

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

<b>Product Name</b>	<b>n-Butanol</b>		
<b>Chemical Name</b>	<b>CAS No</b>	<b>EC No</b>	<b>REACH registration number</b>
Butan-1-ol	71-36-3	200-751-6	01-2119484630-38-0008
<b>Pure substance/mixture</b>	Substance		

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

<b>Industrial</b>	Use: as an intermediate, Cleaning agent, Lubricant, in coatings, in paints, in inks, in toners, in adhesives and Metal working fluids/rolling oils.
<b>Professional</b>	Use: Cleaning agent, Laboratory chemicals, Lubricant, in coatings, in paints, in toners, in inks, in adhesives and Metal working fluids/rolling oils.
<b>Consumer</b>	Use: Cleaning agent, in coatings, in paints, in inks, in toners, in adhesives, Disinfectant and personal care products.
<b>Application</b>	Chemical intermediate, Solvent.
<b>Uses advised against</b>	Not identified.

**1.3. Details of the supplier of the safety data sheet**

<b>Manufacturer</b>	
<b>Perstorp Oxo AB</b>	
SE-444 84 Stenungsund	
Sweden	
Tel. +46 303 728600	
Fax. +46 303 728607	
www.perstorp.com	
<b>E-mail address</b>	productinfo@perstorp.com

**1.4. Emergency telephone number**

<b>Europe</b>	(+1) 760 476 3961 (contract no: 334101)
<b>United Kingdom</b>	(+44) 8 08 189 0979 (contract no: 334101)

**SECTION 2: Hazards identification****Hazards description**

The substance is a flammable liquid and may form explosive air/vapour mixtures. Vapours may spread along floors and be ignited by electrostatic charges. The substance may cause permanent eye damages and by skin contact irritation and dehydration. Vapours are irritating to the respiratory system and also affects the central nervous system which may cause drowsiness or dizziness. Early symptoms of exposure may include fatigue and headache.

**2.1. Classification of the substance or mixture****Classification according to Regulation (EC) No. 1272/2008 [CLP]**

Acute toxicity - Oral	Category 4 - (H302)
Skin corrosion/irritation	Category 2 - (H315)
Serious eye damage/eye irritation	Category 1 - (H318)
Specific target organ toxicity (single exposure)	Category 3 - (H335,H336)
Flammable liquids	Category 3 - (H226)

**Classification according to Directive 67/548/EEC or 1999/45/EC**

Full text of R-phrases: see section 16

**Hazard symbols**

Xn - Harmful  
Xi - Irritant

**R-code(s)**

R10 - Xn; R22 - Xi; R37/38 - Xi; R41 - R67

**2.2. Label elements****Symbols/Pictograms****Signal word**

Danger

**Hazard statements**

H318 - Causes serious eye damage

H315 - Causes skin irritation

H302 - Harmful if swallowed

H336 - May cause drowsiness or dizziness

H335 - May cause respiratory irritation

H226 - Flammable liquid and vapour

**Precautionary Statements**

P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking

P241 - Use explosion-proof electrical/ ventilating/ lighting/ equipment

P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

P303 + P361 + P353 - IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower

P304 + P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing

P312 - Call a POISON CENTRE or doctor if you feel unwell

Contains: Butan-1-ol

**2.3. Other hazards**

None known.

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

Chemical Name	EC No	CAS No	REACH registration number	weight-%	Classification according to Directive 67/548/EEC or 1999/45/EC	Classification according to Regulation (EC) No. 1272/2008 [CLP]
Butan-1-ol	200-751-6	71-36-3	01-2119484630-38-0008	100	R10 Xn; R22 Xi; R37/38-41 R67	Acute Tox. 4 (H302) Skin Irrit. 2 (H315) Eye Dam. 1 (H318) STOT SE 3 (H335) STOT SE 3 (H336) Flam. Liq. 3 (H226)

Full text of R-phrases: see section 16

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

**Additional information**

No information available

**SECTION 4: First aid measures**

#### 4.1. Description of first aid measures

<b>General advice</b>	Immediate medical attention is required. Emergency eyewash facilities must be located in the vicinity of where the product is handled. If unconscious place in recovery position and seek medical advice. First aid personnel should pay attention to their own safety.
<b>Inhalation</b>	Remove to fresh air. Rinse mouth with water. If irritation persists get medical advice/attention.
<b>Skin contact</b>	Wash off immediately with soap and plenty of water. Use lukewarm water if possible. Get medical attention if irritation develops and persists.
<b>Eye contact</b>	Immediate medical attention is required. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Use lukewarm water if possible. Keep eye wide open while rinsing.
<b>Ingestion</b>	Do NOT induce vomiting. Clean mouth with water and drink afterwards plenty of water. Never give anything by mouth to an unconscious person. Get medical attention.

#### **Self-protection of the first aider**

Avoid contact with skin, eyes or clothing.

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

By ingestion: May cause abdominal pain, headache, nausea and diarrhoea. Large doses affect liver and kidneys. May have a narcotic effect. By inhalation: The substance causes respiratory tract irritation and have a narcotic effect. Inhalation of high concentrations of vapours may cause irritation of the respiratory tract with sore throat, coughing, shortness of breath, headaches, nausea, dizziness, dullness, and unconsciousness. It can as well give the same symptoms like those of ingestion. By skin contact: The substance has an irritating and degreasing effect. May cause allergic reactions. By eye contact: Vapours are irritating for the eyes, causing flood of tears and pain. Splashing may cause eye inflammation. Chronic effects: Prolonged inhalation has caused auditory nerve and vestibular injury resulting in severe vertigo and hearing loss in workers exposed to 1-butanol. Repeated or prolonged contact may degrease the skin resulting in drying, cracking and eczematous dermatitis. Person with pre-existing skin disorders or eye problems or impaired liver, kidney or respiratory function may be more susceptible to the effects of the substance.

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

Treat symptomatically.

### **SECTION 5: Firefighting measures**

#### 5.1. Extinguishing media

##### **Suitable extinguishing media**

Water spray, carbon dioxide (CO<sub>2</sub>), dry chemical, alcohol-resistant foam.

##### **Unsuitable extinguishing media**

High volume water jet.

#### 5.2. Special hazards arising from the substance or mixture

The substance is a flammable liquid and may form explosive air/vapour mixtures. Vapours are heavier than air and may spread along floors. Thermal decomposition can lead to release of irritating and toxic gases and vapours.

##### **Hazardous combustion products**

Carbon monoxide (CO), Carbon dioxide (CO<sub>2</sub>).

#### 5.3. Advice for firefighters

Wear self-contained breathing apparatus and protective suit.

##### **Additional information**

Cool containers with flooding quantities of water until well after fire is out. Prevent fire extinguishing water from contaminating surface water or the ground water system. Foam should be applied in large quantities as it is broken down to some extent by the product.

### **SECTION 6: Accidental release measures**

#### 6.1. Personal precautions, protective equipment and emergency procedures

Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate affected area. Remove all sources of ignition.

**6.2. Environmental precautions**

Minimize the area spreading and cover the drains. Do not allow into any sewer, on the ground or into any body of water. Local authorities should be advised if significant spillages cannot be contained. See Section 12 for additional ecological information.

**6.3. Methods and material for containment and cleaning up****Methods for containment**

Small spill	Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal
Large spill	Pump up the product into a spare container suitably labelled.

**Methods for cleaning up**

Clean contaminated surface thoroughly.

**6.4. Reference to other sections**

See Section 7,8,13 for more information.

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

Ensure adequate ventilation, especially in confined areas. Keep away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity). Take precautionary measures against static discharges. Use spark-proof tools and explosion-proof equipment. Use personal protection recommended in Section 8.

**General Hygiene Considerations**

Handle in accordance with good industrial hygiene and safety practice.

**7.2. Conditions for safe storage, including any incompatibilities**

Store in a well-ventilated place. Keep tightly closed in a dry and cool place. Keep away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity). Keep under nitrogen blanket.

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

For details, see the separate exposure scenario(s).

**SECTION 8: Exposure controls/personal protection****8.1. Control parameters****Exposure Limits**

Keep personal exposure levels below Derived No Effect Level (DNEL) and national exposure limit values (if existing).

Chemical Name	European Union	United Kingdom
Butan-1-ol 71-36-3	Not available	STEL: 50 ppm STEL: 154 mg/m <sup>3</sup> Sk*

**Derived No Effect Level (DNEL) - worker**

Butan-1-ol (71-36-3)			
Type	Exposure route	DNEL	Remarks
Chronic effects, local	Inhalation	310	mg/m <sup>3</sup>

**Derived No Effect Level (DNEL) - Consumer**

Butan-1-ol (71-36-3)			
Type	Exposure route	DNEL	Remarks
Chronic effects, systemic	Oral	3.125	mg/kg bw/day
Chronic effects, local	Inhalation	55	mg/m <sup>3</sup>

**Predicted No Effect Concentration (PNEC)**

Butan-1-ol (71-36-3)		
Environmental compartment	Predicted No Effect Concentration (PNEC)	Remarks
Freshwater	0.082	mg/l
Intermittent	2.25	mg/l

Freshwater sediment	0.178	mg/kg dry weight
Marine water	0.008	mg/l
Marine sediment	0.017	mg/kg dry weight
Impact on Sewage Treatment	2476	mg/l
Soil	0.015	mg/kg dry weight

## 8.2. Exposure controls

### Appropriate engineering controls

Eyewash stations. Ensure adequate ventilation, especially in confined areas.

