

1,3-Butadiene

Print date 19.11.2024
 Revision date 19.11.2024
 Version 17.0 (en)
 replaces version of 15.11.2024 (16.0)

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

1.1 Product identifier

Trade name/designation	1,3-Butadiene
Art-Nr(n).	2200, 2206, 70220
Substance name	1,3-butadiene
Index No	601-013-00-X
EC No	203-450-8
REACH No.	01-2119471988-16
CAS No	106-99-0

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

Process categories [PROC]

PROC1 Use in closed process, no likelihood of exposure
 PROC2 Use in closed, continuous process with occasional controlled exposure
 PROC3 Use in closed batch process (synthesis or formulation)
 PROC4 Use in batch and other process (synthesis) where opportunity for exposure arises
 PROC5 Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
 PROC6 Calendering operations
 PROC8a Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
 PROC8b Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
 PROC9 Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
 PROC13 Treatment of articles by dipping and pouring
 PROC14 Production of preparations or articles by tableting, compression, extrusion, pelletisation
 PROC15 Use as laboratory reagent
 PROC16 Use of fuels

Environmental release categories [ERC]

ERC1 Manufacture of substances
 ERC2 Formulation into mixture
 ERC4 Industrial use of processing aids in processes and products, not becoming part of articles
 ERC6a Industrial use resulting in manufacture of another substance (use of intermediates)
 ERC6c Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)
 ERC6d Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
 ERC7 Use of functional fluid at industrial site
 ERC8a Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)

1.3 Details of the supplier of the safety data sheet

Supplier

GHC Gerling, Holz & Co. Handels GmbH
 Ruhrstraße 113
 D-22761 Hamburg
 Telephone +49 40 853 123 0
 E-mail hamburg@ghc.de
 Website www.ghc.com

Department responsible for information:
 GHC Gerling, Holz & Co. Handels GmbH
 Telephone +49 40 853 123 0

E-mail (competent person):
 msds@ghc.de

1.4 Emergency telephone number

EN: Poison Information Center Mainz +49 6131 19240

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SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 [CLP]	Classification procedure
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Flam. Gas 1A, H220

Press. Gas (Liq.), H280

Muta. 1B, H340

Carc. 1A, H350

Hazard statements for physical hazards

H220 Extremely flammable gas.

H280 Contains gas under pressure; may explode if heated.

Hazard statements for health hazards

H340 May cause genetic defects.

H350 May cause cancer.

2.2 Label elements

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

Hazard pictograms



GHS02



GHS08

Signal word

Danger

Hazard statements

H220 Extremely flammable gas.

H280 Contains gas under pressure; may explode if heated.

H340 May cause genetic defects.

H350 May cause cancer.

Precautionary statements

P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

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

P377 Leaking gas fire: Do not extinguish, unless leak can be stopped safely.

P381 In case of leakage, eliminate all ignition sources.

P403 Store in a well-ventilated place.

P405 Store locked up.

Supplemental hazard information

EIGA0357 Asphyxiant in high concentrations.

EIGA0803 Restricted to professional users.

Please return container with residual pressure.

2.3 Other hazards

Adverse human health effects and symptoms

Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

Contact with liquid may cause cold burns/frostbite.

Other adverse effects

The substance/mixture does not contain components identified as having endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated Regulation (EU) 2017/2100 or Commission Delegated Regulation (EU) 2018/605 in quantities of 0.1% or more.

Results of PBT and vPvB assessment

The substance/mixture does not contain components meeting the PBT/vPvB criteria of the Reach Regulation, Annex XIII, at levels of 0.1% or higher.

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SECTION 3: Composition / information on ingredients**3.1 Substances**

Substance name	1,3-butadiene
Index No	601-013-00-X
EC No	203-450-8
REACH No.	01-2119471988-16
CAS No	106-99-0
ATE	ATE(inhalation gas): 128803 ppm

Additional information

Content: >= 99 %

3.2 Mixtures

not applicable

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

Remove contaminated, saturated clothing immediately.
First aider: Pay attention to self-protection!
Call a physician immediately.

Following inhalation

Remove casualty to fresh air and keep warm and at rest.
In case of respiratory standstill give artificial respiration by respiratory bag (Ambu bag) or respirator. Obtain medical assistance.

Following skin contact

In case of skin contact rinse with warm water.
In case of frostbite, wash with plenty of water; do not remove clothing.
In case of frostbite rinse with lukewarm (not hot) water for at least 15 minutes. Do not remove clothing frozen to the skin.
Thaw with lukewarm water. Apply a sterile dressing. Obtain medical assistance.

After eye contact

Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Obtain medical assistance.

Following ingestion

Ingestion is not considered a potential route of exposure.

4.2 Most important symptoms and effects, both acute and delayed**Symptoms**

The following symptoms may occur in case of strong exposition:
Unconsciousness
Dizziness
Respiratory tract irritation
Headache

4.3 Indication of any immediate medical attention and special treatment needed**Notes for the doctor**

Treat symptomatically.
To supervise the blood circulation.

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SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media

Water spray jet
Extinguishing powder

Unsuitable extinguishing media

Carbon dioxide (CO₂)
Full water jet

5.2 Special hazards arising from the substance or mixture

Hazardous combustion products

In case of fire formation of dangerous gases possible.
Carbon monoxide
Carbon dioxide (CO₂)

5.3 Advice for firefighters

Special protective equipment for firefighters

Wear a self-contained breathing apparatus and chemical protective clothing.

Additional information

If possible, shut off gas valves and move containers to a safe location.
Use water spray jet to protect personnel and to cool endangered containers.
Exposure to fire may cause rupture / explosion of the containers.
Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire.
Dispose of fire residues and contaminated extinguishing water in accordance with local, official regulations.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

Use personal protection equipment.
Leave the danger area.
Keep people away and stay on the upwind side.

For emergency responders

Personal protection by wearing close-fitting protective clothing and breathing apparatus.
Pay attention to extension of gas especially at ground (heavier than air) and in direction of the wind.
Remove persons to safety.
Eliminate all ignition sources if safe to do so.

6.2 Environmental precautions

If possible, stop flow of product.
Do not allow to enter into soil/subsoil.
Do not allow to enter into surface water or drains.

6.3 Methods and material for containment and cleaning up

For containment

If necessary, secure leaky pressure receptacles using a salvage container.
Prevent the liquid from spreading over a wide area (set up barriers, cover sewage systems).
Limit expansion of the gas (water spray jet).

For cleaning up

Leave to vapourize.
Provide adequate ventilation.

6.4 Reference to other sections

Disposal: see section 13
Personal protection equipment: see section 8

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

Use only in well-ventilated areas.
 Transfer and handle product only in closed systems.
 Usual measures for fire prevention.
 Containers' temperature should not be increased above 50 °C.
 The working pressure in the receptacle must not exceed the saturation vapour pressure of the pure product resulting at a temperature of 50 °C.
 Prevent cylinders from falling over.
 Take precautionary measures against static discharges. Ground barrels and installations. Use only antistatically equipped (spark-free) tools.
 Use explosion-proof machinery, apparatus, ventilation facilities, tools etc.
 Ensure valve protection device is correctly fitted.
 Ensure valve outlet cap nut or plug (where provided) is correctly fitted.
 Open valve slowly to avoid pressure shock.
 Do not allow backflow into the container.
 Entering of water into the container must be prevented.
 No water to valves, flanges and other fittings.
 Purging of pipes and valves with inert gases - to avoid: water, solvents.

