

Classification code (RID)	:	F3
Special provisions (RID)	:	538
Limited quantities (RID)	:	0
Excepted quantities (RID)	:	E0
Portable tank and bulk container instructions (RID)	:	T1
Portable tank and bulk container special provisions (RID)	:	TP3
Tank codes for RID tanks (RID)	:	LGBV(+)
Special provisions for RID tanks (RID)	:	TU27, TE4, TE6
Transport category (RID)	:	3
Hazard identification number (RID)	:	44

14.7. Maritime transport in bulk according to IMO instruments

Code: IBC	:	No data available.
IBC product name	:	Sulphur (molten)
Ship type	:	Type 3
Pollution category	:	Z

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**
40.	hydrogen sulphide	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.

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 no 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)

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

Installations classées			
No ICPE	Désignation de la rubrique	Code Régime	Rayon
na	Not Applicable	na	na

Germany

Water hazard class (WGK) : WGK 1, Slightly hazardous to water (Classification according to AwSV; ID No. 753).

Major Accidents Ordinance (12. BImSchV) : Is not subject to the Major Accidents Ordinance (12. BImSchV)

Netherlands

Waterbezwaarlijkheid : B (5) - Weinig schadelijk voor in het water levende organismen B(5)

SZW-lijst van kankerverwekkende stoffen : The substance is not listed

SZW-lijst van mutagene stoffen : The substance is not 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

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	
3	Composition/information on ingredients	Update	
7.2	Technical measures	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 : Supplier information. ECHA (European Chemicals Agency).

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:

Acute Tox. 2 (Inhalation)	Acute toxicity (inhal.), Category 2
Aquatic Acute 1	Hazardous to the aquatic environment – Acute Hazard, Category 1
Flam. Gas 1A	Flammable gases, Category 1A
Press. Gas (Comp.)	Gases under pressure : Compressed gas
Skin Irrit. 2	Skin corrosion/irritation, Category 2
H220	Extremely flammable gas.
H280	Contains gas under pressure; may explode if heated.
H315	Causes skin irritation.
H330	Fatal if inhaled.
H400	Very toxic to aquatic life.

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
ERC8a	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)
ERC8d	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)
ERC8e	Widespread use of reactive processing aid (no inclusion into or onto article, outdoor)
ERC8f	Widespread use leading to inclusion into/onto article (outdoor)
ESVOC SPERC 1.1.v1	Manufacture of substance: Industrial (SU3)
ESVOC SPERC 1.1b.v1	Distribution: Industrial (SU3)
ESVOC SPERC 2.2.v1	Formulation & packing of preparations and mixtures: Industrial (SU10)
ESVOC SPERC 4.10a.v1	Use as binders and release agents: Industrial (SU3)
ESVOC SPERC 4.19.v1	Rubber production and processing: Industrial (SU10)
ESVOC SPERC 6.1a.v1	Manufacture of substances: Industrial (SU8, SU9)
ESVOC SPERC 7.12a.v1	Use as a fuel: Industrial (SU3)
ESVOC SPERC 8.10b.v1	Use as binders and release agents: Professional (SU22)
ESVOC SPERC 8.11a.v1	Agrochemical uses: Professional (SU22)
ESVOC SPERC 8.11b.v1	Agrochemical uses: Consumer (SU21)
ESVOC SPERC 8.15.v1	Road and Construction applications: Professional (SU22)
PC11	Explosives
PC12	Fertilizers
PC22	Lawn and Garden Preparations, including fertilizers
PC27	Plant protection products
PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC10	Roller application or brushing
PROC11	Non industrial spraying
PROC13	Treatment of articles by dipping and pouring
PROC14	Tabletting, compression, extrusion, pelettisation, granulation
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
PROC21	Low energy manipulation and handling of substances bound in/on materials or articles
PROC22	Manufacturing and processing of minerals and/or metals at substantially elevated temperature
PROC23	Open processing and transfer operations at substantially elevated temperature
PROC24	High (mechanical) energy work-up of substances bound in /on materials and/or articles
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC4	Chemical production where opportunity for exposure arises
PROC5	Mixing or blending in batch processes
PROC6	Calendering operations