### Individual protection measures, such as personal protective equipment

Eye/face protection	Tight sealing safety goggles.
Hand Protection	Wear protective gloves. Ensure that the breakthrough time of the glove material is not exceeded. Refer to glove supplier for information on breakthrough time for specific gloves.

Duration of contact	Glove material	Glove thickness	Break through time	Remarks
Suitable materials also with prolonged, direct contact (protective index 6, corresponding > 480 minutes of permeation time according to EN 374):	Butyl rubber	0.7 mm		Gloves must conform to standard EN 374
Suitable materials also with prolonged, direct contact (protective index 6, corresponding > 480 minutes of permeation time according to EN 374):	Nitrile rubber, NBR	0.4 mm		Gloves must conform to standard EN 374

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

Respiratory protection      In case of insufficient ventilation, wear suitable respiratory equipment. Suitable respiratory protection for lower concentrations or short-term exposure:  
Gas filter for gases/vapours of organic compounds (boiling point >65°C, e. g. Type A)  
Suitable respiratory protection for higher concentrations or long-term exposure:  
Self-contained breathing apparatus.

### Environmental exposure controls

Further information concerning special risk management measures: see annex of this safety data sheet (exposure scenarios).

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

#### Appearance

liquid  
colourless

#### Odour

sweet

#### Odour threshold

No data available

#### Property

#### Values

#### Remarks • Method

#### pH

5

@ 20°C (47 g/l)

#### Melting point/freezing point

-90 °C / -130 °F

lit.

#### Boiling point / boiling range

117 °C / 243 °F

OECD Test No. 103: Boiling Point

#### Flash point

36 °C / 97 °F

ASTM D 7094-04

#### Evaporation rate

No information available

#### Flammability (solid, gas)

Not applicable

#### Explosive limits

Upper explosive limits

11.2 Vol-%

lit.

Lower explosive limits

1.4 Vol-%

lit.

#### Vapour pressure

1.0 kPa

@ 25°C (lit.)

#### Vapour density

No information available

#### Relative density

0.81

D20/4, ISO 2811-2

#### Water solubility

47 g/L

@ 20 °C OECD Test No. 105: Water Solubility

#### Solubility(ies)

No information available

#### Partition coefficient

1.1

log POW (@25°C) OECD Test No. 117: Partition

#### Autoignition temperature

320 °C / 608 °F

Coefficient (n-octanol/water), HPLC Method  
ASTM E 659-78

**Decomposition temperature****Kinematic viscosity**

Dynamic viscosity 2.9 mPa s

**Explosive properties**

Not applicable

No information available

@ 20°C, ISO 3219

The product is not explosive. However, formation of explosive air/vapour mixtures are possible.

Not oxidizing.

**Oxidising properties****Density**

No information available

**Bulk density**

No information available

**9.2. Other information**

No information available.

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

The substance is an alcohol. Alcohols exhibit both weak acid and weak base behavior. They may initiate the polymerization of isocyanates and epoxides. The substance forms esters through condensation reactions. The substance may be oxidized to aldehydes and ketones.

**10.2. Chemical stability**

Stable under normal conditions.

**10.3. Possibility of hazardous reactions**

Reacts with: Oxidising substances, Strong acids. Reacts with ethylene carbonate to form butyl cellosolve (n-butoxyethanol) (highly toxic). Reacts with nitrous acid to form butyl nitrite (toxic). Reacts with ammonia to produce toxic butylamine.

**10.4. Conditions to avoid**

Keep away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity).

**10.5. Incompatible materials**

Strong oxidising agents. Attacks plastic and rubber.

**10.6. Hazardous decomposition products**

Thermal decomposition can lead to release of irritating and toxic gases and vapours. Carbon monoxide (CO). Carbon dioxide (CO<sub>2</sub>)

**SECTION 11: Toxicological information****11.1. Information on toxicological effects****Information on likely routes of exposure**

Inhalation. Dermal.

**Symptoms related to the physical, chemical and toxicological characteristics**

See Section 4 for more information.

**Numerical measures of toxicity****Acute toxicity**

Harmful if swallowed.

<b>Butan-1-ol (71-36-3)</b>				
Method	Species	Exposure route	Effective dose	Remarks
OECD Test No. 401: Acute Oral Toxicity	Rat	Oral	2290	mg/kg LD50 (lethal dose)
OECD Test No. 402: Acute Dermal Toxicity	Rabbit	Dermal	3430	mg/kg LD50 (lethal dose)
OECD Test No. 403: Acute Inhalation Toxicity	Rat	Inhalation	>17.76	mg/l LC0
Unknown	Hamster	Oral	1200	mg/kg LD50 (lethal dose)

**Skin corrosion/irritation**

Irritating to skin.

Butan-1-ol (71-36-3)			
Method	Species	Exposure route	Results
	Rabbit	Dermal	Irritating to skin

**Serious eye damage/eye irritation**

Irritating to eyes. Risk of serious damage to eyes.

Butan-1-ol (71-36-3)			
Method	Species	Exposure route	Results
OECD Test No. 405: Acute Eye Irritation/Corrosion	Rabbit	Eye	Irritating to eyes Causes serious eye damage

**Respiratory or skin sensitisation**

Not a skin sensitiser.

Butan-1-ol (71-36-3)			
Method	Species	Exposure route	Results
OECD Test No. 406: Skin Sensitisation		Skin	Not a skin sensitiser

**Germ cell mutagenicity**

Not mutagenic.

Butan-1-ol (71-36-3)			
Method	Species	Exposure route	Results
In vitro Mammalian Chromosome Aberration Test	in vitro		Negative
OECD Test No. 476: In vitro Mammalian Cell Gene Mutation Test	in vitro		Negative
OECD Test No. 474: Mammalian Erythrocyte Micronucleus Test	in vivo		Negative
Ames test	in vitro		Negative

**Carcinogenicity**

Since all in vitro mutagenicity studies are negative, there is no hint for any carcinogenic potential.

**Reproductive toxicity**

The material has been tested in rats and found to cause no significant reproductive effects.

Butan-1-ol (71-36-3)				
Method	Species	Exposure route	Effective dose	Remarks
OECD Test No. 416: Two-Generation Reproduction Toxicity	Rat	Inhalation	750	ppm NOAEC (F1, F2) Developmental effects read-across from supporting substance (structural analogue)
OECD Test No. 416: Two-Generation Reproduction Toxicity	Rat	Inhalation	2000	ppm NOAEC (F0, F1) Effects on fertility read-across from supporting substance (structural analogue)
Ministry of Health and Welfare, Japan; Guidelines for Toxicity Studies of Drugs	Rat	Oral	1454	mg/kg bw/day NOAEL Developmental effects
	Rat	Inhalation	10.8	mg/l NOAEL Developmental effects

**STOT - single exposure**

Irritating to respiratory system

Butan-1-ol (71-36-3)				
Method	Species	Exposure route	Effective dose	Remarks
human data	human data	Inhalation		Irritating to respiratory system
	Rat	Inhalation		Irritating to respiratory

				system
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**STOT - repeated exposure**

<b>Butan-1-ol (71-36-3)</b>				
Method	Species	Exposure route	Effective dose	Remarks
(US EPA 90-day)	Rat	Oral	125	mg/kg bw/day NOAEL
EPA OTS 798.2450 (90-day)	Rat	Inhalation	2.35	mg/l NOAEL read-across from supporting substance (structural analogue)

**Aspiration hazard**

No hazard identified.

**SECTION 12: Ecological information****12.1. Toxicity**

Low toxicity to aquatic organisms.

<b>Butan-1-ol (71-36-3)</b>					
Method	Species	Exposure route	Effective dose	Exposure time	Remarks
OECD Test No. 203: Fish, Acute Toxicity Test	Pimephales promelas	Freshwater	1376	96h	mg/l LC50 (lethal concentration)
OECD Test No. 202: Daphnia sp. Acute Immobilization Test	Daphnia magna	Freshwater	1328	48h	mg/l EC50 (effective concentration)
OECD Test No. 201: Freshwater Algae and Cyanobacteria, Growth Inhibition Test	Pseudokirchneriella subcapitata	Freshwater	225	96h	mg/l EC50 (effective concentration)
OECD Test No. 211: Daphnia magna Reproduction Test	Daphnia magna	Freshwater	4.1	21d	mg/l NOEC
DIN 38412, part 8 (Pseudomonas cell multiplication inhibition test)	Bacteria toxicity	Freshwater	4390	17h	mg/l EC50 (effective concentration)

**12.2. Persistence and degradability**

Readily biodegradable

<b>Butan-1-ol (71-36-3)</b>			
Method	Value	Exposure time	Results
	46 - 53 h		DT50 Abiotic Degradation photolysis
	92%	20d	Readily biodegradable

**12.3. Bioaccumulative potential**

No bioaccumulation potential

Chemical Name	Partition coefficient	Bioconcentration factor (BCF)
Butan-1-ol	0.81	

**12.4. Mobility in soil**

The product does not adsorb to suspended solids and sediment based upon the log Koc which indicates a high mobility in soil.

Chemical Name	Log Koc
Butan-1-ol	0.388

**12.5. Results of PBT and vPvB assessment**

This substance does not meet the criteria for classification as PBT or vPvB.

**12.6. Other adverse effects**

No information available.



## SECTION 13: Disposal considerations

### 13.1. Waste treatment methods

#### Waste from residues/unused products

The product is classified as hazardous waste and must be disposed of as such. Incinerate at a licensed installation.

#### Contaminated packaging

Contaminated packaging materials must be disposed of in the same manner as the product. Thoroughly emptied and clean packaging may be recycled.