Advices on general occupational hygiene

When using do not eat, drink, smoke, sniff.
 Wash hands before breaks and after work.
 Remove contaminated clothing and protective equipment before entering eating areas.

7.2 Conditions for safe storage, including any incompatibilities**Requirements for storage rooms and vessels**

All regulations and local requirements for the storage of containers have to be respected.
 Keep container tightly closed and in a well-ventilated place.
 Containers' temperature should not be increased above 50 °C.
 Prevent cylinders from falling over.
 Only use containers specifically approved for the substance/product.
 Information on suitable materials for receptacles and valves see ISO 11114.

Materials to avoid

Do not store together with explosives.
 Do not store together with flammable liquids.
 Do not store together with flammable solids.
 Do not store together with pyrophoric and self-heating substances.
 Do not store together with oxidizing liquids or oxidizing solids.
 Do not store together with toxic liquids or toxic solids.
 Do not store together with infectious substances.
 Do not store together with radioactive material.
 Do not store together with food or feed.

7.3 Specific end use(s)**Recommendation**

Exposure scenarios (ES) see annex to this safety data sheet.

*** SECTION 8: Exposure controls/personal protection***** 8.1 Control parameters***** Occupational exposure limit values**

CAS No	EC No	Substance name	occupational exposure limit value
106-99-0	203-450-8	1,3-Butadien	1 [ml/m ³ (ppm)] 2,2 [mg/m ³] (IE)

DNEL worker

CAS No	Substance name	DNEL value	DNEL type	Remark
106-99-0	1,3-butadiene	2.21 mg/m ³	long-term inhalative (systemic)	Assessment factor 1

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DNEL Consumer

CAS No	Substance name	DNEL value	DNEL type	Remark
106-99-0	1,3-butadiene	0.265 mg/m ³	long-term inhalative (systemic)	Assessment factor 1

8.2 Exposure controls**Appropriate engineering controls****Technical measures to prevent exposure**

Transfer and handle only in enclosed systems.

Personal protection equipment**Eye/face protection**

Protective goggles according to EN 166, in case of increased risk add protective face shield.

Hand protection

Safety gloves according to EN 374:

Glove material specification [make/type, thickness, permeation time/life]: NBR; 0,4 mm; >= 480 min

Body protection:

Safety shoes with steel toecap.

Body covering work clothing or chemical resistant suit at increased risk.

Respiratory protection

Keep self contained breathing apparatus readily available for emergency use.

Respiratory protection necessary at:

high concentrations

Respiratory protection complying with EN 137.

Short term: filter apparatus, filter AX

In case of rescue and maintenance activities in storage containers use environment-independent breathing apparatus because of risk of suffocation due to displacement of oxygen.

Thermal hazards

Use cold-resistant protective equipment.

Environmental exposure controls**Remark**

Prevent release to the environment.

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

Gaseous / liquefied under pressure.

Colour

colourless

Odour

aromatic

Safety relevant basis data

	Value	Method	Source, Remark
Odour threshold:			not determined
Melting point/freezing point			not applicable
Boiling point or initial boiling point and boiling range	-4.5 °C		
flammability			Extremely flammable gas (H220).
Lower and upper explosion limit	Upper explosion limit 16.3 Vol-%		

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	Value	Method	Source, Remark
Lower and upper explosion limit	Lower explosion limit 1.4 Vol-%		
Flash point			not applicable
Auto-ignition temperature	415 °C		
Decomposition temperature			No decomposition if used as directed.
pH			not applicable
Viscosity			not applicable
Solubility(ies)	Water solubility 454.1 mL/L (20°C)		
Partition coefficient n-octanol/water (log value)	1.99		
Vapour pressure	2400 hPa (20°C)		
Density and/or relative density			not applicable
Relative vapour density	1.92		Air = 1.
particle characteristics			not applicable

9.2 Other information**Information with regard to physical hazard classes****Gases under pressure****Safety characteristics**

	Value	Method, Result	Source, Remark
Critical temperature	152 °C		

Other information

Vapours are heavier than air.

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

Formation of explosive gas mixtures in contact with air.

10.2 Chemical stability

The substance is chemically stable under recommended conditions of storage, use and temperature.

10.3 Possibility of hazardous reactions

Reactions with numerous chemical compounds.
Must not be mixed with air or oxygen.
Danger of polymerisation

10.4 Conditions to avoid

Heat sources / heat - risk of bursting.
Ignition sources, open flames, glowing metal surfaces, etc.

10.5 Incompatible materials

Hydrogen bromide (HBr)
Boron trifluoride
Chlorine
Peroxides
Sulphur dioxide (SO₂)

10.6 Hazardous decomposition products

When handled and stored appropriately, no dangerous decomposition products are known.

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SECTION 11: Toxicological information**11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008****Acute toxicity****Animal data**

	Effective dose	Method, Evaluation	Source, Remark
Acute oral toxicity			Study technically not feasible.
Acute dermal toxicity			Study technically not feasible.
Acute inhalation toxicity	CAS No106-99-0 1,3-butadiene Acute inhalation toxicity (gas) LC50: 128803 ppm Species Rat Exposure time 4 h		

Assessment/classification

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

Skin corrosion/irritation**Other information**

Study technically not feasible.

Serious eye damage/irritation**Animal data**

Result / Evaluation	Method	Source, Remark
non-irritant. Species Rabbit		

Sensitisation to the respiratory tract**Assessment/classification**

No data available

Skin sensitisation**Other information**

Study technically not feasible.

Germ cell mutagenicity

	Value	Method	Result / Evaluation	Remark
In vitro mutagenicity/genotoxicity		OECD 473	positive	
In vivo mutagenicity/genotoxicity		OECD 474	positive	

Assessment/classification

May cause genetic defects.

Carcinogenicity**Animal data**

	Value	Method	Result / Evaluation	Remark
Carcinogenicity	6.25 ppm Species Mouse (male / female) Exposure duration 2 a	OECD 453	positive	

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Assessment/classification

May cause cancer.

Reproductive toxicity**Animal data**

	Value	Method	Result / Evaluation	Remark
Reproductive toxicity	NOAEC 6000 ppm	OECD 421		

Assessment/classification

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

STOT-single exposure**STOT SE 1 and 2****Assessment/classification**

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

STOT-repeated exposure**Animal data**

	Effective dose	Method	Specific effects:	Organs affected:	Source, Remark
Inhalative specific target organ toxicity (repeated exposure)	NOAEL(C): 1000 ppm Species Rat Exposure duration 2 a	OECD 453			

Assessment/classification

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

Aspiration hazard**Assessment/classification**

Study technically not feasible.

11.2 Information on other hazards**Additional information**

Can cause frostbite.
 Inhalation causes narcotic effects/intoxication.