PROC7	Industrial spraying
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
SU21	Consumer uses: Private households (= general public = consumers)
SU22	Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
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**
Manufacture of substance	SU3, SU8, SU9		PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC15		ERC1, ERC4	ESVOC SPERC 1.1.v1
Use as an intermediate	SU3, SU8, SU9		PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC15, PROC22, PROC23		ERC6a	ESVOC SPERC 6.1a.v1
Distribution	SU3		PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PROC15		ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7	ESVOC SPERC 1.1b.v1
Formulation & (re)packing of substances and mixtures	SU3, SU10		PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15, PROC23, PROC24		ERC2	ESVOC SPERC 2.2.v1
Use as binders and release agents	SU3		PROC1, PROC2, PROC3, PROC4, PROC6, PROC8a, PROC8b, PROC10, PROC13, PROC14		ERC4	ESVOC SPERC 4.10a.v1
Use as binders and release	SU22		PROC1, PROC2,		ERC8a,	ESVOC SPERC

agents			PROC3, PROC4, PROC6, PROC8a, PROC8b, PROC10, PROC13, PROC14		ERC8d	8.10b.v1
Use in agrochemicals	SU22		PROC1, PROC4, PROC8a, PROC8b, PROC11, PROC13		ERC8a, ERC8d	ESVOC SPERC 8.11a.v1
Use in agrochemicals	SU21	PC12, PC22, PC27			ERC8a, ERC8d	ESVOC SPERC 8.11b.v1
Road and construction applications	SU22		PROC8a, PROC8b, PROC9, PROC10, PROC11, PROC13		ERC8d, ERC8f	ESVOC SPERC 8.15.v1
Use in rubber production and processing	SU3, SU10, SU11		PROC1, PROC2, PROC3, PROC4, PROC5, PROC6, PROC7, PROC8a, PROC8b, PROC9, PROC13, PROC14, PROC15, PROC21		ERC1, ERC4, ERC6d	ESVOC SPERC 4.19.v1
Use as a fuel	SU3		PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC16		ERC7	ESVOC SPERC 7.12a.v1
Explosives manufacture & use	SU22		PROC1, PROC3, PROC5, PROC8a, PROC8b		ERC8e	
Use in matches	SU21	PC11			ERC8e	
Use in fireworks	SU21	PC11			ERC8e	

1. Exposure scenario 01

Manufacture of substance

ES Ref.: 01 ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC15 SU3, SU8, SU9 ERC1, ERC4 ESVOC SPERC 1.1.v1
Processes, tasks activities covered	Manufacture of substance or use as process chemical or extracting agent. Includes recycling/recovery, material transfers, storage, maintenance and loading (including marine vessel/barge, road/rail car and bulk container), sampling 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, PROC4, 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
PROC4	Chemical production where opportunity for exposure arises
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	Solid at STP, liquid at elevated operating temperature, vapour pressure < 0.5 kPa
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 exposures (closed systems)	No other specific measures identified.	
General exposures (closed systems),CS56 - with sample collection	No other specific measures identified.	
General exposures (closed systems),CS55 - Batch process,CS56 - with sample collection	No other specific measures identified.	
CS2 - Process sampling	No other specific measures identified.	

CS16 - General exposures (open systems)	No other specific measures identified.	
CS36 - Laboratory activities	No other specific measures identified.	
CS14 - Bulk transfers,CS81 - Dedicated facility	No other specific measures identified.	
CS39 - Equipment cleaning and maintenance	No other specific measures identified.	
CS85 - Bulk product storage	No other specific measures identified.	