#### Waste codes / waste designations according to EWC / AVV

Waste from residues/unused products: 16 03 05\*.

#### Other Information

Waste codes should be assigned by the user based on the application for which the product was used.

## SECTION 14: Transport information



### ADR Road transport

14.1 UN number	UN1120
14.2 UN proper shipping name	Butanols
Proper Shipping Description	UN1120, Butanols, 3, III, (D/E)
14.3 Transport hazard class(es)	3
Subsidiary hazard class	3
14.4 Packing Group	III
14.5 Environmental hazard	Not applicable
14.6 Special precautions for user	None
Tunnel restriction code	(D/E)
Limited quantity (LQ)	5 L
ADR Hazard Id (Kemmler Number)	30

### RID Rail transport

14.1 UN number	UN1120
14.2 UN proper shipping name	Butanols
Proper Shipping Description	UN1120, Butanols, 3, III
14.3 Transport hazard class(es)	3
14.4 Packing Group	III
14.5 Environmental hazard	Not applicable
14.6 Special precautions for user	None

### IMDG Sea transport

14.1 UN number	UN1120
14.2 UN proper shipping name	Butanols
Proper Shipping Description	UN1120, Butanols, 3, III, (36°C c.c.)
14.3 Transport hazard class(es)	3
14.4 Packing Group	III
14.5 Environmental hazards	Not applicable
14.6 Special precautions for user	223
EmS-No	F-E, S-D
Limited quantity (LQ)	5 L
14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	No information available

### IATA Air transport

14.1 UN number	UN1120
14.2 UN proper shipping name	Butanols

<b>14.3 Transport hazard class(es)</b>	3
<b>14.4 Packing Group</b>	III
<b>Proper Shipping Description</b>	UN1120, Butanols, 3, III
<b>14.5 Environmental hazard</b>	Not applicable
<b>14.6 Special precautions for user</b>	A3
<b>Limited quantity (LQ)</b>	10 L
<b>ERG Code</b>	3L

## SECTION 15: Regulatory information

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

#### International Regulations

Not applicable.

#### European Union

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

Take note of Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work

Commission Regulation No 10/2011 relating to plastic materials and articles intended to come into contact with food.

Commission Decision 96/335/EC establishing an inventory and a common nomenclature of ingredients employed in cosmetic products (INCI)

#### France

Chemical Name	French RG number
Butan-1-ol 71-36-3	RG 84

### 15.2. Chemical safety assessment

A Chemical Safety Assessment has been carried out for this substance.

## SECTION 16: Other information

### Key or legend to abbreviations and acronyms used in the safety data sheet

#### Full text of R-phrases referred to under sections 2 and 3

R10 - Flammable

R22 - Harmful if swallowed

R41 - Risk of serious damage to eyes

R67 - Vapours may cause drowsiness and dizziness

R37/38 - Irritating to respiratory system and skin

#### Full text of H-Statements referred to under section 3

H302 - Harmful if swallowed

H315 - Causes skin irritation

H318 - Causes serious eye damage

H335 - May cause respiratory irritation

H336 - May cause drowsiness or dizziness

H226 - Flammable liquid and vapour

**Issue Date** 12-Jun-2015

**Revision Date** 04-Jun-2015

**Revision Note** Not applicable.

**This safety data sheet complies with the requirements of:** Regulation (EC) No. 1907/2006, COMMISSION REGULATION (EU) No. 453/2010 of 20 May 2010.

#### Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

**End of Safety Data Sheet**

## Annex to the Safety Data Sheet according to Regulation (EC) No 1907/2006 [REACH]

*Product Name* n-Butanol  
*Chemical Name* Butan-1-ol  
*CAS No* 71-36-3  
*EC No* 200-751-6  
*REACH registration number* 01-2119484630-38-0008  
*Pure substance/mixture* Substance

### Exposure scenario

#### Section 1 - Title

**Title** ES1 - Manufacture of substances. Industrial.  
**Version** 1  
**Product Name** n-Butanol  
**Revision Date** 12-Jun-2015  
**Sector(s) of use** SU8 - Manufacture of bulk, large scale chemicals (including petroleum products)  
 SU9 - Manufacture of fine chemicals

### Section 2 - Operational conditions and risk management measures

#### Section 2.1 - Control of environmental exposure

**Environmental release category(ies)** ERC1 - Manufacture of substances  
 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)

**Remarks**  
 Not relevant since not classified as dangerous for the environment.

#### Section 2.2 - Control of worker exposure

##### Control of worker exposure

Title	Contributing Scenario [CS] 1
Process category(ies)	PROC1 - Use in closed process, no likelihood of exposure
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCS followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 2

Process category(ies)	PROC2 - Use in closed, continuous process with occasional controlled exposure
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 3
Process category(ies)	PROC3 - Use in closed batch process (synthesis or formulation)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 4
Process category(ies)	PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 5
Process category(ies)	PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures	Minimisation of manual phases/work tasks

to control dispersion from source towards the worker	Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 6
Process category(ies)	PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 97%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 7
Process category(ies)	PROC15 - Use as laboratory reagent
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

## Section 3 - Exposure estimation

### Environmental exposure

### Environmental release category(ies)

ERC1 - Manufacture of substances  
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)

### Remarks

Not relevant since not classified as dangerous for the environment.

**worker****Control of worker exposure****Calculation method**

Risk management measures are based on qualitative risk characterization  
Used ECETOC TRA model

Title	Exposure route	Calculation method	predicted exposure level	Risk characterisation ratio (RCR)
Contributing Scenario [CS] 1	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	0.03 mg/m <sup>3</sup>	0.0001
Contributing Scenario [CS] 2	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	30.88 mg/m <sup>3</sup>	0.0996
Contributing Scenario [CS] 3	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	77.19 mg/m <sup>3</sup>	0.249
Contributing Scenario [CS] 4	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	61.75 mg/m <sup>3</sup>	0.1992
Contributing Scenario [CS] 5	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0498
Contributing Scenario [CS] 6	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	4.63 mg/m <sup>3</sup>	0.0149
Contributing Scenario [CS] 7	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	30.88 mg/m <sup>3</sup>	0.0996

## Section 4 - Guidance to check compliance with the exposure scenario

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

## Annex to the Safety Data Sheet according to Regulation (EC) No 1907/2006 [REACH]

Product Name	n-Butanol
Chemical Name	Butan-1-ol
CAS No	71-36-3
EC No	200-751-6
REACH registration number	01-2119484630-38-0008
Pure substance/mixture	Substance

### Exposure scenario

#### Section 1 - Title

Title	ES2 - Use as an intermediate. Industrial.
Version	1
Product Name	n-Butanol
Revision Date	12-Jun-2015
Sector(s) of use	SU8 - Manufacture of bulk, large scale chemicals (including petroleum products) SU9 - Manufacture of fine chemicals

### Section 2 - Operational conditions and risk management measures

#### Section 2.1 - Control of environmental exposure

Environmental release category(ies)	ERC6a - Industrial use resulting in manufacture of another substance (use of intermediates)
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**Remarks**  
Not relevant since not classified as dangerous for the environment.

#### Section 2.2 - Control of worker exposure

##### Control of worker exposure

Title	Contributing Scenario [CS] 1
Process category(ies)	PROC1 - Use in closed process, no likelihood of exposure
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 2
Process category(ies)	PROC2 - Use in closed, continuous process with occasional controlled exposure
Covers concentrations up to	100%
Physical form of product	Liquid

Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 3
Process category(ies)	PROC3 - Use in closed batch process (synthesis or formulation)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 4
Process category(ies)	PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 5
Process category(ies)	PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 90%



Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 6
Process category(ies)	PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 97%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 7
Process category(ies)	PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

## Section 3 - Exposure estimation

### Environmental exposure

#### Environmental release category(ies)

ERC6a - Industrial use resulting in manufacture of another substance (use of intermediates)

#### Remarks

Not relevant since not classified as dangerous for the environment.

#### worker

**Control of worker exposure****Calculation method**

Risk management measures are based on qualitative risk characterization  
Used ECETOC TRA model

Title	Exposure route	Calculation method	predicted exposure level	Risk characterisation ratio (RCR)
Contributing Scenario [CS] 1	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	0.031 mg/m <sup>3</sup>	0.0001
Contributing Scenario [CS] 2	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	30.88 mg/m <sup>3</sup>	0.0996
Contributing Scenario [CS] 3	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	77.19 mg/m <sup>3</sup>	0.249
Contributing Scenario [CS] 4	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	61.75 mg/m <sup>3</sup>	0.1992
Contributing Scenario [CS] 5	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0498
Contributing Scenario [CS] 6	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	4.63 mg/m <sup>3</sup>	0.0149
Contributing Scenario [CS] 7	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0498

## Section 4 - Guidance to check compliance with the exposure scenario

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

## Annex to the Safety Data Sheet according to Regulation (EC) No 1907/2006 [REACH]

Product Name	n-Butanol
Chemical Name	Butan-1-ol
CAS No	71-36-3
EC No	200-751-6
REACH registration number	01-2119484630-38-0008
Pure substance/mixture	Substance

### Exposure scenario

#### Section 1 - Title

Title	ES3 - Formulation and (re)packing of substances and mixtures. Industrial.
Version	1
Product Name	n-Butanol
Revision Date	12-Jun-2015
Sector(s) of use	SU10 - Formulation [mixing] of preparations and/or re-packaging (excluding alloys)

### Section 2 - Operational conditions and risk management measures

#### Section 2.1 - Control of environmental exposure

Environmental release category(ies) ERC2 - Formulation of preparations (mixtures)

#### Remarks

Not relevant since not classified as dangerous for the environment.