SECTION 12: Ecological information**12.1 Toxicity****Aquatic toxicity**

	Effective dose	Method, Evaluation	Source, Remark
Acute (short-term) fish toxicity	LL50 34.55 mg/L Species Oncorhynchus mykiss (Rainbow trout) Test duration 72 h	QSAR	
Chronic (long-term) fish toxicity	NOEC 6.62 mg/L Species Oncorhynchus mykiss (Rainbow trout) Test duration 21 d	QSAR	
Acute (short-term) toxicity to crustacea	EC50 64.64 mg/L Species Daphnia magna (Big water flea) Test duration 48 h	QSAR	
Chronic (long-term) toxicity to aquatic invertebrate	NOEC 12.38 mg/L Species Daphnia magna (Big water flea) Test duration 21 d	QSAR	

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	Effective dose	Method, Evaluation	Source, Remark
Acute (short-term) toxicity to algae and cyanobacteria	EC50 35.77 mg/L Species <i>Raphidocelis subcapitata</i> Test duration 72 h	QSAR	
Chronic (long-term) toxicity to aquatic algae and cyanobacteria	not determined		
Toxicity to other aquatic plants/organisms	not determined		
Toxicity to microorganisms	EC50 527.86 mg/L Species activated sludge Test duration 72 h	QSAR	

12.2 Persistence and degradability

	Value	Method	Source, Remark
Biodegradation		QSAR	Readily biodegradable (according to OECD criteria).

12.3 Bioaccumulative potential

	Value	Method	Source, Remark
Bioconcentration factor (BCF)	Bioconcentration factor (BCF) 9.8		calculated

Assessment/classification

Based on the n-octanol/water partition coefficient accumulation in organisms is not expected.

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

The substance/mixture does not contain components meeting the PBT/vPvB criteria of the Reach Regulation, Annex XIII, at levels of 0.1% or higher.

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations**13.1 Waste treatment methods****Waste codes/waste designations according to EWC/AVV**

Waste code product	Waste name
160504 *	gases in pressure containers (including halons) containing hazardous substances

Appropriate disposal / Product

Waste disposal according to directive 2008/98/EC, covering waste and dangerous waste.
Prevent release to the environment. No disposal via the sewage.

Appropriate disposal / Package

Transportable pressure equipment (empty, residual pressure): Return to supplier / manufacturer.

SECTION 14: Transport information

	Land transport (ADR/RID)	Sea transport (IMDG)	Air transport (ICAO-TI / IATA-DGR)
14.1 UN number or ID number	UN 1010	UN 1010	UN 1010
14.2 UN proper shipping name	BUTADIENES, STABILIZED (1,3-butadiene)	BUTADIENES, STABILIZED (1,3-butadiene)	Butadienes, stabilized (1,3-butadiene)

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	Land transport (ADR/RID)	Sea transport (IMDG)	Air transport (ICAO-TI / IATA-DGR)
14.3 Transport hazard class(es)	2.1	2.1	2.1
14.4 Packing group	-	-	-
14.5 Environmental hazards	No	No	No

14.6 Special precautions for user

The protective measures listed in Sections 6, 7 and 8 of the Safety Data Sheet have to be considered.

14.7 Maritime transport in bulk according to IMO instruments

No carriage in bulk.

Land transport (ADR/RID)

UN number or ID number	UN 1010
UN proper shipping name	BUTADIENES, STABILIZED (1,3-butadiene)
Transport hazard class(es)	2.1
Hazard label(s)	2.1
Classification code	2F
Packing group	-
Environmental hazards	No
Limited quantity (LQ)	0
Special provisions	386, 618, 662, 676
Tunnel restriction code	B/D

Sea transport (IMDG)

UN number or ID number	UN 1010
UN proper shipping name	BUTADIENES, STABILIZED (1,3-butadiene)
Transport hazard class(es)	2.1
Packing group	-
Environmental hazards	No
Limited quantity (LQ)	0
Marine pollutant	No
EmS	F-D, S-U

Air transport (ICAO-TI / IATA-DGR)

UN number or ID number	UN 1010
UN proper shipping name	Butadienes, stabilized (1,3-butadiene)
Transport hazard class(es)	2.1
Packing group	-
Environmental hazards	No

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

Observe employment restrictions under the Maternity Protection Directive (92/85/EEC) for expectant or nursing mothers.
Observe restrictions to employment for juvenils according to the 'juvenile work protection guideline' (94/33/EC).

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Other regulations (EU)

To follow:

Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), Annex XVII No 28 - 30.

Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), Annex XVII No 40.

Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances.

National and local regulations concerning chemicals shall be observed.

Directive 2010/75/EU on industrial emissions [Industrial Emissions Directive] VOC

VOC-value ≥ 99 g/L

15.2 Chemical Safety Assessment

*** National regulations**

For this substance a chemical safety assessment has been carried out.

SECTION 16: Other information

Abbreviations and acronyms

Flam. Gas 1A: Flammable gas, Category 1A

Press. Gas (Liq.): Liquefied gas (LG)

Muta. 1B: Germ cell mutagen, Sub-category 1B

Carc. 1A: Carcinogen, Category 1A

Key literature references and sources for data

Information from our suppliers and data from the "GESTIS Substances Database" and the "Registered Substances" database of the European Chemicals Agency (ECHA) were used to create this safety data sheet.

Additional information

The information contained herein is based on the state of our knowledge. It characterizes the product with regard to the appropriate safety precautions. It does not represent a guarantee of the properties of the product.

Relevant H- and EUH-phrases (Number and full text)

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

Indication of changes

* Data changed compared with the previous version

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Annex: Exposure Scenarios**Index****1. Manufacture of substance**

M; ERC1; PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15

2. Formulation

F; ERC2; PROC1, PROC2, PROC3, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15

3. Use as laboratory reagent/agent

IS; ERC4; PROC15

4. Polymer production

IS; ERC6c; PROC1, PROC2, PROC3, PROC6, PROC8a, PROC8b, PROC14

5. Use as a Fuel

IS; ERC7; PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC16

6. Polymer processing

IS; ERC6d; PROC1, PROC2, PROC3, PROC6, PROC8a, PROC8b, PROC9, PROC13, PROC14

7. Use of a substance as an intermediate

IS; ERC6a; PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15

8. Use in rubber production and processing

IS; ERC6d; PROC1, PROC2, PROC3, PROC6, PROC8a, PROC8b, PROC9, PROC14, PROC15

9. Polymer processing, (use in professional settings)

PW; ERC8a; PROC1, PROC2, PROC6, PROC8a, PROC8b

1. Short title of exposure scenario

Manufacture of substance

M; ERC1; PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15

Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	ERC1: Manufacture of the substance As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
Operational conditions	

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Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. General exposures (closed systems) Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN	

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ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,0225 mg/m ³
Risk Characterization Ratio (RCR)	0,010198
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 General exposures (closed systems) With occasional controlled exposure. Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial	

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enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 General exposures (closed systems) With occasional controlled exposure. Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C

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Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
<i>Risk Management Measures</i>	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Handle substance within a predominantly closed system provided with extract ventilation.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:., Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
<i>Exposure estimate and reference to its source</i>	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal

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Additional good practice advice

Where appropriate, replacement of task by automated and/or closed processes.