2.2 Contributing scenario controlling environmental exposure (ERC1, ERC4, ESVOC SPERC 1.1.v1)

Not applicable	
ERC1	Manufacture of the substance
ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ESVOC SPERC 1.1.v1	Manufacture of substance: Industrial (SU3)

Product characteristics

No additional information

Operational conditions

No additional information

Risk management measures

No additional information

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	Not applicable

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

4.1. Health

Guidance - Health	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Risk Management Measures are based on qualitative risk characterisation,Available hazard data do not support the need for a DNEL to be established for other health effects,Users are advised to consider national Occupational Exposure Limits or other equivalent values,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	Not applicable

1. Exposure scenario 02

Use as an intermediate

ES Ref.: 02 ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC15, PROC22, PROC23 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, PROC4, PROC8a, PROC8b, PROC15, PROC22, PROC23)

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
PROC4	Chemical production where opportunity for exposure arises
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
PROC22	Manufacturing and processing of minerals and/or metals at substantially elevated temperature
PROC23	Open processing and transfer operations at substantially elevated temperature

Product characteristics

Physical form	Solid at STP, liquid at elevated operating temperature, vapour pressure < 0.5 kPa
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 exposures (closed systems)	No other specific measures identified.	
General exposures (closed systems),CS56 - with	No other specific measures identified.	

sample collection		
General exposures (closed systems),CS55 - Batch process,CS56 - with sample collection	No other specific measures identified.	
CS2 - Process sampling	No other specific measures identified.	
CS16 - General exposures (open systems)	No other specific measures identified.	
CS36 - Laboratory activities	No other specific measures identified.	
CS14 - Bulk transfers,CS81 - Dedicated facility	No other specific measures identified.	
CS39 - Equipment cleaning and maintenance	No other specific measures identified.	
CS85 - Bulk product storage	No other specific measures identified.	

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

Not applicable	
ERC6a	Use of intermediate
ESVOC SPERC 6.1a.v1	Manufacture of substances: Industrial (SU8, SU9)

Product characteristics

No additional information

Operational conditions

No additional information

Risk management measures

No additional information

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	Not applicable

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

4.1. Health

Guidance - Health	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Risk Management Measures are based on qualitative risk characterisation,Available hazard data do not support the need for a DNEL to be established for other health effects,Users are advised to consider national Occupational Exposure Limits or other equivalent values,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	Not applicable

1. Exposure scenario 03

Distribution

ES Ref.: 03 ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, 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, PROC4, 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
PROC4	Chemical production where opportunity for exposure arises
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	Solid at STP, liquid at elevated operating temperature, vapour pressure < 0.5 kPa
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 exposures (closed systems)	No other specific measures identified.	
General exposures (closed systems),CS56 - with sample collection	No other specific measures identified.	
General exposures (closed systems),CS55 - Batch process,CS56 - with sample collection	No other specific measures identified.	
CS2 - Process sampling	No other specific measures identified.	

CS16 - General exposures (open systems)	No other specific measures identified.	
CS36 - Laboratory activities	No other specific measures identified.	
CS14 - Bulk transfers,CS81 - Dedicated facility	No other specific measures identified.	
CS7 - Small package filling	No other specific measures identified.	
CS39 - Equipment cleaning and maintenance	No other specific measures identified.	
CS85 - Bulk product storage	No other specific measures identified.	

2.2 Contributing scenario controlling environmental exposure (ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1)

Not applicable	
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
ESVOC SPERC 1.1b.v1	Distribution: Industrial (SU3)

Product characteristics

No additional information

Operational conditions

No additional information

Risk management measures

No additional information

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	Not applicable

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

4.1. Health

Guidance - Health	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Risk Management Measures are based on qualitative risk characterisation,Available hazard data do not support the need for a DNEL to be established for other health effects,Users are advised to consider national Occupational Exposure Limits or other equivalent values,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	Not applicable

1. Exposure scenario 04

Formulation & (re)packing of substances and mixtures

ES Ref.: 04 ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15, PROC23, PROC24 SU3, SU10 ERC2 ESVOC SPERC 2.2.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, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15, PROC23, PROC24)

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
PROC4	Chemical production where opportunity for exposure arises
PROC5	Mixing or blending in batch processes
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)
PROC14	Tabletting, compression, extrusion, pelettisation, granulation
PROC15	Use as laboratory reagent
PROC23	Open processing and transfer operations at substantially elevated temperature
PROC24	High (mechanical) energy work-up of substances bound in /on materials and/or articles