#### Section 2.2 - Control of worker exposure

##### Control of worker exposure

Title	Contributing Scenario [CS] 1
Process category(ies)	PROC1 - Use in closed process, no likelihood of exposure
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent/limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 2
Process category(ies)	PROC2 - Use in closed, continuous process with occasional controlled exposure
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than

	8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 3
Process category(ies)	PROC3 - Use in closed batch process (synthesis or formulation)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 4
Process category(ies)	PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 5
Process category(ies)	PROC5 - Mixing or blending in batch processes for formulation of preparations and articles (multi-stage and/or significant contact)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands

health evaluation	Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 6
Process category(ies)	PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 7
Process category(ies)	PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 97%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 8
Process category(ies)	PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed

exposure	
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 9
Process category(ies)	PROC15 - Use as laboratory reagent
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

## Section 3 - Exposure estimation

### Environmental exposure

#### Environmental release category(ies)

ERC2 - Formulation of preparations (mixtures)

#### Remarks

Not relevant since not classified as dangerous for the environment.

### worker

#### Control of worker exposure

#### Calculation method

Risk management measures are based on qualitative risk characterization  
Used ECETOC TRA model

Title	Exposure route	Calculation method	predicted exposure level	Risk characterisation ratio (RCR)
Contributing Scenario [CS] 1	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	0.03 mg/m <sup>3</sup>	0.0001
Contributing Scenario [CS] 2	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	30.88 mg/m <sup>3</sup>	0.0995
Contributing Scenario [CS] 3	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	77.19 mg/m <sup>3</sup>	0.249
Contributing Scenario [CS] 4	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	61.75 mg/m <sup>3</sup>	0.1992
Contributing Scenario [CS] 5	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0497
Contributing Scenario [CS] 6	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0497
Contributing Scenario [CS] 7	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	4.63 mg/m <sup>3</sup>	0.0149
Contributing Scenario [CS] 8	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0497

	systemic			
Contributing Scenario [CS] 9	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	30.88 mg/m <sup>3</sup>	0.0995

**Section 4 - Guidance to check compliance with the exposure scenario**

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

## Annex to the Safety Data Sheet according to Regulation (EC) No 1907/2006 [REACH]

Product Name	n-Butanol
Chemical Name	Butan-1-ol
CAS No	71-36-3
EC No	200-751-6
REACH registration number	01-2119484630-38-0008
Pure substance/mixture	Substance

### Exposure scenario

#### Section 1 - Title

Title	ES4 - Distribution of substance. Industrial.
Version	1
Product Name	n-Butanol
Revision Date	12-Jun-2015
Sector(s) of use	SU8 - Manufacture of bulk, large scale chemicals (including petroleum products) SU9 - Manufacture of fine chemicals

### Section 2 - Operational conditions and risk management measures

#### Section 2.1 - Control of environmental exposure

Environmental release category(ies)	ERC1 - Manufacture of substances ERC2 - Formulation of preparations (mixtures)
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**Remarks**  
 Not relevant since not classified as dangerous for the environment.

#### Section 2.2 - Control of worker exposure

##### Control of worker exposure

Title	Contributing Scenario [CS] 1
Process category(ies)	PROC1 - Use in closed process, no likelihood of exposure
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 2
Process category(ies)	PROC2 - Use in closed, continuous process with occasional controlled exposure
Covers concentrations up to	100%
Physical form of product	Liquid



Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 3
Process category(ies)	PROC3 - Use in closed batch process (synthesis or formulation)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 4
Process category(ies)	PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 5
Process category(ies)	PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 90%

Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 6
Process category(ies)	PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 97%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 7
Process category(ies)	PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 8
Process category(ies)	PROC15 - Use as laboratory reagent
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and	Supervision in place to check that the RMMs in place are being used correctly and OCs followed

exposure	
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

### Section 3 - Exposure estimation

#### Environmental exposure

#### Environmental release category(ies)

ERC1 - Manufacture of substances  
ERC2 - Formulation of preparations (mixtures)

#### Remarks

Not relevant since not classified as dangerous for the environment.

#### worker

#### Control of worker exposure

#### Calculation method

Risk management measures are based on qualitative risk characterization  
Used ECETOC TRA model

Title	Exposure route	Calculation method	predicted exposure level	Risk characterisation ratio (RCR)
Contributing Scenario [CS] 1	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	0.03 mg/m <sup>3</sup>	0.0001
Contributing Scenario [CS] 2	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	30.88 mg/m <sup>3</sup>	0.0996
Contributing Scenario [CS] 3	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	77.19 mg/m <sup>3</sup>	0.249
Contributing Scenario [CS] 4	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	61.75 mg/m <sup>3</sup>	0.1992
Contributing Scenario [CS] 5	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0498
Contributing Scenario [CS] 6	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	4.63 mg/m <sup>3</sup>	0.0149
Contributing Scenario [CS] 7	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0498
Contributing Scenario [CS] 8	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	30.88 mg/m <sup>3</sup>	0.0996

### Section 4 - Guidance to check compliance with the exposure scenario

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

## Annex to the Safety Data Sheet according to Regulation (EC) No 1907/2006 [REACH]

*Product Name* n-Butanol  
*Chemical Name* Butan-1-ol  
*CAS No* 71-36-3  
*EC No* 200-751-6  
*REACH registration number* 01-2119484630-38-0008  
*Pure substance/mixture* Substance

### Exposure scenario

#### Section 1 - Title

**Title** ES4 - Distribution of substance. Professional.  
**Version** 1  
**Product Name** n-Butanol  
**Revision Date** 12-Jun-2015  
**Sector(s) of use** SU22 - Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

### Section 2 - Operational conditions and risk management measures

#### Section 2.1 - Control of environmental exposure

**Environmental release category(ies)** ERC1 - Manufacture of substances  
 ERC2 - Formulation of preparations (mixtures)

**Remarks**  
 Not relevant since not classified as dangerous for the environment.

#### Section 2.2 - Control of worker exposure

##### Control of worker exposure

Title	Contributing Scenario [CS] 1
Process category(ies)	PROC1 - Use in closed process, no likelihood of exposure
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 2
Process category(ies)	PROC2 - Use in closed, continuous process with occasional controlled exposure
Covers concentrations up to	100%
Physical form of product	Liquid

Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 3
Process category(ies)	PROC3 - Use in closed batch process (synthesis or formulation)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 4
Process category(ies)	PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 5
Process category(ies)	PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to	Assumes a good basic standard of occupational hygiene is implemented

personal protection, hygiene and health evaluation	Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 6
Process category(ies)	PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 7
Process category(ies)	PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 8
Process category(ies)	PROC15 - Use as laboratory reagent
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

**Section 3 - Exposure estimation**

**Environmental exposure**

**Environmental release category(ies)** ERC1 - Manufacture of substances  
ERC2 - Formulation of preparations (mixtures)

**Remarks**  
Not relevant since not classified as dangerous for the environment.

**worker**  
**Control of worker exposure**

**Calculation method** Risk management measures are based on qualitative risk characterization  
Used ECETOC TRA model

Title	Exposure route	Calculation method	predicted exposure level	Risk characterisation ratio (RCR)
Contributing Scenario [CS] 1	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	0.03 mg/m <sup>3</sup>	0.0001
Contributing Scenario [CS] 2	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	30.88 mg/m <sup>3</sup>	0.1992
Contributing Scenario [CS] 3	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	77.19 mg/m <sup>3</sup>	0.249
Contributing Scenario [CS] 4	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	61.75 mg/m <sup>3</sup>	0.4980
Contributing Scenario [CS] 5	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.5976
Contributing Scenario [CS] 6	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	4.63 mg/m <sup>3</sup>	0.2988
Contributing Scenario [CS] 7	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.5976
Contributing Scenario [CS] 8	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	30.88 mg/m <sup>3</sup>	0.0996

**Section 4 - Guidance to check compliance with the exposure scenario**

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

## Annex to the Safety Data Sheet according to Regulation (EC) No 1907/2006 [REACH]

Product Name	n-Butanol
Chemical Name	Butan-1-ol
CAS No	71-36-3
EC No	200-751-6
REACH registration number	01-2119484630-38-0008
Pure substance/mixture	Substance

### Exposure scenario

#### Section 1 - Title

Title	ES5 - Use in coatings. Use in paints, in inks, in toners and Adhesives. Consumer use.
Version	1
Product Name	n-Butanol
Revision Date	12-Jun-2015
Sector(s) of use	SU21 - Consumer uses: Private households (= general public = consumers)

### Section 2 - Operational conditions and risk management measures

#### Section 2.1 - Control of environmental exposure

Environmental release category(ies)	ERC8a - Wide dispersive indoor use of processing aids in open systems ERC8c - Wide dispersive indoor use resulting in inclusion into or onto a matrix ERC8d - Wide dispersive outdoor use of processing aids in open systems ERC8f - Wide dispersive outdoor use resulting in inclusion into or onto a matrix
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#### Remarks

Not relevant since not classified as dangerous for the environment.