Guidance to Downstream Users

For scaling see: <http://www.ecetoc.org/tra>

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 With occasional controlled exposure. Use domain: industrial

Operational conditions

Concentration of the substance

1,3-butadiene
 Content: $\geq 0\%$ - $\leq 100\%$

Physical state

liquid

Vapour pressure of the substance during use

268333,1875 Pa

Process temperature

20 °C

Duration and Frequency of activity

60 min 5 days per week

Indoor/Outdoor

Indoor

Operation is carried out at ambient or elevated temperatures

Risk Management Measures

Local exhaust ventilation

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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.

Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.

In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills

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immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 General exposures (closed systems) Use in contained batch processes Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	15 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general	Effectiveness: 30 %

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ventilation (not less than 3 - 5 air changes per hour)	
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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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 General exposures (closed systems) Use in contained

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	batch processes Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	15 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Handle substance within a predominantly closed system provided with extract ventilation.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	

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Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Equipment maintenance Cleaning Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Wear suitable respiratory protection.	Effectiveness: 90 %
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial	

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enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Equipment maintenance Cleaning Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week

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Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Wear suitable respiratory protection.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	

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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	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin	

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contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Use dry break couplings for material transfer	Effectiveness: 95 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular	

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inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Bulk transfer (closed systems) Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa

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Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
<i>Risk Management Measures</i>	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
<i>Exposure estimate and reference to its source</i>	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
<i>Additional good practice advice</i>	

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Where appropriate, replacement of task by automated and/or closed processes.

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Contributing exposure scenario

Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Bulk transfer (closed systems) Use domain: industrial
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Operational conditions

Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures

Risk Management Measures

Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Use dry break couplings for material transfer	Effectiveness: 95 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	

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Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). Process sampling Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	15 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons.	

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Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,3523 mg/m ³
Risk Characterization Ratio (RCR)	0,611882
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). Process sampling Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid

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Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	15 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
<i>Risk Management Measures</i>	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Sample via a closed loop or other system to avoid exposure.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
<i>Exposure estimate and reference to its source</i>	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,3523 mg/m ³
Risk Characterization Ratio (RCR)	0,611882
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker

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Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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Contributing exposure scenario	
Use descriptors covered	PROC15: Use a laboratory reagent. Laboratory activities Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills	

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immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,5776 mg/m ³
Risk Characterization Ratio (RCR)	0,713863
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC15: Use a laboratory reagent. Laboratory activities Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of	

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equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,1269 mg/m ³
Risk Characterization Ratio (RCR)	0,509902
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

2. Short title of exposure scenario

Formulation

F; ERC2; PROC1, PROC2, PROC3, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15

Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	ERC2: Formulation into mixture As no environmental hazard was identified no environmental-related exposure assessment and risk

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	characterization was performed.
Operational conditions	
Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. General exposures (closed systems) Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin	

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contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,0225 mg/m ³
Risk Characterization Ratio (RCR)	0,010198
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 General exposures (closed systems) with sample collection With occasional controlled exposure. Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
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. Restrict access to authorised persons.	

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Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 General exposures (closed systems) with sample collection With occasional controlled exposure. Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %

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Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
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: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³

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Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 General exposures (closed systems) with sample collection With occasional controlled exposure. Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or	

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equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week

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Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	

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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	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with	

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substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 processes at elevated temperatures Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to	

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equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	2,0284 mg/m ³
Risk Characterization Ratio (RCR)	0,917824
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 processes at elevated temperatures Use domain: industrial
Operational conditions	

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Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Handle substance within a predominantly closed system provided with extract ventilation.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	

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Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	2,0284 mg/m ³
Risk Characterization Ratio (RCR)	0,917824
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 General exposures (closed systems) Use in contained batch processes Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or	

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equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,6761 mg/m ³
Risk Characterization Ratio (RCR)	0,305941
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 General exposures (closed systems) Use in contained batch processes Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C

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Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
<i>Risk Management Measures</i>	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
<i>Exposure estimate and reference to its source</i>	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,6761 mg/m ³
Risk Characterization Ratio (RCR)	0,305941
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment

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	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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Contributing exposure scenario	
Use descriptors covered	PROC5: Mixing or blending in batch processes Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Wear suitable respiratory protection.	Effectiveness: 90 %
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills	

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immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Equipment maintenance Cleaning Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Wear suitable respiratory protection.	Effectiveness: 95 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %

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Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,1832 mg/m ³
Risk Characterization Ratio (RCR)	0,535397
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Equipment maintenance Cleaning Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %

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Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Wear suitable respiratory protection.	Effectiveness: 95 %
Drain down and flush system prior to equipment break-in or maintenance.	
Provide extract ventilation to points where emissions occur (LEV).	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	

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Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,1832 mg/m ³
Risk Characterization Ratio (RCR)	0,535397
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Wear suitable respiratory protection.	Effectiveness: 90 %
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract	

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ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week

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Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
<i>Risk Management Measures</i>	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Wear suitable respiratory protection.	Effectiveness: 90 %
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:., Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
<i>Exposure estimate and reference to its source</i>	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
<i>Additional good practice advice</i>	

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Contributing exposure scenario

Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Bulk transfer Use domain: industrial
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Operational conditions

Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures

Risk Management Measures

Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with	

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substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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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	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Ensure material transfers are under containment or extract ventilation	Effectiveness: 95 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons.	

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Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid

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Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
<i>Risk Management Measures</i>	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:., Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
<i>Exposure estimate and reference to its source</i>	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment

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	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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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	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 95 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent	

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exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). Drum and small package filling Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air	Effectiveness: 70 %

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changes per hour)	
Handle substance within closed system.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,3523 mg/m ³
Risk Characterization Ratio (RCR)	0,611882
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	
Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). Drum and small package filling Use domain: industrial

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Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Handle substance within closed system.	Effectiveness: 90 %
Transfer via enclosed lines	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:., Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker

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	Worker - inhalation, long-term - systemic
Exposure estimate	1,3523 mg/m ³
Risk Characterization Ratio (RCR)	0,611882
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). Process sampling Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	15 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	

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In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,3523 mg/m ³
Risk Characterization Ratio (RCR)	0,611882
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). Process sampling Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	15 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	

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Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Sample via a closed loop or other system to avoid exposure.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,3523 mg/m ³
Risk Characterization Ratio (RCR)	0,611882
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing).

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	Process sampling Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	15 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Wear suitable respiratory protection.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	

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Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,3523 mg/m ³
Risk Characterization Ratio (RCR)	0,611882
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC14: Tableting, compression, extrusion, pelletisation, granulation Tableting, compression, extrusion, pelletisation, granulation Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract	

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ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,6903 mg/m ³
Risk Characterization Ratio (RCR)	0,764853
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC15: Use a laboratory reagent. Laboratory activities Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
Operation is carried out at ambient or elevated	

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	temperatures
Risk Management Measures	
Local exhaust ventilation	
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,5776 mg/m ³
Risk Characterization Ratio (RCR)	0,713863
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	
Contributing exposure scenario	

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Use descriptors covered	PROC15: Use a laboratory reagent. Laboratory activities Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic

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Exposure estimate	1,1269 mg/m ³
Risk Characterization Ratio (RCR)	0,509902
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

3. Short title of exposure scenario

Use as laboratory reagent/agent
 IS; ERC4; PROC15

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) As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
Operational conditions	
Contributing exposure scenario	
Use descriptors covered	PROC15: Use a laboratory reagent. Laboratory activities small scale Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Drain down and flush system prior to	