Product characteristics

Physical form	Solid at STP, liquid at elevated operating temperature, vapour pressure < 0.5 kPa
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 exposures (closed systems)	No other specific measures identified.	
General exposures (closed systems),CS56 - with sample collection	No other specific measures identified.	
General exposures (closed systems),CS55 - Batch process,CS56 - with sample collection	No other specific measures identified.	
CS2 - Process sampling	No other specific measures identified.	
CS16 - General exposures (open systems)	No other specific measures identified.	
CS30 - Mixing operations (open systems)	No other specific measures identified.	
Milling, grinding and similar activities	No other specific measures identified.	
CS7 - Small package filling	No other specific measures identified.	
CS53 - Pelletizing	No other specific measures identified.	
CS36 - Laboratory activities	No other specific measures identified.	
CS14 - Bulk transfers,CS81 - Dedicated facility	No other specific measures identified.	
CS39 - Equipment cleaning and maintenance	No other specific measures identified.	
CS16 - General exposures (open systems),Elevated temperature	No other specific measures identified.	
CS85 - Bulk product storage	No other specific measures identified.	

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

Not applicable	
ERC2	Formulation into mixture
ESVOC SPERC 2.2.v1	Formulation & packing of preparations and mixtures: Industrial (SU10)

Product characteristics

No additional information

Operational conditions

No additional information

Risk management measures

No additional information

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	Not applicable

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

4.1. Health

Guidance - Health	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Risk Management Measures are based on qualitative risk characterisation,Available hazard data do not support the need for a DNEL to be established for other health effects,Users are advised to consider national Occupational Exposure Limits or other equivalent values,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	Not applicable

1. Exposure scenario 05

Use as binders and release agents

ES Ref.: 05 ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC4, PROC6, PROC8a, PROC8b, PROC10, PROC13, PROC14 SU3 ERC4 ESVOC SPERC 4.10a.v1
Processes, tasks activities covered	Covers the use as binders and release agents including material transfers, mixing, application (including spraying and brushing), mould forming and casting and handling of waste. 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, PROC4, PROC6, PROC8a, PROC8b, PROC10, PROC13, PROC14)

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
PROC4	Chemical production where opportunity for exposure arises
PROC6	Calendering operations
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
PROC10	Roller application or brushing
PROC13	Treatment of articles by dipping and pouring
PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product characteristics

Physical form	Solid at STP, liquid at elevated operating temperature, vapour pressure < 0.5 kPa
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,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 exposures (closed systems)	No other specific measures identified.	
General exposures (closed systems),CS56 - with sample collection	No other specific measures identified.	
General exposures (closed systems),CS55 - Batch process,CS56 - with sample collection	No other specific measures identified.	
CS16 - General exposures (open systems)	No other specific measures identified.	
CS30 - Mixing operations (open systems)	No other specific measures identified.	
Roller, spreader, flow application	No other specific measures identified.	
CS4 - Dipping, immersion and pouring	No other specific measures identified.	
Article formation in mould	No other specific measures identified.	
CS14 - Bulk transfers,CS81 - Dedicated facility	No other specific measures identified.	
CS39 - Equipment cleaning and maintenance	No other specific measures identified.	

2.2 Contributing scenario controlling environmental exposure (ERC4, ESVOC SPERC 4.10a.v1)

Not applicable	
ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ESVOC SPERC 4.10a.v1	Use as binders and release agents: Industrial (SU3)

Product characteristics

No additional information

Operational conditions

No additional information

Risk management measures

No additional information

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	Not applicable

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

4.1. Health

Guidance - Health	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Risk Management Measures are based on qualitative risk characterisation,Available hazard data do not support the need for a DNEL to be established for other health effects,Users are advised to consider national Occupational Exposure Limits or other equivalent values,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	Not applicable

