We create chemistry

Safety data sheet

BASF safety data sheet. This is a translation of the country-specific safety data sheet into a language other than that required by law. This document does not replace the safety data sheet provided according to Regulation (EC) No 1907/2006.
Date / Revised: 15.08.2023 Version: 3.0
Date previous version: 28.04.2023 Previous version: 2.0
Date / First version: 21.10.2022
Product: **Raffinate I**

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

1.1. Product identifier

Raffinate I

Chemical name: Hydrocarbons, C4, steam-cracker distillates
INDEX-Number: 649-116-00-9
CAS Number: 92045-23-3

REACH registration number: 01-2119474204-43-0007, 01-2119474204-43-0005, 01-2119474204-43

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

Relevant identified uses: Chemical, Intermediate, additive for the petroleum industry
Recommended use: Chemical

For the detailed identified uses of the product see appendix of the safety data sheet.

1.3. Details of the supplier of the safety data sheet

Company:
BASF SE
67056 Ludwigshafen
GERMANY
Operating Division Petrochemicals

Telephone: +49 621 60-42151
E-mail address: sds-petrochemicals@basf.com

1.4. Emergency telephone number

International emergency number:
Telephone: +49 180 2273-112

SECTION 2: Hazards Identification

2.1. Classification of the substance or mixture

According to Regulation (EC) No 1272/2008 [CLP]

Flam. Gas 1	H220 Extremely flammable gas.
Press. Gas Liquefied gas	H280 Contains gas under pressure; may explode if heated.
Muta. 1B	H340 May cause genetic defects.
Carc. 1A	H350 May cause cancer.

According to BASF current knowledge and application of the criteria given in Annex I of Regulation (EC) No. 1272/2008, the following classification exceeding the classification given in Regulation (EC) No 1272/2008, Annex VI, Table 3.1 is required.

Flam. Gas 1A
Press. Gas Liquefied gas
Carc. 1A
Muta. 1B

For the classifications not written out in full in this section the full text can be found in section 16.

2.2. Label elements

According to Regulation (EC) No 1272/2008 [CLP]

Pictogram:

Signal Word:

Danger

Hazard Statement:

H280	Contains gas under pressure; may explode if heated.
H220	Extremely flammable gas.
H350	May cause cancer.
H340	May cause genetic defects.

Precautionary Statements (Prevention):

P280	Wear protective gloves, protective clothing and eye protection or face protection.
P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P201	Obtain special instructions before use.

Precautionary Statements (Response):

P308 + P313	IF exposed or concerned: Get medical attention.

Precautionary Statements (Storage):

P405	Store locked up.

Precautionary Statements (Disposal):

P501	Dispose of contents and container to hazardous or special waste collection point.

Labeling of special preparations (GHS):

Restricted to professional users.

Hazard determining component(s) for labelling: isopentane, 1,3-butadiene

2.3. Other hazards

According to Regulation (EC) No 1272/2008 [CLP]

If applicable information is provided in this section on other hazards which do not result in classification but which may contribute to the overall hazards of the substance or mixture.
See section 12 - Results of PBT and vPvB assessment.
Product does not contain a substance above legal limits included in the list established in accordance with Article 59(1) of Regulation (EC) No 1907/2006 for having endocrine disrupting properties or is identified to have endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605.
The product does not fulfill the criteria for PBT (Persistent/bioaccumulative/toxic) and vPvB (very persistent/very bioaccumulative).

SECTION 3: Composition/Information on Ingredients

3.1. Substances

Chemical nature

aliphatic hydrocarbons
Hydrocarbons, C4, steam-cracker distillate

Content (W/W): 100 %	Flam. Gas 1
CAS Number: 92045-23-3	Press. Gas Liquef. Gas
EC-Number: 295-405-4	Muta. 1B
INDEX-Number: 649-116-00-9	Carc. 1A
	H280, H220, H350, H340

Regulatory relevant ingredients

isopentane

Content (W/W): >= 0,01 % - <= 1 %	Asp. Tox. 1 Flam. Liq. 1
CAS Number: 78-78-4	STOT SE 3 (drowsiness and dizziness)
EC-Number: 201-142-8	Aquatic Chronic 2
INDEX-Number: 601-085-00-2	H224, H304, H336, H411 EUH066

1,3-butadiene

Content (W/W): >= 0,01 % - <= 0,5 %	Flam. Gas 1 Press. Gas Liquef. Gas
CAS Number: 106-99-0	Muta. 1B
EC-Number: 203-450-8	Carc. 1A
INDEX-Number: 601-013-00-X	H280, H220, H350, H340
Substance with EU occupational exposure limit	

For the classifications not written out in full in this section, including the hazard classes and the hazard statements, the full text is listed in section 16.

3.2. Mixtures

Not applicable

SECTION 4: First-Aid Measures

4.1. Description of first aid measures

First aid personnel should pay attention to their own safety. If the patient is likely to become unconscious, place and transport in stable sideways position (recovery position). Immediately remove contaminated clothing.

If inhaled:
Keep patient calm, remove to fresh air, seek medical attention.

On skin contact:
Immediately wash thoroughly with soap and water, seek medical attention.

On contact with eyes:
Wash affected eyes for at least 15 minutes under running water with eyelids held open.

On ingestion:
Immediately rinse mouth and then drink 200-300 ml of water, seek medical attention.

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

Symptoms: Information, i.e. additional information on symptoms and effects may be included in the GHS labeling phrases available in Section 2 and in the Toxicological assessments available in Section 11.

Hazards: Information, i.e. additional information on symptoms and effects may be included in the GHS labeling phrases available in Section 2 and in the Toxicological assessments available in Section 11. (Further) symptoms and / or effects are not known so far

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

Treatment: Treat according to symptoms (decontamination, vital functions), no known specific antidote.

SECTION 5: Fire-Fighting Measures

5.1. Extinguishing media

Suitable extinguishing media:
carbon dioxide, dry powder

Unsuitable extinguishing media for safety reasons:
foam, water spray, water jet

Additional information:
Use extinguishing measures to suit surroundings.

5.2. Special hazards arising from the substance or mixture

Advice: Highly flammable. Vapours may form explosive mixture with air.

Advice: Shut off or stop released substance/product under safe conditions. Cool endangered containers with water-spray.

Advice: Burning produces harmful and toxic fumes.

5.3. Advice for fire-fighters

Special protective equipment:
Wear a self-contained breathing apparatus. Special protective equipment for firefighters

Further information:
Do not put fire out unless flow feeding it can be safely stopped. The substance/product forms flammable mixtures with air. Evacuate area of all unnecessary personnel. Fight fire from maximum distance.

Extend fire extinguishing measures to the surroundings.

SECTION 6: Accidental Release Measures

Shut off or stop source of leak. Shut off or stop released substance/product under safe conditions.

6.1. Personal precautions, protective equipment and emergency procedures

Avoid contact with the skin, eyes and clothing. Avoid all sources of ignition: heat, sparks, open flame. Wear respiratory protection if ventilation is inadequate.

Keep people away and stay on the upwind side.

Handle in accordance with good industrial hygiene and safety practice.

6.2. Environmental precautions

Contain contaminated water/firefighting water.

6.3. Methods and material for containment and cleaning up

Ensure adequate ventilation.

Suppress gases/vapours/mists with water spray jet.

6.4. Reference to other sections

Information regarding exposure controls/personal protection and disposal considerations can be found in section 8 and 13.

SECTION 7: Handling and Storage

7.1. Precautions for safe handling

Refill and handle product only in closed system. Handle in accordance with good industrial hygiene and safety practice. Ensure thorough ventilation of stores and work areas.

Protection against fire and explosion:
Avoid all sources of ignition: heat, sparks, open flame. Vapours may form explosive mixture with air.

Electrical devices must meet the specified temperature class.

Temperature class: T2 (Autoignition temperature >300 °C).

7.2. Conditions for safe storage, including any incompatibilities

No applicable information available.
Further information on storage conditions: Keep container tightly closed in a cool, well-ventilated place.

Avoid all sources of ignition: heat, sparks, open flame.

Storage class according to TRGS 510 (originally VCI, Germany): (2A) Gases (except aerosol dispensers and lighters)

7.3. Specific end use(s)

See exposure scenario(s) in the attachment to this safety data sheet.

SECTION 8: Exposure Controls/Personal Protection

8.1. Control parameters

Components with occupational exposure limits

The surveillance of the workplace by exposure measurements may be necessary, in order to prove the efficiency of safety measures, for example ventilation or the need of respiratory protection. Since this requires a specific competency, only accredited laboratories should be contracted. Regarding suitable methods to assess inhalation exposure, the European Standards EN 482, 689 and 14042 are to be considered. In addition, the TRGS 402 has to be observed in Germany.