#### Section 2.2 - Control of consumer exposure

Control of consumer exposure	
Title	Contributing Scenario [CS] 1
Product (sub) category(ies)	PC1 - Adhesives, sealants Glues, hobby use
Covers concentrations up to	30%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <9g
Exposure duration	Avoid carrying out operation for more than 4h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing



Use in room with a volume of minimum	20m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 2
Product (sub) category(ies)	PC1 - Adhesives, sealants Glues DIY-use (carpet glue, tile glue, wood parquet glue)
Covers concentrations up to	0.2%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <6390g
Exposure duration	Avoid carrying out operation for more than 6h
Use frequency	Covers use up to 1 events per day
Risk management measures	No specific risk management measure identified beyond those operational conditions stated
Use in room with a volume of minimum	20m <sup>3</sup>
Operational conditions	Use in well ventilated areas Covers use at ambient temperatures

Title	Contributing Scenario [CS] 3
Product (sub) category(ies)	PC1 - Adhesives, sealants Glues DIY-use (carpet glue, tile glue, wood parquet glue)
Covers concentrations up to	2%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <9000g
Exposure duration	Avoid carrying out operation for more than 1.25h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid direct eye contact with product, also via contamination on hands IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	53m <sup>3</sup>
Operational conditions	Use in well ventilated areas Covers use at ambient temperatures

Title	Contributing Scenario [CS] 4
Product (sub) category(ies)	PC1 - Adhesives, sealants Glue from spray
Covers concentrations up to	30%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <9000g
Exposure duration	Avoid carrying out operation for more than 4h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

Use in room with a volume of minimum	20m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 5
Product (sub) category(ies)	PC1 - Adhesives, sealants Sealant
Covers concentrations up to	12%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <390g
Exposure duration	Avoid carrying out operation for more than 4h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	20m <sup>3</sup>
Operational conditions	Use in well ventilated areas Covers use at ambient temperatures

Title	Contributing Scenario [CS] 6
Product (sub) category(ies)	PC4 - Anti-freeze and de-icing products Washing car window
Covers concentrations up to	1%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <0.5g
Exposure duration	Avoid carrying out operation for more than 0.02h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid direct eye contact with product, also via contamination on hands IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	34m <sup>3</sup>
Operational conditions	Covers use at ambient temperatures Covers use in a one car garage (>34 m3) under typical ventilation

Title	Contributing Scenario [CS] 7
Product (sub) category(ies)	PC4 - Anti-freeze and de-icing products Pouring into radiator
Covers concentrations up to	10%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <2000g
Exposure duration	Avoid carrying out operation for more than 0.17h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water

	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	58m <sup>3</sup>
Operational conditions	Open windows during application to ensure natural ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 8
Product (sub) category(ies)	PC4 - Anti-freeze and de-icing products Lock de-icer
Covers concentrations up to	50%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <4g
Exposure duration	Avoid carrying out operation for more than 0.25h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	34m <sup>3</sup>
Operational conditions	Covers use in a one car garage (>34 m3) under typical ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 9
Product (sub) category(ies)	PC9a - Coatings and paints, thinners, paint removers Waterborne latex wall paint
Covers concentrations up to	2%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <3750g
Exposure duration	Avoid carrying out operation for more than 2.20h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid direct eye contact with product, also via contamination on hands IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	20m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 10
Product (sub) category(ies)	PC9a - Coatings and paints, thinners, paint removers Solvent rich, high solid, water borne paint
Covers concentrations up to	5%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <1300g
Exposure duration	Avoid carrying out operation for more than 2.20h
Use frequency	Covers use up to 1 events per day

Risk management measures	Avoid direct eye contact with product, also via contamination on hands IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	20m <sup>3</sup>
Operational conditions	Use in well ventilated areas Covers use at ambient temperatures

Title	Contributing Scenario [CS] 11
Product (sub) category(ies)	PC9a - Coatings and paints, thinners, paint removers Aerosol spray can
Covers concentrations up to	25%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <9000g
Exposure duration	Avoid carrying out operation for more than 0.33h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	20m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 12
Product (sub) category(ies)	PC9a - Coatings and paints, thinners, paint removers Removers (paint-, glue-, wall paper-, sealant-remover)
Covers concentrations up to	4%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <2000g
Exposure duration	Avoid carrying out operation for more than 4h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid direct eye contact with product, also via contamination on hands IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	30m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 13
Product (sub) category(ies)	PC9c - Finger paints
Covers concentrations up to	2%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	For each use event, assumes swallowed amount of 1.35g
Exposure duration	Avoid carrying out operation for more than 6h
Use frequency	Covers use up to 1 events per day

Risk management measures	Avoid direct eye contact with product, also via contamination on hands IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	58m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 14
Product (sub) category(ies)	PC15 - Non-metal-surface treatment products Waterborne latex wall paint
Covers concentrations up to	2%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <3750g
Exposure duration	Avoid carrying out operation for more than 2.20h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid direct eye contact with product, also via contamination on hands IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	20m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 15
Product (sub) category(ies)	PC15 - Non-metal-surface treatment products Solvent rich, high solid, water borne paint
Covers concentrations up to	5%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <1300g
Exposure duration	Avoid carrying out operation for more than 2.20h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid direct eye contact with product, also via contamination on hands IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	20m <sup>3</sup>
Operational conditions	Use in well ventilated areas Covers use at ambient temperatures

Title	Contributing Scenario [CS] 16
Product (sub) category(ies)	PC15 - Non-metal-surface treatment products Aerosol spray can
Covers concentrations up to	25%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <9000g
Exposure duration	Avoid carrying out operation for more than 0.33h
Use frequency	Covers use up to 1 events per day

Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	20m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 17
Product (sub) category(ies)	PC15 - Non-metal-surface treatment products Removers (paint-, glue-, wall paper-, sealant-remover)
Covers concentrations up to	4%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <2000g
Exposure duration	Avoid carrying out operation for more than 4h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid direct eye contact with product, also via contamination on hands IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	30m <sup>3</sup>
Operational conditions	Use in well ventilated areas Covers use at ambient temperatures

Title	Contributing Scenario [CS] 18
Product (sub) category(ies)	PC18 - Ink and toners
Covers concentrations up to	4%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <40g
Exposure duration	Avoid carrying out operation for more than 2.20h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid direct eye contact with product, also via contamination on hands IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	20m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 19
Product (sub) category(ies)	PC23 - Leather tanning, dye, finishing, impregnation and care products Polishes, wax / cream (floor, furniture, shoes)
Covers concentrations up to	50%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <56g
Exposure duration	Avoid carrying out operation for more than 4h
Use frequency	Covers use up to 1 events per day

Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	58m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 20
Product (sub) category(ies)	PC23 - Leather tanning, dye, finishing, impregnation and care products Polishes, spray (furniture, shoes)
Covers concentrations up to	50%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <56g
Exposure duration	Avoid carrying out operation for more than 4h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	58m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 21
Product (sub) category(ies)	PC31 - Polishes and wax blends Polishes, wax / cream (floor, furniture, shoes)
Covers concentrations up to	20%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <550g
Exposure duration	Avoid carrying out operation for more than 4h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	58m <sup>3</sup>
Operational conditions	Open windows during application to ensure natural ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 22
Product (sub) category(ies)	PC31 - Polishes and wax blends Polishes, spray (furniture, shoes)
Covers concentrations up to	50%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <9000g
Exposure duration	Avoid carrying out operation for more than 4h

Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	58m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation Covers use at ambient temperatures
Title	Contributing Scenario [CS] 23
Product (sub) category(ies)	PC24 - Lubricants, greases, release products
Remarks	Use in closed process, no likelihood of exposure (closed systems)

### Section 3 - Exposure estimation

**Environmental exposure**

**Environmental release category(ies)**

- ERC8a - Wide dispersive indoor use of processing aids in open systems
- ERC8c - Wide dispersive indoor use resulting in inclusion into or onto a matrix
- ERC8d - Wide dispersive outdoor use of processing aids in open systems
- ERC8f - Wide dispersive outdoor use resulting in inclusion into or onto a matrix

**Remarks**

Not relevant since not classified as dangerous for the environment.

**Control of consumer exposure**

**Calculation method**

The Consexpo model has been used to estimate consumer exposures unless otherwise indicated

**Exposure estimation**

Title	Exposure route	Calculation method	predicted exposure level	Risk characterisation ratio (RCR)
Contributing Scenario [CS] 1	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	51.15 mg/m <sup>3</sup>	0.93
Contributing Scenario [CS] 2	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	42.60 mg/m <sup>3</sup>	0.77
Contributing Scenario [CS] 3	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	48.40 mg/m <sup>3</sup>	0.88
Contributing Scenario [CS] 4	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	0.09 mg/m <sup>3</sup>	0.002



Contributing Scenario [CS] 4	Consumer - oral, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	1.23 mg/kg	0.39
Contributing Scenario [CS] 5	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	48.70 mg/m <sup>3</sup>	0.89
Contributing Scenario [CS] 6	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	0.15 mg/m <sup>3</sup>	0.003
Contributing Scenario [CS] 7	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	0.001 mg/m <sup>3</sup>	0.00002
Contributing Scenario [CS] 8	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	49.05 mg/m <sup>3</sup>	0.89
Contributing Scenario [CS] 9	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	42.90 mg/m <sup>3</sup>	0.78
Contributing Scenario [CS] 10	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	52.50 mg/m <sup>3</sup>	0.95
Contributing Scenario [CS] 11	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	1.30 mg/m <sup>3</sup>	0.02
Contributing Scenario [CS] 11	Consumer - oral, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	0.65 mg/kg	0.21
Contributing Scenario [CS] 12	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	48.30 mg/m <sup>3</sup>	0.88
Contributing Scenario [CS] 13	Consumer - oral, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	1.35 mg/kg	0.43
Contributing Scenario [CS] 14	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	42.90 mg/m <sup>3</sup>	0.78
Contributing Scenario [CS] 15	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	52.50 mg/m <sup>3</sup>	0.95
Contributing Scenario [CS] 16	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer	1.30 mg/m <sup>3</sup>	0.02

		exposures unless otherwise indicated		
Contributing Scenario [CS] 16	Consumer - oral, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	0.65 mg/kg	0.21
Contributing Scenario [CS] 17	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	48.30 mg/m <sup>3</sup>	0.88
Contributing Scenario [CS] 18	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	44.42 mg/m <sup>3</sup>	0.81
Contributing Scenario [CS] 19	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	32.10 mg/m <sup>3</sup>	0.58
Contributing Scenario [CS] 20	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	0.38 mg/m <sup>3</sup>	0.01
Contributing Scenario [CS] 20	Consumer - oral, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	0.52 mg/kg	0.17
Contributing Scenario [CS] 21	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	52.00 mg/m <sup>3</sup>	0.95
Contributing Scenario [CS] 22	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	0.38 mg/m <sup>3</sup>	0.01
Contributing Scenario [CS] 22	Consumer - oral, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	0.52 mg/kg	0.17