1. Exposure scenario 06

Use as binders and release agents

ES Ref.: 06 ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC4, PROC6, PROC8a, PROC8b, PROC10, PROC13, PROC14 SU22 ERC8a, ERC8d ESVOC SPERC 8.10b.v1
Processes, tasks activities covered	Covers the use as binders and release agents including material transfers, mixing, application by spraying, brushing, 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, PROC4, PROC6, PROC8a, PROC8b, PROC10, PROC13, PROC14)

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
PROC4	Chemical production where opportunity for exposure arises
PROC6	Calendering operations
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
PROC10	Roller application or brushing
PROC13	Treatment of articles by dipping and pouring
PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product characteristics

Physical form	Solid at STP, liquid at elevated operating temperature, vapour pressure < 0.5 kPa
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,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 exposures (closed systems)	No other specific measures identified.	
General exposures (closed systems),CS56 - with sample collection	No other specific measures identified.	
General exposures (closed systems),CS55 - Batch process,CS56 - with sample collection	No other specific measures identified.	
CS16 - General exposures (open systems)	No other specific measures identified.	
CS30 - Mixing operations (open systems)	No other specific measures identified.	
Roller, spreader, flow application	No other specific measures identified.	
CS4 - Dipping, immersion and pouring	No other specific measures identified.	
Article formation in mould	No other specific measures identified.	
CS14 - Bulk transfers,CS81 - Dedicated facility	No other specific measures identified.	
CS39 - Equipment cleaning and maintenance	No other specific measures identified.	

2.2 Contributing scenario controlling environmental exposure (ERC8a, ERC8d, ESVOC SPERC 8.10b.v1)

Not applicable	
ERC8a	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)
ERC8d	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)
ESVOC SPERC 8.10b.v1	Use as binders and release agents: Professional (SU22)

Product characteristics

No additional information

Operational conditions

No additional information

Risk management measures

No additional information

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	Not applicable

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

4.1. Health

Guidance - Health	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Risk Management Measures are based on qualitative risk characterisation,Available hazard data do not support the need for a DNEL to be established for other health effects,Users are advised to consider national Occupational Exposure Limits or other equivalent values,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	Not applicable

1. Exposure scenario 07

Use in agrochemicals

ES Ref.: 07 ES Type: Worker	

Use descriptors	PROC1, PROC4, PROC8a, PROC8b, PROC11, PROC13 SU22 ERC8a, ERC8d ESVOC SPERC 8.11a.v1
Processes, tasks activities covered	Use as an agrochemical excipient for application by manual or machine spraying, smokes and fogging; including equipment clean-downs and disposal. 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, PROC4, PROC8a, PROC8b, PROC11, PROC13)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC4	Chemical production where opportunity for exposure arises
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
PROC11	Non industrial spraying
PROC13	Treatment of articles by dipping and pouring

Product characteristics

Physical form	Solid at STP, liquid at elevated operating temperature, vapour pressure < 0.5 kPa
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,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 exposures (closed systems)	No other specific measures identified.	
CS16 - General exposures (open systems)	No other specific measures identified.	
CS14 - Bulk transfers,CS81 - Dedicated facility	No other specific measures identified.	
CS10 - Spraying	No other specific measures identified.	
CS4 - Dipping, immersion and pouring	No other specific measures identified.	

CS39 - Equipment cleaning and maintenance	No other specific measures identified.	

2.2 Contributing scenario controlling environmental exposure (ERC8a, ERC8d, ESVOC SPERC 8.11a.v1)

Not applicable	
ERC8a	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)
ERC8d	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)
ESVOC SPERC 8.11a.v1	Agrochemical uses: Professional (SU22)

Product characteristics

No additional information

Operational conditions

No additional information

Risk management measures

No additional information

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	Not applicable

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

4.1. Health

Guidance - Health	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Risk Management Measures are based on qualitative risk characterisation,Available hazard data do not support the need for a DNEL to be established for other health effects,Users are advised to consider national Occupational Exposure Limits or other equivalent values,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	Not applicable

1. Exposure scenario 08

Use in agrochemicals

ES Ref.: 08 ES Type: Consumer	

Use descriptors	PC12, PC22, PC27 SU21 ERC8a, ERC8d ESVOC SPERC 8.11b.v1
Processes, tasks activities covered	Covers the consumer use of agrochemicals in liquid and solid forms. 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 (PC12, PC22, PC27)