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equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,1269 mg/m ³
Risk Characterization Ratio (RCR)	0,509902
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	
Contributing exposure scenario	
Use descriptors covered	PROC15: Use a laboratory reagent. Laboratory activities small scale Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %

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Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,5776 mg/m ³
Risk Characterization Ratio (RCR)	0,713863
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker

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Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

4. Short title of exposure scenario

Polymer production

IS; ERC6c; PROC1, PROC2, PROC3, PROC6, PROC8a, PROC8b, PROC14

Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	ERC6c: Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article) As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
Operational conditions	
Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. General exposures (closed systems) Continuous process no sampling Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Drain down and flush system prior to	

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equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,0225 mg/m ³
Risk Characterization Ratio (RCR)	0,010198
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	
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 Polymerisation (bulk and batch) Continuous process with sample collection Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene

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	Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure: Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³

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Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 Polymerisation (bulk and batch) Continuous process with sample collection Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
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: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must	

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be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 With occasional controlled exposure. Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor

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	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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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 Additivition and stabilisation Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 5\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin	

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contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,5776 mg/m ³
Risk Characterization Ratio (RCR)	0,713863
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 Additivation and stabilisation Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 5 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
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: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons.	

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Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,5776 mg/m ³
Risk Characterization Ratio (RCR)	0,713863
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 Bulk transfer Continuous process with sample collection Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %

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Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:., Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,5776 mg/m ³
Risk Characterization Ratio (RCR)	0,713863

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Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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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 Bulk transfer Continuous process with sample collection Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
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: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must	

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be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,5776 mg/m ³
Risk Characterization Ratio (RCR)	0,713863
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 Finishing operations Batch process with sample collection Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 5 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week

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Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,5776 mg/m ³
Risk Characterization Ratio (RCR)	0,713863
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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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 Finishing operations Batch process with sample collection Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 5\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
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: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with	

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substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,5776 mg/m ³
Risk Characterization Ratio (RCR)	0,713863
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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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) Batch process with sample collection Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 25 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
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	

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equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,9466 mg/m ³
Risk Characterization Ratio (RCR)	0,428318
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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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) Batch process with sample collection Use domain: industrial
Operational conditions	

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Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 25\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
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: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:., Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker

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	Worker - inhalation, long-term - systemic
Exposure estimate	0,9466 mg/m ³
Risk Characterization Ratio (RCR)	0,428318
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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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) Batch process with sample collection Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract	

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ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,5776 mg/m ³
Risk Characterization Ratio (RCR)	0,713863
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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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) Batch process with sample collection Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C

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Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
<i>Risk Management Measures</i>	
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 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
<i>Exposure estimate and reference to its source</i>	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,5776 mg/m ³
Risk Characterization Ratio (RCR)	0,713863
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
<i>Additional good practice advice</i>	
Where appropriate, replacement of task by automated and/or closed processes.	

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Contributing exposure scenario

Use descriptors covered	PROC6: Calendering operations Pelletizing Extrusion and masterbatching Use domain: industrial
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Operational conditions

Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 1\%$
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Physical state	liquid
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Vapour pressure of the substance during use	268333,1875 Pa
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Process temperature	20 °C
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Duration and Frequency of activity	480 min 5 days per week
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Indoor/Outdoor	Indoor
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	Operation is carried out at ambient or elevated temperatures
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Risk Management Measures

Local exhaust ventilation	
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Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
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Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
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Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
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In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
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Avoid frequent and direct contact with substance. Clean up contamination as	
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soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,6903 mg/m ³
Risk Characterization Ratio (RCR)	0,764853
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC6: Calendering operations Pelletizing Extrusion and masterbatching Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance.	

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Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,6903 mg/m ³
Risk Characterization Ratio (RCR)	0,764853
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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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	1,3-butadiene Content: >= 0 % - <= 100 %

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Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Wear suitable respiratory protection.	Effectiveness: 90 %
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912

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Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Wear suitable respiratory protection.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent	

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exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or	Effectiveness: 70 %

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controlled ventilation (5 to 10 air changes per hour)	
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	
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

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Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Sample via a closed loop or other system to avoid exposure.	Effectiveness: 95 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	

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Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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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	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Sample via a closed loop or other system to avoid exposure.	Effectiveness: 95 %
Transfer via enclosed lines	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must	

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be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
Operation is carried out at ambient or elevated	

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	temperatures
Risk Management Measures	
Local exhaust ventilation	
Transfer via enclosed lines	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	
Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities

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	Pelletisation and pellet screening (open systems) Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 1\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker

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	Worker - inhalation, long-term - systemic
Exposure estimate	1,6903 mg/m ³
Risk Characterization Ratio (RCR)	0,764853
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 95 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use	

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suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,6903 mg/m ³
Risk Characterization Ratio (RCR)	0,764853
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	

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Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	
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

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Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Ensure material transfers are under containment or extract ventilation	Effectiveness: 95 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	

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Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC14: Tableting, compression, extrusion, pelletisation, granulation Pelletizing Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must	

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be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,6903 mg/m ³
Risk Characterization Ratio (RCR)	0,764853
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC14: Tableting, compression, extrusion, pelletisation, granulation Pelletizing Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures

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Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,6903 mg/m ³
Risk Characterization Ratio (RCR)	0,764853
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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5. Short title of exposure scenario

Use as a Fuel

IS; ERC7; PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC16

Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	ERC7: Use of functional fluid at industrial site As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
Operational conditions	
Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. General exposures (closed systems) Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or	

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equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,0225 mg/m ³
Risk Characterization Ratio (RCR)	0,010198
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. Storage Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week

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Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,0225 mg/m ³
Risk Characterization Ratio (RCR)	0,010198
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	
Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed

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	continuous process with occasional controlled exposure or processes with equivalent containment conditions General exposures (closed systems) With occasional controlled exposure. Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to	

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prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 General exposures (closed systems) With occasional controlled exposure. Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Handle substance within closed system.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular	

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inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 With occasional controlled exposure. Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid

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Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
<i>Risk Management Measures</i>	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:., Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
<i>Exposure estimate and reference to its source</i>	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment

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	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 With occasional controlled exposure. Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Handle substance within a predominantly closed system provided with extract ventilation.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves.,	

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Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 General exposures (closed systems) Batch process Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures

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Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,6761 mg/m ³
Risk Characterization Ratio (RCR)	0,305941
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	
Contributing exposure scenario	
Use descriptors covered	PROC3: Manufacture or formulation in the chemical

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	industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition General exposures (closed systems) Batch process Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Handle substance within closed system.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin	

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contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,6761 mg/m ³
Risk Characterization Ratio (RCR)	0,305941
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 General exposures (open systems) (closed systems) Batch process Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 25 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons.	