## Section 4 - Guidance to check compliance with the exposure scenario

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

## Annex to the Safety Data Sheet according to Regulation (EC) No 1907/2006 [REACH]

Product Name	n-Butanol
Chemical Name	Butan-1-ol
CAS No	71-36-3
EC No	200-751-6
REACH registration number	01-2119484630-38-0008
Pure substance/mixture	Substance

### Exposure scenario

#### Section 1 - Title

Title	ES5 - Use in coatings. Use in paints, in inks, in toners and Adhesives. Industrial.
Version	1
Product Name	n-Butanol
Revision Date	12-Jun-2015
Sector(s) of use	SU3 - Industrial uses: Uses of substances as such or in preparations at industrial sites

### Section 2 - Operational conditions and risk management measures

#### Section 2.1 - Control of environmental exposure

Environmental release category(ies)	ERC4 - Industrial use of processing aids in processes and products, not becoming part of articles
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**Remarks**  
Not relevant since not classified as dangerous for the environment.

#### Section 2.2 - Control of worker exposure

##### Control of worker exposure

Title	Contributing Scenario [CS] 1
Process category(ies)	PROC1 - Use in closed process, no likelihood of exposure
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent/limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 2
Process category(ies)	PROC2 - Use in closed, continuous process with occasional controlled exposure
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa

Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 3
Process category(ies)	PROC3 - Use in closed batch process (synthesis or formulation)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 4
Process category(ies)	PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 5
Process category(ies)	PROC5 - Mixing or blending in batch processes for formulation of preparations and articles (multi-stage and/or significant contact)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to	Assumes a good basic standard of occupational hygiene is implemented

personal protection, hygiene and health evaluation	Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 6
Process category(ies)	PROC7 - Industrial spraying
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Ensure that a spraying booth is used Minimisation of manual phases/work tasks Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m)
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed Regular inspection and maintenance of equipment and machines
Additional good practice advice beyond the REACH Chemical Safety Report	Clean equipment and the work area every day
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 7
Process category(ies)	PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 8
Process category(ies)	PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 97%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands

health evaluation	Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 9
Process category(ies)	PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 10
Process category(ies)	PROC10 - Roller application or brushing
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 11
Process category(ies)	PROC13 - Treatment of articles by dipping and pouring
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 12
Process category(ies)	PROC15 - Use as laboratory reagent
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

## Section 3 - Exposure estimation

### Environmental exposure

#### Environmental release category(ies)

ERC4 - Industrial use of processing aids in processes and products, not becoming part of articles

#### Remarks

Not relevant since not classified as dangerous for the environment.

### worker

#### Control of worker exposure

#### Calculation method

Risk management measures are based on qualitative risk characterization  
Used ECETOC TRA model  
Used Stoffenmanager model

Title	Exposure route	Calculation method	predicted exposure level	Risk characterisation ratio (RCR)
Contributing Scenario [CS] 1	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	0.03 mg/m <sup>3</sup>	0.0001
Contributing Scenario [CS] 2	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	30.88 mg/m <sup>3</sup>	0.0996
Contributing Scenario [CS] 3	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	77.19 mg/m <sup>3</sup>	0.249
Contributing Scenario [CS] 4	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	61.75 mg/m <sup>3</sup>	0.1992
Contributing Scenario [CS] 5	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0498
Contributing Scenario [CS] 6	Worker - inhalative, long-term - local and systemic	Used Stoffenmanager model	0 mg/m <sup>3</sup>	0
Contributing Scenario [CS] 7	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0498
Contributing Scenario [CS] 8	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	4.63 mg/m <sup>3</sup>	0.0149

	systemic			
Contributing Scenario [CS] 9	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0498
Contributing Scenario [CS] 10	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0498
Contributing Scenario [CS] 11	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0498
Contributing Scenario [CS] 12	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	30.88 mg/m <sup>3</sup>	0.0996

#### Section 4 - Guidance to check compliance with the exposure scenario

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.



## Annex to the Safety Data Sheet according to Regulation (EC) No 1907/2006 [REACH]

Product Name	n-Butanol
Chemical Name	Butan-1-ol
CAS No	71-36-3
EC No	200-751-6
REACH registration number	01-2119484630-38-0008
Pure substance/mixture	Substance

### Exposure scenario

#### Section 1 - Title

Title	ES5 - Use in coatings. Use in paints, in inks, in toners and Adhesives. Professional.
Version	1
Product Name	n-Butanol
Revision Date	12-Jun-2015
Sector(s) of use	SU22 - Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

### Section 2 - Operational conditions and risk management measures

#### Section 2.1 - Control of environmental exposure

Environmental release category(ies)	ERC8a - Wide dispersive indoor use of processing aids in open systems ERC8c - Wide dispersive indoor use resulting in inclusion into or onto a matrix ERC8d - Wide dispersive outdoor use of processing aids in open systems ERC8f - Wide dispersive outdoor use resulting in inclusion into or onto a matrix
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#### Remarks

Not relevant since not classified as dangerous for the environment.

#### Section 2.2 - Control of worker exposure

##### Control of worker exposure

Title	Contributing Scenario [CS] 1
Process category(ies)	PROC1 - Use in closed process, no likelihood of exposure
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent/limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 2
Process category(ies)	PROC2 - Use in closed, continuous process with occasional controlled exposure
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 3
Process category(ies)	PROC3 - Use in closed batch process (synthesis or formulation)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 4
Process category(ies)	PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 5
Process category(ies)	PROC5 - Mixing or blending in batch processes for formulation of preparations and articles (multi-stage and/or significant contact)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa

Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 6
Process category(ies)	PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 7
Process category(ies)	PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 8
Process category(ies)	PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to	Assumes a good basic standard of occupational hygiene is implemented

personal protection, hygiene and health evaluation	Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 9
Process category(ies)	PROC10 - Roller application or brushing
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 10
Process category(ies)	PROC11 - Non industrial spraying
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Ensure that a spraying booth is used Minimisation of manual phases/work tasks Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m)
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed Regular inspection and maintenance of equipment and machines
Additional good practice advice beyond the REACH Chemical Safety Report	Clean equipment and the work area every day
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 11
Process category(ies)	PROC11 - Non industrial spraying
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 6h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 47%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and	Supervision in place to check that the RMMs in place are being used correctly and OCs followed

exposure	Regular inspection and maintenance of equipment and machines
Additional good practice advice beyond the REACH Chemical Safety Report	Clean equipment and the work area every day
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 12
Process category(ies)	PROC11 - Non industrial spraying
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 47%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Respiratory protection Efficiency of at least 80% Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed Regular inspection and maintenance of equipment and machines
Additional good practice advice beyond the REACH Chemical Safety Report	Clean equipment and the work area every day
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 13
Process category(ies)	PROC13 - Treatment of articles by dipping and pouring
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 14
Process category(ies)	PROC15 - Use as laboratory reagent
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent	Supervision in place to check that the RMMs in place are being used correctly and OCs

/limit releases, dispersion and exposure	followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 15
Process category(ies)	PROC19 - Hand-mixing with intimate contact and only PPE available
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

### Section 3 - Exposure estimation

**Environmental exposure**

**Environmental release category(ies)**

ERC8a - Wide dispersive indoor use of processing aids in open systems  
 ERC8c - Wide dispersive indoor use resulting in inclusion into or onto a matrix  
 ERC8d - Wide dispersive outdoor use of processing aids in open systems  
 ERC8f - Wide dispersive outdoor use resulting in inclusion into or onto a matrix

**Remarks**

Not relevant since not classified as dangerous for the environment.