PC12	Fertilizers
PC22	Lawn and Garden Preparations, including fertilizers
PC27	Plant protection products

Product characteristics

Physical form	Solid at STP, liquid at elevated operating temperature, vapour pressure < 0.5 kPa
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	unless stated differently,Covers use up to 37500 g	
	Covers skin contact area up to 6600 cm2	
Frequency and duration of use	unless stated differently,Covers use up to	4 Uses per day
	Covers exposure up to	8 Hours/event
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.	
	Fertilizers	Unless otherwise stated. Covers concentrations up to. Covers use up to. days/year. covers use up to 1 time/on day of use. Covers skin contact area up to. For each use event, assumes swallowed amount of . For each use event, covers use amounts up to: Covers outdoor use.
	Lawn and Garden Mixtures, including fertilizers	Unless otherwise stated. Covers concentrations up to 90%. Covers use up to 1. days/year. covers use up to 1 time/on day of use. ESIG GES Consumer Tool. For further information, please also consult our Internet site (http://www.progreen.co.uk/index.php?c=61&p=132).
	Plant protection products	Unless otherwise stated. Covers concentrations up to 90%. Covers use up to 1. days/year. covers use up to 1 time/on day of use. Covers skin contact area up to 857,50

		cm2. For each use event, assumes swallowed amount of . 0,3 g. For each use event, covers use amounts up to: 2500g. Covers outdoor use.

Risk management measures

Other risk management measures:

Fertilizers	No specific risk management measure identified beyond those operational conditions stated.	
Lawn and Garden Mixtures, including fertilizers	No specific risk management measure identified beyond those operational conditions stated.	
Plant protection products	No specific risk management measure identified beyond those operational conditions stated.	

2.2 Contributing scenario controlling environmental exposure (ERC8a, ERC8d, ESVOC SPERC 8.11b.v1)

Not applicable	
ERC8a	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)
ERC8d	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)
ESVOC SPERC 8.11b.v1	Agrochemical uses: Consumer (SU21)

Product characteristics

No additional information

Operational conditions

No additional information

Risk management measures

No additional information

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 unless otherwise indicated.

3.2. Environment

Information for contributing exposure scenario	
2.2	Not applicable

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	Not applicable

1. Exposure scenario 09

Road and construction applications

ES Ref.: 09	
ES Type: Worker	

Use descriptors	PROC8a, PROC8b, PROC9, PROC10, PROC11, PROC13 SU22 ERC8d, ERC8f ESVOC SPERC 8.15.v1
Processes, tasks activities covered	Application of surface coatings and binders in road and construction activities, including paving uses, manual mastic and in the application of roofing and water-proofing membranes. 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 (PROC8a, PROC8b, PROC9, PROC10, PROC11, PROC13)

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)
PROC10	Roller application or brushing
PROC11	Non industrial spraying
PROC13	Treatment of articles by dipping and pouring

Product characteristics

Physical form	Solid at STP, liquid at elevated operating temperature, vapour pressure < 0.5 kPa
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,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.	
CS14 - Bulk transfers,CS81 - Dedicated facility	No other specific measures identified.	
CS7 - Small package filling	No other specific measures identified.	
Roller, spreader, flow application	No other specific measures identified.	
CS10 - Spraying	No other specific measures identified.	
CS4 - Dipping, immersion and pouring	No other specific measures identified.	
CS39 - Equipment cleaning and maintenance	No other specific measures identified.	