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Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,4057 mg/m ³
Risk Characterization Ratio (RCR)	0,183565
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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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 General exposures (open systems) (closed systems) Batch process Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 25 %

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Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Handle substance within a predominantly closed system provided with extract ventilation.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic

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Exposure estimate	0,4057 mg/m ³
Risk Characterization Ratio (RCR)	0,183565
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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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	1,3-butadiene Content: >= 0 % - <= 25 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use	

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suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,8114 mg/m ³
Risk Characterization Ratio (RCR)	0,367129
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	
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	1,3-butadiene Content: >= 0 % - <= 25 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	

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Transfer via enclosed lines	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,8114 mg/m ³
Risk Characterization Ratio (RCR)	0,367129
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	

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Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 25\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Wear suitable respiratory protection.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic

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Exposure estimate	2,0284 mg/m ³
Risk Characterization Ratio (RCR)	0,917824
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 25 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Wear suitable respiratory protection.	Effectiveness: 90 %
Transfer via enclosed lines	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves.,	

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Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	2,0284 mg/m ³
Risk Characterization Ratio (RCR)	0,917824
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 25 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Wear suitable respiratory protection.	Effectiveness: 90 %

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Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,6761 mg/m ³
Risk Characterization Ratio (RCR)	0,305941
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 25 %

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Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Wear suitable respiratory protection.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,6761 mg/m ³
Risk Characterization Ratio (RCR)	0,305941
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal

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Additional good practice advice

Where appropriate, replacement of task by automated and/or closed processes.

Guidance to Downstream Users

For scaling see: <http://www.ecetoc.org/tra>

Contributing exposure scenario

Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Drum/Batch transfers Use domain: industrial
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Operational conditions

Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 25\%$
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Physical state	liquid
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Vapour pressure of the substance during use	268333,1875 Pa
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Process temperature	20 °C
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Duration and Frequency of activity	240 min 5 days per week
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Indoor/Outdoor	Indoor
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	Operation is carried out at ambient or elevated temperatures
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Risk Management Measures

Local exhaust ventilation	
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Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
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Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
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Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
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In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
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Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,8256 mg/m ³
Risk Characterization Ratio (RCR)	0,826041
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 25 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Transfer via enclosed lines	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular	

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inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,8256 mg/m ³
Risk Characterization Ratio (RCR)	0,826041
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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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	1,3-butadiene Content: >= 0 % - <= 25 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa

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Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
<i>Risk Management Measures</i>	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 95 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
<i>Exposure estimate and reference to its source</i>	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,8256 mg/m ³
Risk Characterization Ratio (RCR)	0,826041
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker

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Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: $\geq 0\%$ - $\leq 25\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Transfer via enclosed lines	Effectiveness: 70 %
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 95 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent	

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exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,8256 mg/m ³
Risk Characterization Ratio (RCR)	0,826041
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC16: Use of fuels General exposures (open systems) (closed systems) Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 25 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general ventilation (not less than 3 - 5 air	Effectiveness: 30 %

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changes per hour)	
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,4733 mg/m ³
Risk Characterization Ratio (RCR)	0,214159
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

6. Short title of exposure scenario

Polymer processing

IS; ERC6d; PROC1, PROC2, PROC3, PROC6, PROC8a, PROC8b, PROC9, PROC13, PROC14

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Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	ERC6d: Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article) As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
Operational conditions	

Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. Bulk transfer (closed systems) Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent	

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exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,0225 mg/m ³
Risk Characterization Ratio (RCR)	0,010198
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. Bulk weighing (closed systems) Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Drain down and flush system prior to equipment break-in or maintenance.	

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Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,0225 mg/m ³
Risk Characterization Ratio (RCR)	0,010198
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 1 %

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Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,5634 mg/m ³
Risk Characterization Ratio (RCR)	0,254951
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal

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Additional good practice advice

Where appropriate, replacement of task by automated and/or closed processes.

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For scaling see: <http://www.ecetoc.org/tra>

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: industrial

Operational conditions**Concentration of the substance**

1,3-butadiene
 Content: $\geq 0\%$ - $\leq 1\%$

Physical state

liquid

Vapour pressure of the substance during use

268333,1875 Pa

Process temperature

20 °C

Duration and Frequency of activity

480 min 5 days per week

Indoor/Outdoor

Indoor

Operation is carried out at ambient or elevated temperatures

Risk Management Measures

Handle substance within closed system.

Effectiveness: 90 %

Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.

Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.

In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.

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Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,5634 mg/m ³
Risk Characterization Ratio (RCR)	0,254951
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 weighing With occasional controlled exposure. Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
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	

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equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,3944 mg/m ³
Risk Characterization Ratio (RCR)	0,178466
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 weighing With occasional controlled exposure. Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene

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	Content: $\geq 0\%$ - $\leq 1\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	

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Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,3944 mg/m ³
Risk Characterization Ratio (RCR)	0,178466
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 With occasional controlled exposure. Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 1\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal -	

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This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 Additive premixing (closed systems) Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week

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Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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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 Additive premixing (closed systems) Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 1\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as	

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soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC6: Calendering operations Calendering (including Banburys) Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of	

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equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC6: Calendering operations Calendering (including Banburys) Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C

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Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
<i>Risk Management Measures</i>	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:., Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
<i>Exposure estimate and reference to its source</i>	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal

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Additional good practice advice

Where appropriate, replacement of task by automated and/or closed processes.

Guidance to Downstream Users

For scaling see: <http://www.ecetoc.org/tra>

Contributing exposure scenario

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

Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 1\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures

Risk Management Measures

Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	

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Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,6903 mg/m ³
Risk Characterization Ratio (RCR)	0,764853
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to	

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prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,6903 mg/m ³
Risk Characterization Ratio (RCR)	0,764853
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance	268333,1875 Pa

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during use	
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
<i>Risk Management Measures</i>	
Local exhaust ventilation	
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
<i>Exposure estimate and reference to its source</i>	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,6903 mg/m ³
Risk Characterization Ratio (RCR)	0,764853
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
<i>Additional good practice advice</i>	
Where appropriate, replacement of task by automated and/or closed processes.	

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Guidance to Downstream Users

For scaling see: <http://www.ecetoc.org/tra>

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

1,3-butadiene
 Content: $\geq 0\%$ - $\leq 1\%$

Physical state

liquid

Vapour pressure of the substance during use

268333,1875 Pa

Process temperature

20 °C

Duration and Frequency of activity

480 min 5 days per week

Indoor/Outdoor

Indoor

Operation is carried out at ambient or elevated temperatures

Risk Management Measures

Ensure material transfers are under containment or extract ventilation

Effectiveness: 95 %

Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.

Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.

In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.

Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide

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specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,6903 mg/m ³
Risk Characterization Ratio (RCR)	0,764853
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Bulk transfer Drum/Batch transfers Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	

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Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,1832 mg/m ³
Risk Characterization Ratio (RCR)	0,535397
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C

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Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,8932 mg/m ³
Risk Characterization Ratio (RCR)	0,856635
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
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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	1,3-butadiene Content: $\geq 0\%$ - $\leq 1\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as	

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soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,8932 mg/m ³
Risk Characterization Ratio (RCR)	0,856635
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular	

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inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,3523 mg/m ³
Risk Characterization Ratio (RCR)	0,611882
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa

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Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
<i>Risk Management Measures</i>	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
<i>Exposure estimate and reference to its source</i>	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,3523 mg/m ³
Risk Characterization Ratio (RCR)	0,611882
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal

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Additional good practice advice

Where appropriate, replacement of task by automated and/or closed processes.