**worker**

**Control of worker exposure**

**Calculation method**

Risk management measures are based on qualitative risk characterization  
 Used ECETOC TRA model  
 Used Stoffenmanager model

Title	Exposure route	Calculation method	predicted exposure level	Risk characterisation ratio (RCR)
Contributing Scenario [CS] 1	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	0.03 mg/m <sup>3</sup>	0.0001
Contributing Scenario [CS] 2	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	61.75 mg/m <sup>3</sup>	0.1992
Contributing Scenario [CS] 3	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	77.19 mg/m <sup>3</sup>	0.249
Contributing Scenario [CS] 4	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	154.38 mg/m <sup>3</sup>	0.498
Contributing Scenario [CS] 5	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	185.25 mg/m <sup>3</sup>	0.5976

	systemic			
Contributing Scenario [CS] 6	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	185.25 mg/m <sup>3</sup>	0.5976
Contributing Scenario [CS] 7	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	92.63 mg/m <sup>3</sup>	0.2988
Contributing Scenario [CS] 8	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	185.25 mg/m <sup>3</sup>	0.5976
Contributing Scenario [CS] 9	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	185.25 mg/m <sup>3</sup>	0.5976
Contributing Scenario [CS] 10	Worker - inhalative, long-term - local and systemic	Used Stoffenmanager model	0 mg/m <sup>3</sup>	0
Contributing Scenario [CS] 11	Worker - inhalative, long-term - local and systemic	Used Stoffenmanager model	300 mg/m <sup>3</sup>	0.9677
Contributing Scenario [CS] 12	Worker - inhalative, long-term - local and systemic	Used Stoffenmanager model	187.5 mg/m <sup>3</sup>	0.6048
Contributing Scenario [CS] 13	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	185.25 mg/m <sup>3</sup>	0.5976
Contributing Scenario [CS] 14	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	30.88 mg/m <sup>3</sup>	0.0996
Contributing Scenario [CS] 15	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	185.25 mg/m <sup>3</sup>	0.5976

## Section 4 - Guidance to check compliance with the exposure scenario

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

## Annex to the Safety Data Sheet according to Regulation (EC) No 1907/2006 [REACH]

Product Name	n-Butanol
Chemical Name	Butan-1-ol
CAS No	71-36-3
EC No	200-751-6
REACH registration number	01-2119484630-38-0008
Pure substance/mixture	Substance

### Exposure scenario

#### Section 1 - Title

Title	ES6 - Use: Cleaning agent. Consumer use.
Version	1
Product Name	n-Butanol
Revision Date	12-Jun-2015
Sector(s) of use	SU21 - Consumer uses: Private households (= general public = consumers)

### Section 2 - Operational conditions and risk management measures

#### Section 2.1 - Control of environmental exposure

Environmental release category(ies)	ERC8a - Wide dispersive indoor use of processing aids in open systems ERC8d - Wide dispersive outdoor use of processing aids in open systems
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**Remarks**  
 Not relevant since not classified as dangerous for the environment.

#### Section 2.2 - Control of consumer exposure

Control of consumer exposure	
Title	Contributing Scenario [CS] 1
Product (sub) category(ies)	PC4 - Anti-freeze and de-icing products Washing car window
Covers concentrations up to	1%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <0.5g
Exposure duration	Avoid carrying out operation for more than 0.02h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid direct eye contact with product, also via contamination on hands IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	34m <sup>3</sup>
Operational conditions	Covers use at ambient temperatures Covers use in a one car garage (>34 m3) under typical ventilation



Title	Contributing Scenario [CS] 2
Product (sub) category(ies)	PC4 - Anti-freeze and de-icing products Pouring into radiator
Covers concentrations up to	10%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <2000g
Exposure duration	Avoid carrying out operation for more than 0.17h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	58m <sup>3</sup>
Operational conditions	Open windows during application to ensure natural ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 3
Product (sub) category(ies)	PC4 - Anti-freeze and de-icing products Lock de-icer
Covers concentrations up to	50%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <4g
Exposure duration	Avoid carrying out operation for more than 0.25h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	34m <sup>3</sup>
Operational conditions	Covers use in a one car garage (>34 m3) under typical ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 4
Product (sub) category(ies)	PC9a - Coatings and paints, thinners, paint removers Waterborne latex wall paint
Covers concentrations up to	2%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <3750g
Exposure duration	Avoid carrying out operation for more than
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid direct eye contact with product, also via contamination on hands IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	20m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 5
Product (sub) category(ies)	PC9a - Coatings and paints, thinners, paint removers Solvent rich, high solid, water borne paint
Covers concentrations up to	5%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <1300g
Exposure duration	Avoid carrying out operation for more than 2.20h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid direct eye contact with product, also via contamination on hands IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	20m <sup>3</sup>
Operational conditions	Use in well ventilated areas Covers use at ambient temperatures

Title	Contributing Scenario [CS] 6
Product (sub) category(ies)	PC9a - Coatings and paints, thinners, paint removers Aerosol spray can
Covers concentrations up to	25%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <3750g
Exposure duration	Avoid carrying out operation for more than 0.33h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	20m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 7
Product (sub) category(ies)	PC9a - Coatings and paints, thinners, paint removers Removers (paint-, glue-, wall paper-, sealant-remover)
Covers concentrations up to	4%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <2000g
Exposure duration	Avoid carrying out operation for more than 4h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid direct eye contact with product, also via contamination on hands IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	30m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation

	Covers use at ambient temperatures
Title	Contributing Scenario [CS] 8
Product (sub) category(ies)	PC9c - Finger paints
Covers concentrations up to	1%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	For each use event, assumes swallowed amount of 1.35g
Exposure duration	Avoid carrying out operation for more than 4h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid direct eye contact with product, also via contamination on hands IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	58m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation Covers use at ambient temperatures
Title	Contributing Scenario [CS] 9
Product (sub) category(ies)	PC35 - Washing and cleaning products (including solvent based products) Laundry and dish washing products
Covers concentrations up to	5%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <15g
Exposure duration	Avoid carrying out operation for more than 0.5h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid direct eye contact with product, also via contamination on hands IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	20m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation Covers use at ambient temperatures
Title	Contributing Scenario [CS] 10
Product (sub) category(ies)	PC35 - Washing and cleaning products (including solvent based products) Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners)
Covers concentrations up to	50%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <500g
Exposure duration	Avoid carrying out operation for more than 0.0125h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	58m <sup>3</sup>

Operational conditions	Covers use at ambient temperatures Covers use under typical household ventilation
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Title	Contributing Scenario [CS] 11
Product (sub) category(ies)	PC35 - Washing and cleaning products (including solvent based products) Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners)
Covers concentrations up to	8%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <880g
Exposure duration	Avoid carrying out operation for more than 4h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid direct eye contact with product, also via contamination on hands IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	58m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation Covers use at ambient temperatures

  

Title	Contributing Scenario [CS] 12
Product (sub) category(ies)	PC35 - Washing and cleaning products (including solvent based products) Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners)
Covers concentrations up to	20%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <3750g
Exposure duration	Avoid carrying out operation for more than 0.42h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	10m <sup>3</sup>
Operational conditions	Covers use at ambient temperatures Covers use under typical household ventilation

  

Title	Contributing Scenario [CS] 13
Product (sub) category(ies)	PC35 - Washing and cleaning products (including solvent based products) Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners)
Covers concentrations up to	20%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <30g
Exposure duration	Avoid carrying out operation for more than 0.42h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if

	present and easy to do. Continue rinsing
Use in room with a volume of minimum	10m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 14
Product (sub) category(ies)	PC38 - Welding and soldering products, flux products
Covers concentrations up to	10%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <12g
Exposure duration	Avoid carrying out operation for more than 1h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	20m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 15
Product (sub) category(ies)	PC24 - Lubricants, greases, release products
Remarks	Use in closed process, no likelihood of exposure (closed systems)

### Section 3 - Exposure estimation

**Environmental exposure**

**Environmental release category(ies)**

ERC8a - Wide dispersive indoor use of processing aids in open systems  
ERC8d - Wide dispersive outdoor use of processing aids in open systems

**Remarks**

Not relevant since not classified as dangerous for the environment.

**Control of consumer exposure**

**Calculation method**

The Consexpo model has been used to estimate consumer exposures unless otherwise indicated

**Exposure estimation**

Title	Exposure route	Calculation method	predicted exposure level	Risk characterisation ratio (RCR)
Contributing Scenario [CS] 1	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	0.15 mg/m <sup>3</sup>	0.003
Contributing Scenario [CS] 2	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer	0.001 mg/m <sup>3</sup>	0.00002

		exposures unless otherwise indicated		
Contributing Scenario [CS] 3	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	49.05 mg/m <sup>3</sup>	0.89
Contributing Scenario [CS] 4	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	42.90 mg/m <sup>3</sup>	0.78
Contributing Scenario [CS] 5	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	52.50 mg/m <sup>3</sup>	0.95
Contributing Scenario [CS] 6	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	1.30 mg/m <sup>3</sup>	0.02
Contributing Scenario [CS] 6	Consumer - oral, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	0.65 mg/kg	0.21
Contributing Scenario [CS] 7	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	48.30 mg/m <sup>3</sup>	0.88
Contributing Scenario [CS] 8	Consumer - oral, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	1.35 mg/kg	0.43
Contributing Scenario [CS] 9	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	32.40 mg/m <sup>3</sup>	0.59
Contributing Scenario [CS] 10	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	0.001 mg/m <sup>3</sup>	0.00001
Contributing Scenario [CS] 11	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	46.50 mg/m <sup>3</sup>	0.85
Contributing Scenario [CS] 12	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	0.0001 mg/m <sup>3</sup>	0.000002
Contributing Scenario [CS] 12	Consumer - oral, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	0.01 mg/kg	0.003
Contributing Scenario [CS] 13	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	6.37 mg/m <sup>3</sup>	0.12
Contributing Scenario [CS] 14	Consumer - inhalative,	The Consexpo model	45.12 mg/m <sup>3</sup>	0.82

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	long-term - local and systemic	has been used to estimate consumer exposures unless otherwise indicated		
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**Section 4 - Guidance to check compliance with the exposure scenario**

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

## Annex to the Safety Data Sheet according to Regulation (EC) No 1907/2006 [REACH]

Product Name	n-Butanol
Chemical Name	Butan-1-ol
CAS No	71-36-3
EC No	200-751-6
REACH registration number	01-2119484630-38-0008
Pure substance/mixture	Substance

### Exposure scenario

#### Section 1 - Title

Title	ES6 - Use: Cleaning agent. Industrial.
Version	1
Product Name	n-Butanol
Revision Date	12-Jun-2015
Sector(s) of use	SU3 - Industrial uses: Uses of substances as such or in preparations at industrial sites

### Section 2 - Operational conditions and risk management measures

#### Section 2.1 - Control of environmental exposure

Environmental release category(ies)	ERC4 - Industrial use of processing aids in processes and products, not becoming part of articles
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**Remarks**  
Not relevant since not classified as dangerous for the environment.