75-28-5: Hydrocarbons, C3-4; Petroleum gas
Short Term Exposure Classification: (TRGS 900 (DE))
Category II: Substances with a resorptive effect
OEL 2.400 mg/m3 ; 1.000 ppm (TRGS 900 (DE))
Ceiling limit value/factor: 4

78-78-4: isopentane
TWA value 3.000 mg/m3 ; 1.000 ppm (OEL (EU))
indicative
Short Term Exposure Classification: (TRGS 900 (DE))
Category II: Substances with a resorptive effect
OEL 3.000 mg/m3 ; 1.000 ppm (TRGS 900 (DE))
Ceiling limit value/factor: 2

106-97-8: butane
Short Term Exposure Classification: (TRGS 900 (DE))
Category II: Substances with a resorptive effect
OEL 2.400 mg/m3 ; 1.000 ppm (TRGS 900 (DE))
Ceiling limit value/factor: 4

106-99-0: 1,3-butadiene
Tolerance Concentration (risk 4:1000): 5 mg/m3 ; 2 ppm (TRGS 910)
Acceptance concentration (risk 4:10000): 0,5 mg/m3 ; 0,2 ppm (TRGS 910)
Excursion factor (TRGS 910)
Ceiling limit value/factor: 8
Factor by which the average shift value (SMW) can be exceeded four times per shift during a maximum. period of 15 minutes each.
TWA value 2,2 mg/m3 ; 1 ppm (Directive 2004/37/EC)

PNEC

Hazard assessment based on constituents, therefore no PNEC was derived for the multicomponent substance itsself.

DNEL

worker:
Long-term exposure- systemic effects, Inhalation: 2,21 mg/m3, 1 ppm

8.2. Exposure controls

Personal protective equipment

Respiratory protection:
Wear respiratory protection if ventilation is inadequate. Suitable respiratory protection for lower concentrations or short-term effect: Gas filter for gases/vapours of organic compounds (boiling point <65 °C, f.e. EN 14387 Type AX) Suitable respiratory protection for higher concentrations or long-term effect: Self-contained breathing apparatus.

Hand protection:
When there is a risk of frostbite from escaping gas, use thermally insulated gloves (EN 511).

Chemical resistant protective gloves (EN ISO 374-1)
Suitable materials also with prolonged, direct contact (Recommended: Protective index 6, corresponding > 480 minutes of permeation time according to EN ISO 374-1):
nitrile rubber (NBR) - 0.4 mm coating thickness
fluoroelastomer (FKM) - 0.7 mm coating thickness

Suitable materials for short-term contact (recommended: At least protective index 2, corresponding > 30 minutes of permeation time according to EN ISO 374-1)
butyl rubber (butyl) - 0.7 mm coating thickness
chloroprene rubber (CR) - 0.5 mm coating thickness

Manufacturer's directions for use should be observed because of great diversity of types.
Supplementary note: The specifications are based on tests, literature data and information of glove manufacturers or are derived from similar substances by analogy. Due to many conditions (e.g. temperature) it must be considered, that the practical usage of a chemical-protective glove in practice may be much shorter than the permeation time determined through testing.

Eye protection:
Safety glasses with side-shields (frame goggles) (e.g. EN 166)

Body protection:
Body protection must be chosen depending on activity and possible exposure, e.g. apron, protecting boots, chemical-protection suit (according to EN 14605 in case of splashes or EN ISO 13982 in case of dust).

General safety and hygiene measures

Handle in accordance with good industrial hygiene and safety practice. Wearing of closed work clothing is required additionally to the stated personal protection equipment. Avoid contact with the skin, eyes and clothing. Ensure adequate ventilation. Avoid inhalation of vapour. At the end of the shift the skin should be cleaned and skin-care agents applied. Remove contaminated clothing immediately and dispose of safely.

Environmental exposure controls

Suitable risk management measures should be in place.

SECTION 9: Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

State of matter:	gaseous	
Form:	pressurised liquified gas	
Colour:	colourless	
Odour:	sweetish	
Odour threshold:	not determined	
Melting temperature:	< -100 °C Literature data.	

Boiling range:	-7 - 0 °C The product has not been tested., The statements are based on the properties of the individual components.	

Flammability:	Extremely flammable.	(other)
Lower explosion limit:	1,5 %(V) The product has not been tested. The statement has been derived from the properties of the individual components.	
Upper explosion limit:	12 %(V) The product has not been tested. The statement has been derived from the properties of the individual components., Literature data.	
Flash point:	< -30 °C	(ISO 13736, closed cup)
Auto-ignition temperature:	374 °C	(DIN EN 14522)
Thermal decomposition:	No decomposition if stored and handled as prescribed/indicated.	
pH value:	not applicable	
Viscosity, kinematic:	not applicable	

Viscosity, dynamic:		
	not applicable	
Thixotropy:	not thixotropic	
Solubility in water:		(calculated)
	135,6 - 732,3 mg/l	
	(20 °C)	
Solubility (qualitative) solvent(s):	organic solvents	
	soluble	
Partitioning coefficient n-octanol/water (log Kow):	2,09 - 2,31	(calculated)
	Literature data.	
Vapour pressure:	2.522 hPa	(OECD Guideline 104)
	(20 °C)	
	static	
	4.492 hPa	(OECD Guideline 104)
	(40 °C)	
	static	
	5.840 hPa	(OECD Guideline 104)
	(50 °C)	
	static	
Relative density:	approx. 0,5	
Density:	0,58 - 0,62 g/cm3	(ASTM D 2598)
	(15 °C, 1.013 hPa)	
	compressed liquefied gas	
Relative vapour density (air):		
	Heavier than air., Information based on the main component/s.	
Information on: Butene		
Relative vapour density (air):1,99		(calculated)
	(25 °C)	
	Heavier than air.	
Information on: butane		
Relative vapour density (air):2,113		
	Literature data., Heavier than air.	
Information on: Hydrocarbons, C3-4; Petroleum gas		
Relative vapour density (air):2,047		
	Literature data., Heavier than air.	
Information on: 2-methylpropene		
Relative vapour density (air):2		
	Literature data.	

Particle characteristics

Particle size distribution: The substance / product is marketed or used in a non solid or granular form. -

9.2. Other information

Information with regard to physical hazard classes

Explosives

Explosion hazard:	Based on the chemical structure there is no indication of explosive properties.	(other)

Oxidizing properties

Fire promoting properties:	Based on its structural properties the product is not classified as oxidizing.	(other)

Pyrophoric properties

Self-ignition temperature:		Test type: Spontaneous self-ignition at room-temperature.
	Based on its structural properties the product is not classified as self-igniting.	

Self-heating substances and mixtures

Self heating ability:	It is not a substance capable of spontaneous heating.

Substances and mixtures, which emit flammable gases in contact with water

Formation of flammable gases:
Forms no flammable gases in the presence of water.

Corrosion to metals

Corrosive effects to metal are not anticipated.

Other safety characteristics

Radioactivity:		not radioactive for transport purposes
:	No data available.	
Surface tension:	Based on chemical structure, surface activity is not to be expected.	
SAPT-Temperature:	Product does not fulfil criteria for polymerizing substances according to transport regulations.	
Evaporation rate:	Value can be approximated from Henry's Law Constant or vapor pressure.	

SECTION 10: Stability and Reactivity

10.1. Reactivity

No hazardous reactions if stored and handled as prescribed/indicated.

Corrosion to metals:	Corrosive effects to metal are not anticipated.	
Formation of flammable gases:	Remarks:	Forms no flammable gases in the presence of water.

10.2. Chemical stability

The product is stable if stored and handled as prescribed/indicated.

Peroxides: The product does not contain peroxides.

10.3. Possibility of hazardous reactions

Formation of explosive gas/air mixtures.

10.4. Conditions to avoid

Avoid all sources of ignition: heat, sparks, open flame. Avoid direct sunlight.

10.5. Incompatible materials

Substances to avoid:
oxygen, nitrogen oxides, oxidizing agents

10.6. Hazardous decomposition products

No hazardous decomposition products if stored and handled as prescribed/indicated.

SECTION 11: Toxicological Information

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

Acute toxicity

Assessment of acute toxicity:

Virtually nontoxic by inhalation. The product has not been tested. The statement has been derived from the properties of the individual components.

Experimental/calculated data:

LC50 rat (by inhalation): 620 mg/l 4 h (other)
The product has not been tested. The statement has been derived from substances/products of a similar structure or composition. The vapour was tested.