2.2 Contributing scenario controlling environmental exposure (ERC8d, ERC8f, ESVOC SPERC 8.15.v1)

Not applicable	
ERC8d	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)
ERC8f	Widespread use leading to inclusion into/onto article (outdoor)
ESVOC SPERC 8.15.v1	Road and Construction applications: Professional (SU22)

Product characteristics

No additional information

Operational conditions

No additional information

Risk management measures

No additional information

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	Not applicable

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

4.1. Health

Guidance - Health	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Risk Management Measures are based on qualitative risk characterisation,Available hazard data do not support the need for a DNEL to be established for other health effects,Users are advised to consider national Occupational Exposure Limits or other equivalent values,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	Not applicable

1. Exposure scenario 10

Use in rubber production and processing

ES Ref.: 10 ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC4, PROC5, PROC6, PROC7, PROC8a, PROC8b, PROC9, PROC13, PROC14, PROC15, PROC21 SU3, SU10, SU11 ERC1, ERC4, ERC6d ESVOC SPERC 4.19.v1
Processes, tasks activities covered	Manufacture of tyres and general rubber articles, including processing of raw (uncured) rubber, handling and mixing of rubber additives, vulcanising, cooling and finishing 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, PROC4, PROC5, PROC6, PROC7, PROC8a, PROC8b, PROC9, PROC13, PROC14, PROC15, PROC21)

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
PROC4	Chemical production where opportunity for exposure arises
PROC5	Mixing or blending in batch processes
PROC6	Calendering operations
PROC7	Industrial spraying
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)
PROC13	Treatment of articles by dipping and pouring
PROC14	Tabletting, compression, extrusion, pelettisation, granulation
PROC15	Use as laboratory reagent
PROC21	Low energy manipulation and handling of substances bound in/on materials or articles

Product characteristics

Physical form	Solid at STP, liquid at elevated operating temperature, vapour pressure < 0.5 kPa
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 exposures (closed systems)	No other specific measures identified.	
General exposures (closed systems),CS56 - with sample collection	No other specific measures identified.	
General exposures (closed systems),CS55 - Batch process,CS56 - with sample collection	No other specific measures identified.	
CS16 - General exposures (open systems)	No other specific measures identified.	
CS30 - Mixing operations (open systems)	No other specific measures identified.	
CS64 - Calendering (including Banburys),CS70 - Vulcanisation,CS71 - Cooling cured articles	No other specific measures identified.	
CS10 - Spraying	No other specific measures identified.	
Small scale weighing	No other specific measures identified.	
CS4 - Dipping, immersion and pouring	No other specific measures identified.	
CS73 - Pressing uncured rubber blanks	No other specific measures identified.	
CS102 - Finishing operations	No other specific measures identified.	
CS36 - Laboratory activities	No other specific measures identified.	
CS14 - Bulk transfers,CS81 - Dedicated facility	No other specific measures identified.	
CS39 - Equipment cleaning and maintenance	No other specific measures identified.	

2.2 Contributing scenario controlling environmental exposure (ERC1, ERC4, ERC6d, ESVOC SPERC 4.19.v1)

Not applicable	
ERC1	Manufacture of the substance
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

No additional information

Operational conditions

No additional information

Risk management measures

No additional information

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	Not applicable

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

4.1. Health

Guidance - Health	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Risk Management Measures are based on qualitative risk characterisation,Available hazard data do not support the need for a DNEL to be established for other health effects,Users are advised to consider national Occupational Exposure Limits or other equivalent values,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	Not applicable

1. Exposure scenario 11

Use as a fuel

ES Ref.: 11 ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC16 SU3 ERC7 ESVOC SPERC 7.12a.v1
Processes, tasks activities covered	Covers the use as a fuel (or fuel additive), and includes 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

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

Not applicable	
ERC7	Use of functional fluid at industrial site
ESVOC SPERC 7.12a.v1	Use as a fuel: Industrial (SU3)

Product characteristics

No additional information

Operational conditions

No additional information

Risk management measures

No additional information

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC4, 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
PROC4	Chemical production where opportunity for exposure arises
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	Solid at STP, liquid at elevated operating temperature, vapour pressure < 0.5 kPa
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 exposures (closed systems)	No other specific measures identified.	
General exposures (closed systems),CS56 - with sample collection	No other specific measures identified.	
General exposures (closed systems),CS55 - Batch process,CS56 - with sample collection	No other specific measures identified.	
CS2 - Process sampling	No other specific measures identified.	
CS16 - General exposures (open systems)	No other specific measures identified.	
CS107 - (closed systems)	No other specific measures identified.	
CS14 - Bulk transfers,CS81 - Dedicated facility	No other specific measures identified.	
CS39 - Equipment cleaning and maintenance	No other specific measures identified.	
CS85 - Bulk product storage	No other specific measures identified.	