Guidance to Downstream Users

For scaling see: <http://www.ecetoc.org/tra>

Contributing exposure scenario

Use descriptors covered	PROC13: Treatment of articles by dipping and pouring. Production of articles by dipping and pouring Use domain: industrial
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Operational conditions

Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 1\%$
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Physical state	liquid
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Vapour pressure of the substance during use	268333,1875 Pa
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Process temperature	20 °C
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Duration and Frequency of activity	240 min 5 days per week
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Indoor/Outdoor	Indoor
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	Operation is carried out at ambient or elevated temperatures
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Risk Management Measures

Local exhaust ventilation	
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Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
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Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
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Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
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In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
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Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC13: Treatment of articles by dipping and pouring. Production of articles by dipping and pouring Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 90 %

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Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC14: Tableting, compression, extrusion, pelletisation, granulation Extrusion and masterbatching Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 1 %

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Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:., Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912

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Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC14: Tableting, compression, extrusion, pelletisation, granulation Extrusion and masterbatching Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 1\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	

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In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC14: Tableting, compression, extrusion, pelletisation, granulation Injection moulding (of articles) Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	

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Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	
Contributing exposure scenario	
Use descriptors covered	PROC14: Tableting, compression, extrusion, pelletisation, granulation Injection moulding (of articles) Use domain: industrial

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Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 1\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	

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Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

7. Short title of exposure scenario

Use of a substance as an intermediate

IS; ERC6a; PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15

Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	ERC6a: Use of intermediate As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
Operational conditions	
Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. General exposures (closed systems) Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C

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Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,0225 mg/m ³
Risk Characterization Ratio (RCR)	0,010198
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	
Contributing exposure scenario	

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Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions General exposures (closed systems) With occasional controlled exposure. Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide	

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specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 General exposures (closed systems) With occasional controlled exposure. Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Handle substance within a predominantly closed system provided with extract ventilation.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons.	

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Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	
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 With occasional controlled exposure. Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %

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Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker

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Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 General exposures (closed systems) Use in contained batch processes Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	15 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use	

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suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 General exposures (closed systems) Use in contained batch processes Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	15 min 5 days per week
Indoor/Outdoor	Indoor
Operation is carried out at ambient or elevated	

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	temperatures
Risk Management Measures	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Handle substance within a predominantly closed system provided with extract ventilation.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Equipment maintenance Cleaning Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Wear suitable respiratory protection.	Effectiveness: 90 %
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide	

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specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Equipment maintenance Cleaning Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Wear suitable respiratory protection.	Effectiveness: 90 %
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of	

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equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Equipment maintenance Cleaning Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C

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Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
<i>Risk Management Measures</i>	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Wear suitable respiratory protection.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
<i>Exposure estimate and reference to its source</i>	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
<i>Additional good practice advice</i>	
Where appropriate, replacement of task by automated and/or closed processes.	

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Contributing exposure scenario**Use descriptors covered**

PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
Equipment maintenance Cleaning Use domain: industrial

Operational conditions

Concentration of the substance

1,3-butadiene
Content: $\geq 0\%$ - $\leq 100\%$

Physical state

liquid

Vapour pressure of the substance during use

268333,1875 Pa

Process temperature

20 °C

Duration and Frequency of activity

60 min 5 days per week

Indoor/Outdoor

Indoor

Operation is carried out at ambient or elevated temperatures

Risk Management Measures

Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)

Effectiveness: 30 %

Wear suitable respiratory protection.

Effectiveness: 90 %

Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.

Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.

In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.

Avoid frequent and direct contact with substance. Clean up contamination as

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soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular	

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inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa

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Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
<i>Risk Management Measures</i>	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Use dry break couplings for material transfer	Effectiveness: 95 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
<i>Exposure estimate and reference to its source</i>	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal

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Additional good practice advice

Where appropriate, replacement of task by automated and/or closed processes.

Guidance to Downstream Users

For scaling see: <http://www.ecetoc.org/tra>

Contributing exposure scenario

Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Bulk transfer (closed systems) Use domain: industrial
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Operational conditions

Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures

Risk Management Measures

Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	

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Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Bulk transfer (closed systems) Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Use dry break couplings for material transfer	Effectiveness: 95 %
Drain down and flush system prior to equipment break-in or maintenance.	

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Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). Process sampling Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %

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Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	15 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:., Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,3523 mg/m ³
Risk Characterization Ratio (RCR)	0,611882
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker

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Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). Process sampling Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	15 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Sample via a closed loop or other system to avoid exposure.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent	

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exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,3523 mg/m ³
Risk Characterization Ratio (RCR)	0,611882
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC15: Use a laboratory reagent. Laboratory activities Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %

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Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,5776 mg/m ³
Risk Characterization Ratio (RCR)	0,713863
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	
Contributing exposure scenario	
Use descriptors covered	PROC15: Use a laboratory reagent. Laboratory activities Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %

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Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,1269 mg/m ³
Risk Characterization Ratio (RCR)	0,509902
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	

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8. Short title of exposure scenario

Use in rubber production and processing

IS; ERC6d; PROC1, PROC2, PROC3, PROC6, PROC8a, PROC8b, PROC9, PROC14, PROC15

Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	ERC6d: Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article) As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
Operational conditions	
Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. Bulk weighing (closed systems) Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
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.	

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Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,0158 mg/m ³
Risk Characterization Ratio (RCR)	0,007139
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. Material transfers Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %

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Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,0225 mg/m ³
Risk Characterization Ratio (RCR)	0,010198
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	

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For scaling see: <http://www.ecetoc.org/tra>

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 weighing With occasional controlled exposure. Use domain: industrial

Operational conditions

Concentration of the substance

1,3-butadiene
Content: $\geq 0\%$ - $\leq 100\%$

Physical state

liquid

Vapour pressure of the substance during use

268333,1875 Pa

Process temperature

20 °C

Duration and Frequency of activity

240 min 5 days per week

Indoor/Outdoor

Indoor

Operation is carried out at ambient or elevated temperatures

Risk Management Measures

Local exhaust ventilation

Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)

Effectiveness: 70 %

Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.

Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.

In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.

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Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 weighing With occasional controlled exposure. Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %

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Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 Material transfers With occasional controlled exposure. Use domain: industrial
Operational conditions	

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Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic

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Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 Material transfers With occasional controlled exposure. Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Transfer via enclosed lines	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use	

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suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 Additive premixing Batch process (closed systems) Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
Operation is carried out at ambient or elevated	

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	temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,6761 mg/m ³
Risk Characterization Ratio (RCR)	0,305941
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	
Contributing exposure scenario	

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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 Additive premixing Batch process (closed systems) Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as	

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soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,6761 mg/m ³
Risk Characterization Ratio (RCR)	0,305941
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC6: Calendering operations Calendering (including Banburys) Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of	

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equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC6: Calendering operations Calendering (including Banburys) Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C

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Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
<i>Risk Management Measures</i>	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:., Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
<i>Exposure estimate and reference to its source</i>	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal

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Additional good practice advice

Where appropriate, replacement of task by automated and/or closed processes.

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For scaling see: <http://www.ecetoc.org/tra>

Contributing exposure scenario**Use descriptors covered**

PROC6: Calendering operations
 Cooling cured articles Use domain: industrial

Operational conditions

Concentration of the substance

1,3-butadiene
 Content: $\geq 0\%$ - $\leq 1\%$

Physical state

liquid

Vapour pressure of the substance during use

268333,1875 Pa

Process temperature

20 °C

Duration and Frequency of activity

240 min 5 days per week

Indoor/Outdoor

Indoor

Operation is carried out at ambient or elevated temperatures

Risk Management Measures

Local exhaust ventilation

Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)

Effectiveness: 70 %

Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.

Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.

In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.

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Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC6: Calendering operations Cooling cured articles Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 90 %
Drain down and flush system prior to	

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equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	
Contributing exposure scenario	
Use descriptors covered	PROC6: Calendering operations Vulcanisation Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 1 %

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Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:., Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker

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Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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Contributing exposure scenario	
Use descriptors covered	PROC6: Calendering operations Vulcanisation Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 1\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves.,	

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Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Wear suitable respiratory protection.	Effectiveness: 90 %

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Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	
Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Equipment maintenance Use domain: industrial

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Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Wear suitable respiratory protection.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker

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	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	

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In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	

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Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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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	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Transfer via enclosed lines	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic

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Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Transfer via enclosed lines	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent	

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exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). Material transfers Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air	Effectiveness: 70 %

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changes per hour)	
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,8114 mg/m ³
Risk Characterization Ratio (RCR)	0,367129
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). Material transfers Use domain: industrial
Operational conditions	

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Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 1\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Transfer via enclosed lines	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:., Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,8114 mg/m ³
Risk Characterization Ratio (RCR)	0,367129

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Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). Small scale weighing Dedicated facility Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 5\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves.,	

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Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,6227 mg/m ³
Risk Characterization Ratio (RCR)	0,734259
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). Small scale weighing Dedicated facility Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 5 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or	Effectiveness: 70 %

controlled ventilation (5 to 10 air changes per hour)	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,6227 mg/m ³
Risk Characterization Ratio (RCR)	0,734259
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC14: Tableting, compression, extrusion, pelletisation, granulation Pressing uncured rubber blanks Use domain: industrial

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Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 1\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	

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Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC14: Tableting, compression, extrusion, pelletisation, granulation Pressing uncured rubber blanks Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal -	

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This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,0142 mg/m ³
Risk Characterization Ratio (RCR)	0,458912
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC15: Use a laboratory reagent. Laboratory activities Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures

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Risk Management Measures	
Local exhaust ventilation	
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,5776 mg/m ³
Risk Characterization Ratio (RCR)	0,713863
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	
Contributing exposure scenario	
Use descriptors covered	PROC15: Use a laboratory reagent.

	Laboratory activities Use domain: industrial
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,1269 mg/m ³

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Risk Characterization Ratio (RCR)	0,509902
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

9. Short title of exposure scenario

Polymer processing, (use in professional settings)
 PW; ERC8a; PROC1, PROC2, PROC6, PROC8a, PROC8b

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) As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
Operational conditions	
Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. Bulk transfer (closed systems) Use domain: professional
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	

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Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,2254 mg/m ³
Risk Characterization Ratio (RCR)	0,10198
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. Storage Use domain: professional
Operational conditions	
Concentration of the substance	1,3-butadiene

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	Content: $\geq 0\%$ - $\leq 100\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,2254 mg/m ³
Risk Characterization Ratio (RCR)	0,10198
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal

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Additional good practice advice

Where appropriate, replacement of task by automated and/or closed processes.

Guidance to Downstream Users

For scaling see: <http://www.ecetoc.org/tra>

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**

1,3-butadiene
 Content: $\geq 0\%$ - $\leq 1\%$

Physical state

liquid

Vapour pressure of the substance during use

268333,1875 Pa

Process temperature

20 °C

Duration and Frequency of activity

480 min 5 days per week

Indoor/Outdoor

Indoor

Operation is carried out at ambient or elevated temperatures

Risk Management Measures**Local exhaust ventilation**

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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.

Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.

In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills

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immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,5776 mg/m ³
Risk Characterization Ratio (RCR)	0,713863
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %

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Ensure material transfers are under containment or extract ventilation	Effectiveness: 80 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,5776 mg/m ³
Risk Characterization Ratio (RCR)	0,713863
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	
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 With occasional controlled exposure. Use domain: professional

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Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 1\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	

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Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,5776 mg/m ³
Risk Characterization Ratio (RCR)	0,713863
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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 With occasional controlled exposure. Use domain: professional
Operational conditions	
Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 1\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Handle substance within closed system.	Effectiveness: 80 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or	

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equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,5776 mg/m ³
Risk Characterization Ratio (RCR)	0,713863
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC6: Calendering operations Injection moulding (of articles) Use domain: professional
Operational conditions	
Concentration of the substance	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor

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	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	Effectiveness: 95 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:., Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	

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Contributing exposure scenario**Use descriptors covered**

PROC6: Calendering operations
 Injection moulding (of articles) Use domain: professional

Operational conditions

Concentration of the substance

1,3-butadiene
 Content: $\geq 0\%$ - $\leq 1\%$

Physical state

liquid

Vapour pressure of the substance during use

268333,1875 Pa

Process temperature

20 °C

Duration and Frequency of activity

480 min 5 days per week

Indoor/Outdoor

Indoor

Operation is carried out at ambient or elevated temperatures

Risk Management Measures

Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)

Effectiveness: 30 %

Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.

Effectiveness: 95 %

Handle substance within a predominantly closed system provided with extract ventilation.

Effectiveness: 80 %

Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.

Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.

In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable

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respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
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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	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
Wear suitable respiratory protection.	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air	Effectiveness: 30 %

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changes per hour)	
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	1,5776 mg/m ³
Risk Characterization Ratio (RCR)	0,713863
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	
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	

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Concentration of the substance	1,3-butadiene Content: $\geq 0\%$ - $\leq 1\%$
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Wear suitable respiratory protection.	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic

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Exposure estimate	1,5776 mg/m ³
Risk Characterization Ratio (RCR)	0,713863
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Local exhaust ventilation	
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. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use	

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suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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	1,3-butadiene Content: >= 0 % - <= 1 %
Physical state	liquid
Vapour pressure of the substance during use	268333,1875 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
	Operation is carried out at ambient or elevated temperatures
Risk Management Measures	
Provide a good standard of general	Effectiveness: 30 %

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ventilation (not less than 3 - 5 air changes per hour)	
Ensure material transfers are under containment or extract ventilation	Effectiveness: 90 %
Drain down and flush system prior to equipment break-in or maintenance. Restrict access to authorised persons. Provide specific employee training to prevent/minimize exposures. Regular inspection and maintenance of equipment and machines.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Disposal - This material and its container must be disposed of in a safe manner.	
In case of potential exposure:, Use suitable chemically resistant gloves., Wear suitable coveralls to prevent exposure to the skin., Wear suitable respiratory protection., Clear spills immediately, Consider the need for risk based health surveillance.	
Avoid frequent and direct contact with substance. Clean up contamination as soon as they occur. Wash off any skin contamination immediately. Provide specific employee training to prevent/minimize exposures.	
Wear suitable gloves tested to EN ISO 374-1.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - systemic
Exposure estimate	0,7888 mg/m ³
Risk Characterization Ratio (RCR)	0,356931
Assessment method	EASY TRA v6.0, ECETOC TRA v3.0, Worker
Assessment method	Qualitative assessment
	Worker - dermal
Additional good practice advice	
Where appropriate, replacement of task by automated and/or closed processes.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	