Irritation

Assessment of irritating effects:

Contact with liquid may cause frostbite. The substance is gaseous at room temperature and pressure. Testing for this particular endpoint is technically not feasible and/or this endpoint does not represent a relevant exposure scenario.

Respiratory/Skin sensitization

Assessment of sensitization:

No data available. The substance is gaseous at room temperature and pressure. Testing for this particular endpoint is technically not feasible and/or this endpoint does not represent a relevant exposure scenario. The chemical structure does not suggest a sensitizing effect.

Germ cell mutagenicity

Assessment of mutagenicity:

Capable of causing genetic defects. EU-classification

Carcinogenicity

Assessment of carcinogenicity:
The substance caused cancer in animal studies. EU-classification
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Reproductive toxicity

Assessment of reproduction toxicity:
Animal studies gave no indication of a fertility impairing effect at doses which were not toxic to the parental animals. The product has not been tested. The statement has been derived from substances/products of a similar structure or composition. The results were determined in a Screening test (OECD 421/422).

Developmental toxicity

Assessment of teratogenicity:

Animal studies gave no indication of a developmental toxic effect at doses that were not toxic to the parental animals. The product has not been tested. The statement has been derived from substances/products of a similar structure or composition. The results were determined in a Screening test (OECD 421/422).

Experiences in humans

Experimental/calculated data:

High concentrations have a narcotizing effect.

May cause frostbite

Specific target organ toxicity (single exposure)

Assessment of STOT single:

Based on the available information there is no specific target organ toxicity to be expected after a single exposure.

Remarks: The product has not been tested. The statement has been derived from the properties of the individual components.

Repeated dose toxicity and Specific target organ toxicity (repeated exposure)

Assessment of repeated dose toxicity:

Repeated inhalative uptake of the substance did not cause substance-related effects. The product has not been tested. The statement has been derived from the properties of the individual components.

Aspiration hazard

not applicable

Interactive effects

No data available.

11.2. Information on other hazards

Endocrine disrupting properties

The substance is not identified to have endocrine disrupting properties according to Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 nor is included in the Candidate List of substances of very high concern according to EU REACh Article 59 for having endocrine disrupting properties.

SECTION 12: Ecological Information

12.1. Toxicity

Assessment of aquatic toxicity:
There is a high probability that the product is not acutely harmful to aquatic organisms. The product has not been tested. The statement has been derived from the properties of the individual components.

Assessment of terrestrial toxicity:
No data available.
Study technically not feasible.

12.2. Persistence and degradability

Assessment biodegradation and elimination (H2O):

The product is highly volatile and can be eliminated from water by stripping. The product has not been tested. The statement has been derived from the properties of the individual components.

Elimination information:
The product has not been tested. The statement has been derived from the properties of the individual components.

Assessment of stability in water:
According to structural properties, hydrolysis is not expected/probable.

Information on Stability in Water (Hydrolysis):
No data available.

12.3. Bioaccumulative potential

Assessment bioaccumulation potential:
Because of the n-octanol/water distribution coefficient (log Pow) accumulation in organisms is not to be expected.
The product has not been tested. The statement has been derived from the properties of the individual components.

Bioaccumulation potential:
No data available.

12.4. Mobility in soil

Assessment transport between environmental compartments:
Volatility: The substance will rapidly evaporate into the atmosphere from the water surface. The product has not been tested. The statement has been derived from the properties of the individual components.
Adsorption in soil: No data available.

12.5. Results of PBT and vPvB assessment

According to Annex XIII of Regulation (EC) No.1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH): The product does not fulfill the criteria for PBT (Persistent/bioaccumulative/toxic) and vPvB (very persistent/very bioaccumulative).

12.6. Endocrine disrupting properties

The substance is not identified to have endocrine disrupting properties according to Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 nor is included in the Candidate List of substances of very high concern according to EU REACh Article 59 for having endocrine disrupting properties.

12.7. Other adverse effects

The substance is not listed in Regulation (EC) 1005/2009 on substances that deplete the ozone layer.

12.8. Additional information

Other ecotoxicological advice:
Avoid release into the atmosphere.

SECTION 13: Disposal Considerations

13.1. Waste treatment methods

Dispose of in accordance with national, state and local regulations.

Contaminated packaging:
Disposal must be made according to official regulations.

SECTION 14: Transport Information

Land transport

ADR

UN number or ID number:	UN1965
UN proper shipping name:	HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S. (MIXTURE A)
Transport hazard class(es):	2.1
Packing group:	Not applicable
Environmental hazards:	no
Special precautions for user:	Tunnel code: B/D

RID

UN number or ID number:	UN1965
UN proper shipping name:	HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S. (MIXTURE A)
Transport hazard class(es):	2.1, 13
Packing group:	Not applicable
Environmental hazards:	no
Special precautions for	Shunting label: 13

user:

Inland waterway transport

ADN

UN number or ID number:	UN1965
UN proper shipping name:	HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S. (MIXTURE A)
Transport hazard class(es):	2.1
Packing group:	Not applicable
Environmental hazards:	no
Special precautions for user:	None known

Transport in inland waterway vessel

UN number or ID number:	UN1965
UN proper shipping name:	HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S.
Transport hazard class(es):	2.1, CMR
Packing group:	Not applicable
Environmental hazards:	no
Type of inland waterway vessel:	G
Cargo tank design:	1
Cargo tank type:	1

Sea transport

IMDG

UN number or ID number:	UN 1965
UN proper shipping name:	HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S. (BUTENE/BUTANE)
Transport hazard class(es):	2.1
Packing group:	Not applicable
Environmental hazards:	no Marine pollutant: NO
Special precautions for user:	EmS: F-D; S-U

Air transport

IATA/ICAO

UN number or ID number:	UN 1965
UN proper shipping name:	HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S. (BUTENE/BUTANE)
Transport hazard class(es):	2.1
Packing group:	Not applicable
Environmental hazards:	No Mark as dangerous for the environment is needed
Special precautions for user:	None known

14.1. UN number or ID number
See corresponding entries for “UN number or ID number” for the respective regulations in the tables above.

14.2. UN proper shipping name
See corresponding entries for “UN proper shipping name” for the respective regulations in the tables above.

14.3. Transport hazard class(es)
See corresponding entries for “Transport hazard class(es)” for the respective regulations in the tables above.

14.4. Packing group
See corresponding entries for “Packing group” for the respective regulations in the tables above.

14.5. Environmental hazards
See corresponding entries for “Environmental hazards” for the respective regulations in the tables above.

14.6. Special precautions for user
See corresponding entries for “Special precautions for user” for the respective regulations in the tables above.

14.7. Maritime transport in bulk according to IMO instruments

Maritime transport in bulk is not intended.

SECTION 15: Regulatory Information

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

Prohibitions, Restrictions and Authorizations

Chemical Prohibition Ordinance (DE): Annex 2
Restriction Type: Restricted substance

Annex XVII of Regulation (EC) No 1907/2006: Number on List: 40, 29, 28, 75, 75, 40, 28, 28, 29

Hazardous Incident Ordinance (Germany):
List entry in regulation: 1.2.2
Listed in above regulation: Liquefied flammable gases, Category 1 or 2 (including LPG) and natural gas

Directive 2012/18/EU - Control of Major Accident Hazards involving dangerous substances (EU):
List entry in regulation: P2
Listed in above regulation: Liquefied flammable gases, Category 1 or 2 (including LPG) and natural gas

Classification according to 'TA-Luft' (Germany):

5.2.7.1.1 class III: Carcinogenic substances class III	1,00 %

1,3-butadiene

Water hazard class (§6 AwSV para.4 (Legal binding announcement of the substance in the Federal Gazette)): (3) Strongly water polluting. ID-No.: 8481

Law on the Protection of Working Youth
The Maternity Protection Act needs to be considered.
List of carcinogenic, mutagenic or reprotoxic substances (TRGS 905)
Regulation on prohibitions and restrictions on the marketing of dangerous substances, preparations and goods in accordance with the chemical law (Germany)
German Regulation TA Luft (Technical Instruction on Air Quality Control, i.e. first Directive to the Federal Immission Control Ordinance)
Observe TRGS 910 on cmr substances (German Technical Rule for Hazardous Substances)

15.2. Chemical Safety Assessment

Assessment of safe use has been performed for the mixture and the result is attached as an annex to the SDS

SECTION 16: Other Information

Assessment of the hazard classes according to UN GHS criteria (most recent version)

Carc. 1A
Muta. 1B
Flam. Gas 1A
Press. Gas Liquefied gas

Full text of the classifications, including the hazard classes and the hazard statements, if mentioned in section 2 or 3:

Flam. Gas	Flammable gases
Press. Gas	Gases under pressure
Muta.	Germ cell mutagenicity
Carc.	Carcinogenicity
Asp. Tox.	Aspiration hazard
Flam. Liq.	Flammable liquids
STOT SE	Specific target organ toxicity — single exposure
Aquatic Chronic	Hazardous to the aquatic environment - chronic
H280	Contains gas under pressure; may explode if heated.
H220	Extremely flammable gas.
H350	May cause cancer.
H340	May cause genetic defects.
H224	Extremely flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H336	May cause drowsiness or dizziness.
H411	Toxic to aquatic life with long lasting effects.
EUH066	Repeated exposure may cause skin dryness or cracking.