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	Not applicable

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

4.1. Health

Guidance - Health	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Risk Management Measures are based on qualitative risk characterisation,Available hazard data do not support the need for a DNEL to be established for other health effects,Users are advised to consider national Occupational Exposure Limits or other equivalent values,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	Not applicable

1. Exposure scenario 12

Explosives manufacture & use

ES Ref.: 12 ES Type: Worker	

Use descriptors	PROC1, PROC3, PROC5, PROC8a, PROC8b SU22 ERC8e
Processes, tasks activities covered	Covers exposures arising from the manufacture and use of slurry explosives (including materials transfer, mixing and charging) and equipment cleaning. 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, PROC3, PROC5, PROC8a, PROC8b)

PROC1	Chemical production or refinery in closed process without likelihood of 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
PROC5	Mixing or blending in batch processes
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	Solid at STP, liquid at elevated operating temperature, vapour pressure < 0.5 kPa
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 exposures (closed systems)	No other specific measures identified.	
General exposures (closed systems),CS55 - Batch process,CS56 - with sample collection	No other specific measures identified.	
CS30 - Mixing operations (open systems)	No other specific measures identified.	
CS14 - Bulk transfers,CS81 - Dedicated facility	No other specific measures identified.	
CS39 - Equipment cleaning and maintenance	No other specific measures identified.	

2.2 Contributing scenario controlling environmental exposure (ERC8e)

Not applicable	
ERC8e	Widespread use of reactive processing aid (no inclusion into or onto article, outdoor)

Product characteristics

No additional information

Operational conditions

No additional information

Risk management measures

No additional information

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	Not applicable

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

4.1. Health

Guidance - Health	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Risk Management Measures are based on qualitative risk characterisation,Available hazard data do not support the need for a DNEL to be established for other health effects,Users are advised to consider national Occupational Exposure Limits or other equivalent values,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	Not applicable

1. Exposure scenario 13

Use in matches

ES Ref.: 13 ES Type: Consumer	

Use descriptors	PC11 SU21 ERC8e
Processes, tasks activities covered	Consumer use (C)

2. Operational conditions and risk management measures

2.1 Contributing scenario consumer end-use (PC11)

Not applicable	
PC11	Explosives

Product characteristics

No additional information

Operational conditions

No additional information

Risk management measures

No additional information

2.2 Contributing scenario controlling environmental exposure (ERC8e)

Not applicable	
ERC8e	Widespread use of reactive processing aid (no inclusion into or onto article, outdoor)

Product characteristics

No additional information

Operational conditions

No additional information

Risk management measures

No additional information

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	Not applicable

3.2. Environment

Information for contributing exposure scenario	
2.2	Not applicable

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

4.1. Health

Guidance - Health	Not applicable

4.2. Environment

Guidance - Environment	Not applicable

1. Exposure scenario 14

Use in fireworks

ES Ref.: 14 ES Type: Consumer	

Use descriptors	PC11 SU21 ERC8e
Processes, tasks activities covered	Consumer use (C)

2. Operational conditions and risk management measures

2.1 Contributing scenario consumer end-use (PC11)

Not applicable	
PC11	Explosives

Product characteristics

No additional information

Operational conditions

No additional information

Risk management measures

No additional information

2.2 Contributing scenario controlling environmental exposure (ERC8e)

Not applicable	
ERC8e	Widespread use of reactive processing aid (no inclusion into or onto article, outdoor)

Product characteristics

No additional information

Operational conditions

No additional information

Risk management measures

No additional information

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	Not applicable

3.2. Environment

Information for contributing exposure scenario	
2.2	Not applicable

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

4.1. Health

Guidance - Health	Not applicable

4.2. Environment

Guidance - Environment	Not applicable