Abbreviations
ADR = The European Agreement concerning the International Carriage of Dangerous Goods by Road. ADN = The European Agreement concerning the International Carriage of Dangerous Goods by Inland waterways. ATE = Acute Toxicity Estimates. CAO = Cargo Aircraft Only. CAS = Chemical Abstract Service. CLP = Classification, Labelling and Packaging of substances and mixtures. DIN = German national organization for standardization. DNEL = Derived No Effect Level. EC50 = Effective concentration median for 50% of the population. EC = European Community. EN = European Standards. IARC = International Agency for Research on Cancer. IATA = International Air Transport Association. IBC-Code = Intermediate Bulk Container code. IMDG = International Maritime Dangerous Goods Code. ISO = International Organization for Standardization. STEL = Short-Term Exposure Limit. LC50 = Lethal concentration median for 50% of the population. LD50 = Lethal dose median for 50% of the population. TLV = Threshold Limit Value. MARPOL = The International Convention for the Prevention of Pollution from Ships. NEN = Dutch Norm. NOEC = No Observed Effect Concentration. OEL = Occupational Exposure Limit. OECD = Organization for Economic Cooperation and Development. PBT = Persistent, Bioaccumulative and Toxic. PNEC = Predicted No Effect Level. PPM = Parts per million. RID = The European Agreement concerning the International Carriage of Dangerous Goods by Rail. TWA = Time Weight Average. UN-number = UN number at transport. vPvB = very Persistent and very Bioaccumulative.

The data contained in this safety data sheet are based on our current knowledge and experience and describe the product only with regard to safety requirements. This safety data sheet is neither a Certificate of Analysis (CoA) nor technical data sheet and shall not be mistaken for a specification agreement. Identified uses in this safety data sheet do neither represent an agreement on the corresponding contractual quality of the substance/mixture nor a contractually designated use. It is the responsibility of the recipient of the product to ensure any proprietary rights and existing laws and legislation are observed.

Annex: Exposure Scenarios

Index

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1. Short title of exposure scenario

General measures applicable to all activities

Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	All relevant process categories Use domain: industrial and professional
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Risk Management Measures	
Drain down and flush system prior to equipment break-in or maintenance. Regular inspection and maintenance of equipment and machines. Provide specific employee training to prevent/minimize exposures. Avoid/prevent any exposure and emissions Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Restrict access to authorised persons.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	
Use suitable chemically resistant gloves. Wear suitable coveralls to prevent exposure to the skin.	
Risk Management Measures are based on qualitative risk characterisation., Consider the need for risk based health surveillance.	
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes. Ensure good work practices are implemented. Disposal - This material and its container must be disposed of in a safe manner. Clear spills immediately	

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2. Short title of exposure scenario

Manufacture of substance
IS; SU8, SU9; ERC1, ERC4; PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC15

Manufacture of the substance or use as a process chemical or extraction 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

Control of exposure and risk management measures

Contributing exposure scenario		
Use descriptors covered	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: ESVOC SpERC 1.1.v1	
Operational conditions		
Annual amount per site	50.000.000 kg	
Minimum emission days per year Continuous	300	
Emission factor air	0,001 %	
Emission factor water	0,001 %	
Emission factor soil	0,01 %	
	Releases based on ESVOC/CEFIC information	
Dilution factor river	40	
Dilution factor coast	100	
Risk Management Measures		
Treat air emissions to provide a typical removal efficiency of (%)		90 %
Treat wastewater (prior to discharge to STP) to provide the required removal efficiency of (%)		0 %
	Prevent discharge of undissolved substance to or recover from wastewater	
Type of STP		Municipal STP
Estimated subst. removal from wastewater via sewage treatm. (%)		96,7 %
Total effic. of removal from wastewater after RMMs and STP(%)		96,7 %
Assumed sewage treatment plant flow (m3/d)		10.000 m3/d
Sludge Treatment		Do not use sludge as fertiliser
Waste-Related Measures		
	No waste from process	
Exposure estimate and reference to its source		
Risk Characterization Ratio (RCR)	0,0019	
	Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation).	
Maximum amount of safe use	90.000 t/d	

Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation).

Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²)
Risk Management Measures	
Handle substance within closed system.	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,01 ppm
Risk Characterization Ratio (RCR)	0,01
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	

Carry out in a fully closed cabin with independent exhaust ventilation	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Sample via a closed loop or other system to avoid exposure.	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,70 ppm
Risk Characterization Ratio (RCR)	0,70
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions Storage Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Store substance within a closed system.	
Provide extract ventilation to material transfer points and other openings.	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Sample via a closed loop or other system to avoid exposure.	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,70 ppm
Risk Characterization Ratio (RCR)	0,70
Guidance to Downstream Users	

http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3

Contributing exposure scenario	
Use descriptors covered	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 Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 15 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²)
	Relevant for PROC 3
Exposed skin area	Palm of both hands (480 cm²)
	Relevant for PROC 4
Risk Management Measures	
Sample via a closed loop or other system to avoid exposure.	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Carry out in a fully closed cabin with independent exhaust ventilation	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,70 ppm
Risk Characterization Ratio (RCR)	0,70
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Use domain: industrial
Operational conditions	

Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Both hands (960 cm²)
Risk Management Measures	
Drain down and flush system prior to equipment break-in or maintenance. Clean up contamination as soon as they occur.	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
Wear a half face respirator conforming to EN140 Type A filter or better.	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Sample via a closed loop or other system to avoid exposure.	Effectiveness: 90 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,18 ppm
Risk Characterization Ratio (RCR)	0,18
Additional good practice advice	
Retain drain downs in sealed storage pending disposal or for subsequent recycle.	
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 15 min 5 days per week

Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Sample via a closed loop or other system to avoid exposure.	Effectiveness: 95 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,53 ppm
Risk Characterization Ratio (RCR)	0,53
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Bulk transfer (open systems) (closed systems) Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 97 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Use dry break couplings for material transfer	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,63 ppm
Risk Characterization Ratio (RCR)	0,63
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC15: Use a laboratory reagent. Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 15 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²)
Risk Management Measures	
Handle in a fume cupboard or under extract ventilation	Effectiveness: 90 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,50 ppm
Risk Characterization Ratio (RCR)	0,50
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

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3. Short title of exposure scenario

Distribution of substance
IS; SU8, SU9; ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7; PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PROC15
Loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums and small packs) of substance, including its distribution and associated laboratory activities

Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	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: ESVOC SpERC 1.1b.v1
Operational conditions	
Annual amount per site	100.000 kg
Minimum emission days per year Continuous	20
Emission factor air	0,01 %
Emission factor water	0,001 %
Emission factor soil	0,001 %
	Releases based on ESVOC/CEFIC information
Dilution factor river	10
Dilution factor coast	100
Risk Management Measures	
Treat air emissions to provide a typical removal efficiency of (%)	90 %
	Prevent discharge of undissolved substance to or recover from wastewater
Type of STP	Municipal STP
Estimated subst. removal from wastewater via sewage treatm. (%)	96,7 %
Total effic. of removal from wastewater after RMMs and STP(%)	96,7 %
Assumed sewage treatment plant flow (m3/d)	2.000 m3/d
Sludge Treatment	Do not use sludge as fertiliser
Waste-Related Measures	
	No waste from process
Exposure estimate and reference to its source	
Risk Characterization Ratio (RCR)	0,00046
	Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation).
Maximum amount of safe use	11.000 t/d
Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation).	

Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. Use domain: industrial

Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²)
Risk Management Measures	
Handle substance within closed system.	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,01 ppm
Risk Characterization Ratio (RCR)	0,01
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions with sample collection With occasional controlled exposure. Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 95 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Handle substance within closed system. Sample via a closed loop or	

other system to avoid exposure.	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,35 ppm
Risk Characterization Ratio (RCR)	0,35
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions Storage Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 240 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²), Palm of both hands (480 cm²)
Risk Management Measures	
Store substance within a closed system.	
Provide extract ventilation to material transfer points and other openings.	Effectiveness: 90 %
Transfer via enclosed lines	Effectiveness: 70 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,90 ppm
Risk Characterization Ratio (RCR)	0,90
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition Use domain: industrial
Operational conditions	

Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 95 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Sample via a closed loop or other system to avoid exposure. Handle substance within closed system.	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,70 ppm
Risk Characterization Ratio (RCR)	0,70
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC4: Chemical production where opportunity for exposure arises Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
Transfer via enclosed lines	Effectiveness: 70 %
Sample via a closed loop or other	

system to avoid exposure. Clear transfer lines prior to de-coupling	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,60 ppm
Risk Characterization Ratio (RCR)	0,60
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Both hands (960 cm²)
Risk Management Measures	
Drain down and flush system prior to equipment break-in or maintenance. Clean up contamination as soon as they occur.	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
Wear a half face respirator conforming to EN140 Type A filter or better.	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Sample via a closed loop or other system to avoid exposure.	Effectiveness: 90 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,18 ppm
Risk Characterization Ratio (RCR)	0,18
Additional good practice advice	
Retain drain downs in sealed storage pending disposal or for subsequent recycle.	
Guidance to Downstream Users	

http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Bulk transfer (open systems) (closed systems) Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Outdoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 97 %
Transfer via enclosed lines Clear transfer lines prior to de-coupling	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,63 ppm
Risk Characterization Ratio (RCR)	0,63
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 240 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)

Risk Management Measures	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 90 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Transfer via enclosed lines	Effectiveness: 80 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,72 ppm
Risk Characterization Ratio (RCR)	0,72
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC15: Use a laboratory reagent. Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²)
Risk Management Measures	
Handle in a fume cupboard or under extract ventilation	Effectiveness: 99 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,35 ppm
Risk Characterization Ratio (RCR)	0,35
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

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4. Short title of exposure scenario

Use as an intermediate
IS; SU8, SU9; ERC6a; PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC15
Use of the substance as an intermediate (not related to Strictly Controlled Conditions). Includes recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container).

Control of exposure and risk management measures

Contributing exposure scenario		
Use descriptors covered	ERC6a: Use of intermediate ESVOC SpERC 6.1a.v1: ESVOC SpERC 6.1a.v1	
Operational conditions		
Annual amount per site	15.000.000 kg	
Minimum emission days per year Continuous	300	
Emission factor air	0,5 %	
Emission factor water	0,03 %	
Emission factor soil	0,1 %	
	Releases based on ESVOC/CEFIC information	
Dilution factor river	10	
Dilution factor coast	100	
Risk Management Measures		
Treat air emissions to provide a typical removal efficiency of (%)		80 %
	Prevent discharge of undissolved substance to or recover from wastewater	
Type of STP		Municipal STP
Estimated subst. removal from wastewater via sewage treatm. (%)		96,7 %
Total effic. of removal from wastewater after RMMs and STP(%)		96,7 %
Assumed sewage treatment plant flow (m3/d)		2.000 m3/d
Sludge Treatment		Do not use sludge as fertiliser
Waste-Related Measures		
	No waste from process	
Exposure estimate and reference to its source		
Risk Characterization Ratio (RCR)	0,89	
	Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation).	
Maximum amount of safe use	56 t/d	

Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation).

Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²)
Risk Management Measures	
Handle substance within closed system.	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,01 ppm
Risk Characterization Ratio (RCR)	0,01
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	

Carry out in a fully closed cabin with independent exhaust ventilation	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Sample via a closed loop or other system to avoid exposure.	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,70 ppm
Risk Characterization Ratio (RCR)	0,70
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions Storage Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Store substance within a closed system.	
Provide extract ventilation to material transfer points and other openings.	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Sample via a closed loop or other system to avoid exposure.	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,70 ppm
Risk Characterization Ratio (RCR)	0,70
Guidance to Downstream Users	

http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3

Contributing exposure scenario	
Use descriptors covered	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 Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 15 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²)
	Relevant for PROC 3
Exposed skin area	Palm of both hands (480 cm²)
	Relevant for PROC 4
Risk Management Measures	
Sample via a closed loop or other system to avoid exposure.	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Carry out in a fully closed cabin with independent exhaust ventilation	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,70 ppm
Risk Characterization Ratio (RCR)	0,70
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Use domain: industrial
Operational conditions	

Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Both hands (960 cm²)
Risk Management Measures	
Drain down and flush system prior to equipment break-in or maintenance. Clean up contamination as soon as they occur.	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
Wear a half face respirator conforming to EN140 Type A filter or better.	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Sample via a closed loop or other system to avoid exposure.	Effectiveness: 90 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,18 ppm
Risk Characterization Ratio (RCR)	0,18
Additional good practice advice	
Retain drain downs in sealed storage pending disposal or for subsequent recycle.	
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 15 min 5 days per week

Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Sample via a closed loop or other system to avoid exposure.	Effectiveness: 95 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,53 ppm
Risk Characterization Ratio (RCR)	0,53
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Bulk transfer (open systems) (closed systems) Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 97 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Use dry break couplings for material transfer	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,63 ppm
Risk Characterization Ratio (RCR)	0,63
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC15: Use a laboratory reagent. Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 15 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²)
Risk Management Measures	
Handle in a fume cupboard or under extract ventilation	Effectiveness: 90 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,50 ppm
Risk Characterization Ratio (RCR)	0,50
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

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5. Short title of exposure scenario

Formulation
IS; SU10; ERC2; PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15
Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, large and small scale packing, maintenance and associated laboratory activities

Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	ERC2: Formulation into mixture ESVOC SpERC 2.2.v1: ESVOC SpERC 2.2.v1
Operational conditions	
Annual amount per site	25.000.000 kg
Minimum emission days per year	300

Continuous		
Emission factor air	0,01 %	
Emission factor water	0,001 %	
Emission factor soil	0,01 %	
	Releases based on ESVOC/CEFIC information	
Dilution factor river	10	
Dilution factor coast	100	
Risk Management Measures		
	Prevent discharge of undissolved substance to or recover from wastewater	
Type of STP		Municipal STP
Estimated subst. removal from wastewater via sewage treatm. (%)		96,7 %
Total effic. of removal from wastewater after RMMs and STP(%)		96,7 %
Assumed sewage treatment plant flow (m3/d)		2.000 m3/d
Sludge Treatment		Do not use sludge as fertiliser
Waste-Related Measures		
	No waste from process	
Exposure estimate and reference to its source		
Risk Characterization Ratio (RCR)	0,03	
	Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation).	
Maximum amount of safe use	2.700 t/d	
Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation).		

Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm^2)

Risk Management Measures	
Handle substance within closed system.	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,01 ppm
Risk Characterization Ratio (RCR)	0,01
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm^2)
Risk Management Measures	
Carry out in a fully closed cabin with independent exhaust ventilation	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Sample via a closed loop or other system to avoid exposure.	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,70 ppm
Risk Characterization Ratio (RCR)	0,70
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent

	containment condition Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 95 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Sample via a closed loop or other system to avoid exposure. Handle substance within closed system.	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,70 ppm
Risk Characterization Ratio (RCR)	0,70
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 240 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)

Risk Management Measures	
Store substance within a closed system.	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,90 ppm
Risk Characterization Ratio (RCR)	0,90
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC4: Chemical production where opportunity for exposure arises Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 95 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Sample via a closed loop or other system to avoid exposure. Formulate in enclosed or ventilated mixing vessels	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,70 ppm
Risk Characterization Ratio (RCR)	0,70
Guidance to Downstream Users	

http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3

Contributing exposure scenario	
Use descriptors covered	PROC5: Mixing or blending in batch processes Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
Wear a half face respirator conforming to EN140 Type A filter or better.	Effectiveness: 90 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,75 ppm
Risk Characterization Ratio (RCR)	0,75
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (manual) Transfer from/pouring from containers Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 240 min 5 days per week

Indoor/Outdoor	Indoor
Exposed skin area	Both hands (960 cm²)
Risk Management Measures	
Avoid spillage when withdrawing pump.	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Use drum pumps.	Effectiveness: 80 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,90 ppm
Risk Characterization Ratio (RCR)	0,90
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Cleaning Equipment maintenance Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Both hands (960 cm²)
Risk Management Measures	
Drain down and flush system prior to equipment break-in or maintenance. Clean up contamination as soon as they occur.	
Apply vessel entry procedures including use of forced supplied air.	Effectiveness: 90 %
Wear a half face respirator conforming to EN140 Type A filter or better.	Effectiveness: 90 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %

Retain drain downs in sealed storage pending disposal or for subsequent recycle.	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,75 ppm
Risk Characterization Ratio (RCR)	0,75
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Bulk transfer Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 97 %
Transfer via enclosed lines Clear transfer lines prior to de-coupling	Effectiveness: 90 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,45 ppm
Risk Characterization Ratio (RCR)	0,45
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Drum/Batch transfers Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %

Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Use drum pumps.	Effectiveness: 80 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,90 ppm
Risk Characterization Ratio (RCR)	0,90
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 95 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Transfer via enclosed lines Clear transfer lines prior to de-coupling	Effectiveness: 90 %
Exposure estimate and reference to its source	

Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,30 ppm
Risk Characterization Ratio (RCR)	0,30
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC14: Tabletting, compression, extrusion, pelletisation, granulation Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 1 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Wear a half face respirator conforming to EN140 Type A filter or better.	Effectiveness: 90 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,75 ppm
Risk Characterization Ratio (RCR)	0,75
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC15: Use a laboratory reagent. Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa

Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²)
Risk Management Measures	
Handle in a fume cupboard or under extract ventilation	Effectiveness: 99 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,15 ppm
Risk Characterization Ratio (RCR)	0,15
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

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6. Short title of exposure scenario

Use in Coatings
IS; ERC4; PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC14, PROC15
Covers the use in coatings (paints, inks, adhesives, etc) including exposures during use (including materials receipt, storage, preparation and transfer from bulk and semi-bulk, application by spray, roller, spreader, dip, flow, fluidised bed on production lines and film formation) and equipment cleaning, maintenance and associated laboratory activities.

Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	ERC4: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) ESVOC SpERC 7.12a.v1: ESVOC SpERC 7.12a.v1
Operational conditions	
Annual amount per site	100.000 kg
Minimum emission days per year Continuous	20
Emission factor air	9,8 %
Emission factor water	0,07 %
Emission factor soil	0 %

	Releases based on ESVOC/CEFIC information	
Dilution factor river	10	
Dilution factor coast	100	
Risk Management Measures		
Treat air emissions to provide a typical removal efficiency of (%)		90 %
	Prevent discharge of undissolved substance to or recover from wastewater	
Type of STP		Municipal STP
Estimated subst. removal from wastewater via sewage treatm. (%)		96,7 %
Total effic. of removal from wastewater after RMMs and STP(%)		96,7 %
Assumed sewage treatment plant flow (m3/d)		2.000 m3/d
Sludge Treatment		Do not use sludge as fertiliser
Waste-Related Measures		
	No waste from process	
Exposure estimate and reference to its source		
Risk Characterization Ratio (RCR)	0,11	
	Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation).	
Maximum amount of safe use	44 t/d	
Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation).		

Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²)
Risk Management Measures	
Handle substance within closed system.	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic

Exposure estimate	0,01 ppm
Risk Characterization Ratio (RCR)	0,01
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC5: Mixing or blending in batch processes Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm^2)
Risk Management Measures	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
Wear a half face respirator conforming to EN140 Type A filter or better.	Effectiveness: 90 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,75 ppm
Risk Characterization Ratio (RCR)	0,75
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions Storage Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance	2380 hPa

during use	
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Store substance within a closed system.	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
Handle substance within closed system.	Effectiveness: 90 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,50 ppm
Risk Characterization Ratio (RCR)	0,50
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions Film formation - force drying, stoving or UV/EB radiation curing. Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Process temperature	> 100 °C
Duration and Frequency of activity	Application duration: 240 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker

	Worker - inhalation, long-term - systemic
Exposure estimate	0,90 ppm
Risk Characterization Ratio (RCR)	0,90
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	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 Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
	Relevant for PROC 4
Exposed skin area	Palm of one hand (240 cm²)
	Relevant for PROC 3
Risk Management Measures	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
Relevant for PROC 3, Relevant for PROC 4	
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Relevant for PROC 3, Relevant for PROC 4	
Formulate in enclosed or ventilated mixing vessels	
Relevant for PROC 3	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,60 ppm
Risk Characterization Ratio (RCR)	0,60

Guidance to Downstream Users
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3

Contributing exposure scenario	
Use descriptors covered	PROC7: Industrial spraying Spraying (automatic/robotic) Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Hands and forearms (1500 cm²)
Risk Management Measures	
Carry out in a vented booth provided with laminar airflow.	Effectiveness: 99 %
Wear a half face respirator conforming to EN140 Type A filter or better.	Effectiveness: 90 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,50 ppm
Risk Characterization Ratio (RCR)	0,50
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC7: Industrial spraying Spraying (manual) Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Hands and forearms (1500 cm²)
Risk Management Measures	
Minimise exposure by extracted full	Effectiveness: 90 %

enclosure for the operation or equipment.	
Wear a full face respirator conforming to EN 136 with type A filter or better.	Effectiveness: 95 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,75 ppm
Risk Characterization Ratio (RCR)	0,75
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Material transfers Non-dedicated facility Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 240 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Both hands (960 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Clear transfer lines prior to de-coupling	Effectiveness: 80 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,90 ppm
Risk Characterization Ratio (RCR)	0,90
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Cleaning Equipment maintenance Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Both hands (960 cm²)
Risk Management Measures	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Drain down and flush system prior to equipment break-in or maintenance. Clean up contamination as soon as they occur.	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
Retain drain downs in sealed storage pending disposal or for subsequent recycle.	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,70 ppm
Risk Characterization Ratio (RCR)	0,70
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Material transfers Dedicated facility Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %

Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 97 %
Clear transfer lines prior to de-coupling	Effectiveness: 80 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,90 ppm
Risk Characterization Ratio (RCR)	0,90
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). Material transfers Drum/Batch transfers Transfer from/pouring from containers Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 95 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,60 ppm

Risk Characterization Ratio (RCR)	0,60
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC10: Roller application or brushing PROC13: Treatment of articles by dipping and pouring. PROC14: Tabletting, compression, extrusion, pelletisation, granulation Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
	Relevant for PROC 13 Relevant for PROC 14
Exposed skin area	Both hands (960 cm²)
	Relevant for PROC 10
Risk Management Measures	
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
Wear a half face respirator conforming to EN140 Type A filter or better.	Effectiveness: 90 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,75 ppm
Risk Characterization Ratio (RCR)	0,75
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC15: Use a laboratory reagent. Use domain: industrial
Operational conditions	

Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²)
Risk Management Measures	
Handle in a fume cupboard or under extract ventilation	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,70 ppm
Risk Characterization Ratio (RCR)	0,70
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

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7. Short title of exposure scenario

Use as a Fuel
IS; ERC7; PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC16
Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste.

Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	ERC7: Use of functional fluid at industrial site ESVOC SpERC 7.12a.v1: ESVOC SpERC 7.12a.v1
Operational conditions	
Annual amount per site	10.000.000 kg
Minimum emission days per year Continuous	20
Emission factor air	0,25 %
Emission factor water	0,001 %

Emission factor soil	0 %	
	Releases based on ESVOC/CEFIC information	
Dilution factor river	10	
Dilution factor coast	100	
Risk Management Measures		
Treat air emissions to provide a typical removal efficiency of (%)		95 %
	Prevent discharge of undissolved substance to or recover from wastewater	
Type of STP		Municipal STP
Estimated subst. removal from wastewater via sewage treatm. (%)		96,7 %
Total effic. of removal from wastewater after RMMs and STP(%)		96,7 %
Assumed sewage treatment plant flow (m3/d)		2.000 m3/d
Sludge Treatment		Do not use sludge as fertiliser
Waste-Related Measures		
	No waste from process	
Exposure estimate and reference to its source		
Risk Characterization Ratio (RCR)	0,29	
	Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation).	
Maximum amount of safe use	120 t/d	
Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation).		

Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²)
Risk Management Measures	
Handle substance within closed system.	
Exposure estimate and reference to its source	

Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,01 ppm
Risk Characterization Ratio (RCR)	0,01
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 240 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,90 ppm
Risk Characterization Ratio (RCR)	0,90
Additional good practice advice	
Handle substance within closed system. Store substance within a closed system.	
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition Batch process Use domain: industrial
Operational conditions	

Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²)
Risk Management Measures	
Handle substance within closed system. Handle substance within a predominantly closed system provided with extract ventilation.	
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,60 ppm
Risk Characterization Ratio (RCR)	0,60
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC4: Chemical production where opportunity for exposure arises Bulk transfer Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
Provide a good standard of controlled	Effectiveness: 70 %

ventilation (10 to 15 air changes per hour)	
Transfer via enclosed lines	Effectiveness: 80 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,60 ppm
Risk Characterization Ratio (RCR)	0,60
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Equipment maintenance Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Both hands (960 cm²)
Risk Management Measures	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Clean up contamination as soon as they occur. Drain down and flush system prior to equipment break-in or maintenance.	
Retain drain downs in sealed storage pending disposal or for subsequent recycle.	
Wear a full face respirator conforming to EN 136 with type A filter or better.	Effectiveness: 95 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,88 ppm
Risk Characterization Ratio (RCR)	0,88
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Disposal of wastes (Disposal/transfer) Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Both hands (960 cm²)
Risk Management Measures	
Clean up contamination as soon as they occur.	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Transfer via enclosed lines	Effectiveness: 80 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,70 ppm
Risk Characterization Ratio (RCR)	0,70
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Drum/Batch transfers Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week

Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Use drum pumps.	Effectiveness: 80 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,90 ppm
Risk Characterization Ratio (RCR)	0,90
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC16: Use of fuels Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²)
Risk Management Measures	
Handle substance within a predominantly closed system provided with extract ventilation.	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,35 ppm
Risk Characterization Ratio (RCR)	0,35
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

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8. Short title of exposure scenario

Use as a Fuel
PW; ERC9a, ERC9b; PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC16
Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste.

Control of exposure and risk management measures

Contributing exposure scenario		
Use descriptors covered	ERC9a: Widespread use of functional fluid (indoor) ERC9b: Widespread use of functional fluid (outdoor) ESVOC SpERC 9.12b.v1: ESVOC SpERC 9.12b.v1	
Operational conditions		
Annual amount for wide disperse uses	75.000.000 kg	
Minimum emission days per year Continuous	365	
Emission factor air	1 %	
Emission factor water	0,001 %	
Emission factor soil	0,001 %	
Dilution factor river	10	
Dilution factor coast	100	
Risk Management Measures		
Type of STP		Municipal STP
Estimated subst. removal from wastewater via sewage treatm. (%)		96,7 %
Total effic. of removal from wastewater after RMMs and STP(%)		96,7 %
Assumed sewage treatment plant flow (m3/d)		2.000 m3/d
Waste-Related Measures		
	Dispose of waste cans and containers according to local regulations	
Exposure estimate and reference to its source		
Risk Characterization Ratio (RCR)	0,00034	
	Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation).	
Maximum amount of safe use	30 t/d	
Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation).		

Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. Use domain: professional
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²)
Risk Management Measures	
Handle substance within closed system.	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,10 ppm
Risk Characterization Ratio (RCR)	0,10
Additional good practice advice	
Transfer via enclosed lines Store substance within a closed system.	
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions Use domain: professional
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Outdoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	

Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
In case of indoor use:, Use a local exhaust ventilation with adequate effectiveness (30%).	
Handle substance within closed system.	Effectiveness: 80 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,70 ppm
Risk Characterization Ratio (RCR)	0,70
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition Use domain: professional
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 240 min 5 days per week
Indoor/Outdoor	Outdoor
Exposed skin area	Palm of one hand (240 cm²)
Risk Management Measures	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
In case of indoor use:, Use a local exhaust ventilation with adequate effectiveness (30%).	
Formulate in enclosed or ventilated mixing vessels	Effectiveness: 80 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,84 ppm
Risk Characterization Ratio (RCR)	0,84
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC4: Chemical production where opportunity for exposure arises Bulk transfer Use domain: professional
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Outdoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
In case of indoor use:, Use a local exhaust ventilation with adequate effectiveness (30%).	
Clear transfer lines prior to de-coupling	
Transfer via enclosed lines	Effectiveness: 80 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,70 ppm
Risk Characterization Ratio (RCR)	0,70
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Cleaning Equipment maintenance Vessel and container cleaning Use domain: professional
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week

Indoor/Outdoor	Indoor
Exposed skin area	Both hands (960 cm²)
Risk Management Measures	
Clean up contamination as soon as they occur. Drain down and flush system prior to equipment break-in or maintenance.	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 80 %
Wear a half face respirator conforming to EN140 Type A filter or better.	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Retain drain downs in sealed storage pending disposal or for subsequent recycle.	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,70 ppm
Risk Characterization Ratio (RCR)	0,70
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Drum/Batch transfers Use domain: professional
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Outdoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
In case of indoor use:, Use a local exhaust ventilation with adequate effectiveness (30%).	

Use drum pumps.	Effectiveness: 80 %
Transfer via enclosed lines	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,70 ppm
Risk Characterization Ratio (RCR)	0,70
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Dipping, immersion and pouring Use domain: professional
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Outdoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 95 %
In case of indoor use:, Use a local exhaust ventilation with adequate effectiveness (30%).	
Transfer via enclosed lines	Effectiveness: 80 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,35 ppm
Risk Characterization Ratio (RCR)	0,35
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC16: Use of fuels Use domain: professional
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate

	Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Outdoor
Exposed skin area	Palm of one hand (240 cm^2)
Risk Management Measures	
Handle substance within a predominantly closed system provided with extract ventilation.	Effectiveness: 80 %
In case of indoor use:, Use a local exhaust ventilation with adequate effectiveness (30%).	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,70 ppm
Risk Characterization Ratio (RCR)	0,70
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

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9. Short title of exposure scenario

Polymer production
IS; SU10; ERC4, ERC6c; PROC1, PROC2, PROC3, PROC4, PROC5, PROC6, PROC8a, PROC8b, PROC14
Manufacture of polymers from monomers in continuous and batch processes, include sparging, discharging, and reactor maintenance and immediate polymer product formation (i.e. compounding, pelletisation, product off-gassing).

Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	ERC4: Use of non-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) ESVOC SpERC 4.20.v1: ESVOC SpERC 4.20.v1
Operational conditions	
Annual amount per site	5.000.000 kg

Minimum emission days per year Continuous	100	
Emission factor air	0,2 %	
Emission factor water	0,03 %	
Emission factor soil	0,01 %	
	Releases based on ESVOC/CEFIC information	
Dilution factor river	10	
Dilution factor coast	100	
Risk Management Measures		
Treat air emissions to provide a typical removal efficiency of (%)		80 %
	Prevent discharge of undissolved substance to or recover from wastewater	
Type of STP		Municipal STP
Estimated subst. removal from wastewater via sewage treatm. (%)		96,7 %
Total effic. of removal from wastewater after RMMs and STP(%)		96,7 %
Assumed sewage treatment plant flow (m3/d)		2.000 m3/d
Sludge Treatment		Do not use sludge as fertiliser
Waste-Related Measures		
	No waste from process	
Exposure estimate and reference to its source		
Risk Characterization Ratio (RCR)	0,13	
	Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation).	
Maximum amount of safe use	400 t/d	
Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation).		

Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week

Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²)
Risk Management Measures	
Handle substance within closed system.	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,01 ppm
Risk Characterization Ratio (RCR)	0,01
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Outdoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,70 ppm
Risk Characterization Ratio (RCR)	0,70
Additional good practice advice	
Store substance within a closed system.	
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent

	containment condition Polymerisation (bulk and batch) Finishing operations Additivation and stabilisation Bulk transfer Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²)
Risk Management Measures	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 95 %
Formulate in enclosed or ventilated mixing vessels	Effectiveness: 90 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,50 ppm
Risk Characterization Ratio (RCR)	0,50
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC4: Chemical production where opportunity for exposure arises Intermediate polymer storage Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	

Store substance within a closed system.	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,30 ppm
Risk Characterization Ratio (RCR)	0,30
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC5: Mixing or blending in batch processes Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Formulate in enclosed or ventilated mixing vessels	Effectiveness: 90 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,75 ppm
Risk Characterization Ratio (RCR)	0,75
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC6: Calendering operations

	Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Both hands (960 cm²)
Risk Management Measures	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
Use suitable chemically resistant gloves.	
Handle substance within closed system.	Effectiveness: 90 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,75 ppm
Risk Characterization Ratio (RCR)	0,75
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Equipment maintenance Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Both hands (960 cm²)

Risk Management Measures	
Clean up contamination as soon as they occur. Drain down and flush system prior to equipment break-in or maintenance.	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
Retain drain downs in sealed storage pending disposal or for subsequent recycle.	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,50 ppm
Risk Characterization Ratio (RCR)	0,50
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Bulk transfer transport with sample collection Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 240 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 97 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,81 ppm
Risk Characterization Ratio (RCR)	0,81
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Pelletisation and pellet screening (open systems) Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 5 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 97 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,90 ppm
Risk Characterization Ratio (RCR)	0,90
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities transport with sample collection Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under	Effectiveness: 97 %

containment or extract ventilation	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,90 ppm
Risk Characterization Ratio (RCR)	0,90
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC14: Tabletting, compression, extrusion, pelletisation, granulation Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 1 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,75 ppm
Risk Characterization Ratio (RCR)	0,75
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

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10. Short title of exposure scenario

Polymer processing
IS; SU10; ERC4; PROC1, PROC2, PROC3, PROC4, PROC5, PROC6, PROC8a, PROC8b, PROC14, PROC21

Processing of formulated polymers including material transfers, additives handling (e.g. pigments, stabilisers, fillers, plasticisers, etc.), moulding, curing and forming activities, material re-works, storage and associated maintenance.

Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	ERC4: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) ESVOC SpERC 4.21a.v1: ESVOC SpERC 4.21a.v1
Operational conditions	
Annual amount per site	100.000 kg
Minimum emission days per year Continuous	20
Emission factor air	15 %
Emission factor water	0 %
Emission factor soil	0,001 %
	Releases based on ESVOC/CEFIC information
Dilution factor river	10
Dilution factor coast	100
Risk Management Measures	
Treat air emissions to provide a typical removal efficiency of (%)	80 %
	Prevent discharge of undissolved substance to or recover from wastewater
Type of STP	Municipal STP
Estimated subst. removal from wastewater via sewage treatm. (%)	96,7 %
Total effic. of removal from wastewater after RMMs and STP(%)	96,7 %
Assumed sewage treatment plant flow (m3/d)	2.000 m3/d
Sludge Treatment	Do not use sludge as fertiliser
Waste-Related Measures	
	No waste from process
Exposure estimate and reference to its source	
Risk Characterization Ratio (RCR)	0,17
	Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation).
Maximum amount of safe use	29 t/d
Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation).	

Contributing exposure scenario

Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²)
Risk Management Measures	
Handle substance within closed system.	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,01 ppm
Risk Characterization Ratio (RCR)	0,01
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 240 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
Provide a good standard of controlled	Effectiveness: 70 %

ventilation (10 to 15 air changes per hour)	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,90 ppm
Risk Characterization Ratio (RCR)	0,90
Additional good practice advice	
Handle substance within closed system. Store substance within a closed system.	
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions Bulk transfer Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,30 ppm
Risk Characterization Ratio (RCR)	0,30
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent

	containment condition Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 240 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
Formulate in enclosed or ventilated mixing vessels	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 95 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,30 ppm
Risk Characterization Ratio (RCR)	0,30
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC4: Chemical production where opportunity for exposure arises Additive premixing Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	

Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,60 ppm
Risk Characterization Ratio (RCR)	0,60
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC5: Mixing or blending in batch processes Additive premixing Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 240 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Provide extract ventilation to material transfer points and other openings.	Effectiveness: 90 %
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 90 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,45 ppm
Risk Characterization Ratio (RCR)	0,45
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario

Use descriptors covered	PROC6: Calendering operations Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Both hands (960 cm²)
Risk Management Measures	
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 90 %
Restrict area of openings to equipment.	Effectiveness: 90 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,75 ppm
Risk Characterization Ratio (RCR)	0,75
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Equipment maintenance Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor

Exposed skin area	Both hands (960 cm²)
Risk Management Measures	
Clean up contamination as soon as they occur. Drain down and flush system prior to equipment break-in or maintenance.	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
Retain drain downs in sealed storage pending disposal or for subsequent recycle.	
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,15 ppm
Risk Characterization Ratio (RCR)	0,15
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Drum/Batch transfers Bulk transfer Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 97 %
Provide enhanced ventilation by mechanical means.	Effectiveness: 70 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,36 ppm

Risk Characterization Ratio (RCR)	0,36
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Bulk transfer Dedicated facility Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm^2)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 97 %
Use drum pumps.	Effectiveness: 80 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,90 ppm
Risk Characterization Ratio (RCR)	0,90
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). Small scale weighing Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week

Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
Use drum pumps.	Effectiveness: 80 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,80 ppm
Risk Characterization Ratio (RCR)	0,80
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). Bulk transfer Small package filling Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Transfer via enclosed lines	Effectiveness: 90 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,60 ppm
Risk Characterization Ratio (RCR)	0,60
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC13: Treatment of articles by dipping and pouring.

	PROC14: Tabletting, compression, extrusion, pelletisation, granulation Extrusion and masterbatching Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 1 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 90 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,75 ppm
Risk Characterization Ratio (RCR)	0,75
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC14: Tabletting, compression, extrusion, pelletisation, granulation Injection moulding (of articles) Use domain: industrial
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	

Provide extract ventilation to material transfer points and other openings.	Effectiveness: 90 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Restrict area of openings to equipment.	Effectiveness: 90 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,75 ppm
Risk Characterization Ratio (RCR)	0,75
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC21: Low energy manipulation and handling of substances bound in/on materials or articles Use domain: industrial and professional
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0 ppm
Risk Characterization Ratio (RCR)	0
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

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11. Short title of exposure scenario

Polymer processing
PW; ERC8a, ERC8d; PROC1, PROC2, PROC6, PROC8a, PROC8b, PROC21
Processing of formulated polymers including material transfers, moulding and forming activities, material re-works and associated maintenance.

Control of exposure and risk management measures

Contributing exposure scenario		
Use descriptors covered	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 4.21a.v1: ESVOC SpERC 4.21a.v1	
Operational conditions		
Annual amount for wide disperse uses	1.000.000 kg	
Minimum emission days per year Continuous	365	
Emission factor air	98 %	
Emission factor water	1 %	
Emission factor soil	1 %	
	Releases based on ESVOC/CEFIC information	
Dilution factor river	10	
Dilution factor coast	100	
Risk Management Measures		
Type of STP		Municipal STP
Estimated subst. removal from wastewater via sewage treatm. (%)		96,7 %
Total effic. of removal from wastewater after RMMs and STP(%)		96,7 %
Assumed sewage treatment plant flow (m3/d)		2.000 m3/d
Sludge Treatment		Do not use sludge as fertiliser
Waste-Related Measures		
	No waste from process	
Exposure estimate and reference to its source		
Risk Characterization Ratio (RCR)	0,00034	
	Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation).	
Maximum amount of safe use	400 kg/d	
Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation).		

Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. Use domain: professional
Operational conditions	

Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of one hand (240 cm²)
Risk Management Measures	
Handle substance within closed system.	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,10 ppm
Risk Characterization Ratio (RCR)	0,10
Additional good practice advice	
Transfer via enclosed lines Store substance within a closed system.	
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions Bulk transfer (closed systems) With occasional controlled exposure. Use domain: professional
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 80 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %

Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,60 ppm
Risk Characterization Ratio (RCR)	0,60
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions Storage Use domain: professional
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm²)
Risk Management Measures	
Store substance within a closed system.	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 80 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,60 ppm
Risk Characterization Ratio (RCR)	0,60
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC6: Calendering operations Use domain: professional
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %

Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Both hands (960 cm²)
Risk Management Measures	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 80 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Restrict area of openings to equipment.	Effectiveness: 90 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,60 ppm
Risk Characterization Ratio (RCR)	0,60
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Equipment maintenance Use domain: professional
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Both hands (960 cm²)
Risk Management Measures	
Clean up contamination as soon as they occur. Drain down and flush system prior to equipment break-in or maintenance.	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 80 %

Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Retain drain downs in sealed storage pending disposal or for subsequent recycle.	
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,60 ppm
Risk Characterization Ratio (RCR)	0,60
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Material transfers Use domain: professional
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 60 min 5 days per week
Indoor/Outdoor	Indoor
Exposed skin area	Palm of both hands (480 cm^2)
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 80 %
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Effectiveness: 70 %
Use drum pumps.	Effectiveness: 90 %
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,30 ppm
Risk Characterization Ratio (RCR)	0,30
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

Contributing exposure scenario	
Use descriptors covered	PROC21: Low energy manipulation and handling of substances bound in/on materials or articles

	Use domain: industrial and professional
Operational conditions	
Concentration of the substance	Hydrocarbons, C4, steam-cracker distillate Content: >= 0 % - <= 100 %
Physical state	Liquid, high fugacity
Vapour pressure of the substance during use	2380 hPa
Duration and Frequency of activity	Application duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Exposure estimate and reference to its source	
Assessment method	ESIG GES tool, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0 ppm
Risk Characterization Ratio (RCR)	0
Guidance to Downstream Users	
http://www.esig.org/en/regulatory-information/reach/ges-library/ges-library-3	

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