#### Section 2.2 - Control of worker exposure

##### Control of worker exposure

Title	Contributing Scenario [CS] 1
Process category(ies)	PROC1 - Use in closed process, no likelihood of exposure
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent/limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 2
Process category(ies)	PROC2 - Use in closed, continuous process with occasional controlled exposure
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa



Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 3
Process category(ies)	PROC3 - Use in closed batch process (synthesis or formulation)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 4
Process category(ies)	PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 5
Process category(ies)	PROC7 - Industrial spraying
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Ensure that a spraying booth is used Minimisation of manual phases/work tasks Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m)
Conditions and measures related to personal protection, hygiene and	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands

health evaluation	Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed Regular inspection and maintenance of equipment and machines
Additional good practice advice beyond the REACH Chemical Safety Report	Clean equipment and the work area every day
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 6
Process category(ies)	PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 7
Process category(ies)	PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 97%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 8
Process category(ies)	PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands

health evaluation	Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 9
Process category(ies)	PROC10 - Roller application or brushing
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 10
Process category(ies)	PROC13 - Treatment of articles by dipping and pouring
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

### Section 3 - Exposure estimation

**Environmental exposure**

**Environmental release category(ies)** ERC4 - Industrial use of processing aids in processes and products, not becoming part of articles

**Remarks**  
Not relevant since not classified as dangerous for the environment.

**worker**  
**Control of worker exposure**

**Calculation method** Risk management measures are based on qualitative risk characterization  
Used ECETOC TRA model

## Used Stoffenmanager model

Title	Exposure route	Calculation method	predicted exposure level	Risk characterisation ratio (RCR)
Contributing Scenario [CS] 1	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	0.03 mg/m <sup>3</sup>	0.0001
Contributing Scenario [CS] 2	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	30.88 mg/m <sup>3</sup>	0.0996
Contributing Scenario [CS] 3	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	77.19 mg/m <sup>3</sup>	0.249
Contributing Scenario [CS] 4	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	61.75 mg/m <sup>3</sup>	0.1992
Contributing Scenario [CS] 5	Worker - inhalative, long-term - local and systemic	Used Stoffenmanager model	0 mg/m <sup>3</sup>	0
Contributing Scenario [CS] 6	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0498
Contributing Scenario [CS] 7	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	4.63 mg/m <sup>3</sup>	0.0149
Contributing Scenario [CS] 8	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0498
Contributing Scenario [CS] 9	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0498
Contributing Scenario [CS] 10	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0498

## Section 4 - Guidance to check compliance with the exposure scenario

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

## Annex to the Safety Data Sheet according to Regulation (EC) No 1907/2006 [REACH]

Product Name	n-Butanol
Chemical Name	Butan-1-ol
CAS No	71-36-3
EC No	200-751-6
REACH registration number	01-2119484630-38-0008
Pure substance/mixture	Substance

### Exposure scenario

#### Section 1 - Title

Title	ES6 - Use: Cleaning agent. Professional.
Version	1
Product Name	n-Butanol
Revision Date	12-Jun-2015
Sector(s) of use	SU22 - Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

### Section 2 - Operational conditions and risk management measures

#### Section 2.1 - Control of environmental exposure

Environmental release category(ies)	ERC8a - Wide dispersive indoor use of processing aids in open systems ERC8d - Wide dispersive outdoor use of processing aids in open systems
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**Remarks**  
Not relevant since not classified as dangerous for the environment.

#### Section 2.2 - Control of worker exposure

##### Control of worker exposure

Title	Contributing Scenario [CS] 1
Process category(ies)	PROC1 - Use in closed process, no likelihood of exposure
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent/limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 2
Process category(ies)	PROC2 - Use in closed, continuous process with occasional controlled exposure

Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 3
Process category(ies)	PROC3 - Use in closed batch process (synthesis or formulation)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 4
Process category(ies)	PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 5
Process category(ies)	PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source	Minimisation of manual phases/work tasks

towards the worker	
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 6
Process category(ies)	PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 7
Process category(ies)	PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 8
Process category(ies)	PROC10 - Roller application or brushing
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed

Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 9
Process category(ies)	PROC11 - Non industrial spraying
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Ensure that a spraying booth is used Minimisation of manual phases/work tasks Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m)
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed Regular inspection and maintenance of equipment and machines
Additional good practice advice beyond the REACH Chemical Safety Report	Clean equipment and the work area every day
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 10
Process category(ies)	PROC11 - Non industrial spraying
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 6h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 47%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed Regular inspection and maintenance of equipment and machines
Additional good practice advice beyond the REACH Chemical Safety Report	Clean equipment and the work area every day
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 11
Process category(ies)	PROC11 - Non industrial spraying
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 47%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Respiratory protection Efficiency of at least 80% Use suitable eye protection and gloves



Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed Regular inspection and maintenance of equipment and machines
Additional good practice advice beyond the REACH Chemical Safety Report	Clean equipment and the work area every day
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 12
Process category(ies)	PROC13 - Treatment of articles by dipping and pouring
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

### Section 3 - Exposure estimation

**Environmental exposure**

**Environmental release category(ies)**

ERC8a - Wide dispersive indoor use of processing aids in open systems  
ERC8d - Wide dispersive outdoor use of processing aids in open systems

**Remarks**

Not relevant since not classified as dangerous for the environment.

**worker**

**Control of worker exposure**

**Calculation method**

Risk management measures are based on qualitative risk characterization  
Used ECETOC TRA model  
Used Stoffenmanager model

Title	Exposure route	Calculation method	predicted exposure level	Risk characterisation ratio (RCR)
Contributing Scenario [CS] 1	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	0.03 mg/m <sup>3</sup>	0.0001
Contributing Scenario [CS] 2	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	61.75 mg/m <sup>3</sup>	0.1992
Contributing Scenario [CS] 3	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	77.19 mg/m <sup>3</sup>	0.249
Contributing Scenario [CS] 4	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	154.38 mg/m <sup>3</sup>	0.498
Contributing Scenario [CS] 5	Worker - inhalative, long-term - local and	Used ECETOC TRA model	185.25 mg/m <sup>3</sup>	0.5976

	systemic			
Contributing Scenario [CS] 6	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	92.63 mg/m <sup>3</sup>	0.2988
Contributing Scenario [CS] 7	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	185.25 mg/m <sup>3</sup>	0.5976
Contributing Scenario [CS] 8	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	185.25 mg/m <sup>3</sup>	0.5976
Contributing Scenario [CS] 9	Worker - inhalative, long-term - local and systemic	Used Stoffenmanager model	0 mg/m <sup>3</sup>	0
Contributing Scenario [CS] 10	Worker - inhalative, long-term - local and systemic	Used Stoffenmanager model	300 mg/m <sup>3</sup>	0.9677
Contributing Scenario [CS] 11	Worker - inhalative, long-term - local and systemic	Used Stoffenmanager model	187.50 mg/m <sup>3</sup>	0.6048
Contributing Scenario [CS] 12	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	185.25 mg/m <sup>3</sup>	0.5976

#### Section 4 - Guidance to check compliance with the exposure scenario

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

## Annex to the Safety Data Sheet according to Regulation (EC) No 1907/2006 [REACH]

Product Name	n-Butanol
Chemical Name	Butan-1-ol
CAS No	71-36-3
EC No	200-751-6
REACH registration number	01-2119484630-38-0008
Pure substance/mixture	Substance

### Exposure scenario

#### Section 1 - Title

Title	ES7 - Use: Lubricant. Consumer use.
Version	1
Product Name	n-Butanol
Revision Date	12-Jun-2015
Sector(s) of use	SU21 - Consumer uses: Private households (= general public = consumers)

### Section 2 - Operational conditions and risk management measures

#### Section 2.1 - Control of environmental exposure

Environmental release category(ies)	ERC8a - Wide dispersive indoor use of processing aids in open systems ERC8d - Wide dispersive outdoor use of processing aids in open systems ERC9a - Wide dispersive indoor use of substances in closed systems ERC9b - Wide dispersive outdoor use of substances in closed systems
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**Remarks**  
Not relevant since not classified as dangerous for the environment.

#### Section 2.2 - Control of consumer exposure

Control of consumer exposure	
Title	Contributing Scenario [CS] 1
Product (sub) category(ies)	PC1 - Adhesives, sealants Glues, hobby use
Covers concentrations up to	30%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <9g
Exposure duration	Avoid carrying out operation for more than 4h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

Use in room with a volume of minimum	20m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 2
Product (sub) category(ies)	PC1 - Adhesives, sealants Glues DIY-use (carpet glue, tile glue, wood parquet glue)
Covers concentrations up to	0.2%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <6390g
Exposure duration	Avoid carrying out operation for more than 6h
Use frequency	Covers use up to 1 events per day
Risk management measures	No specific risk management measure identified beyond those operational conditions stated
Use in room with a volume of minimum	20m <sup>3</sup>
Operational conditions	Use in well ventilated areas Covers use at ambient temperatures

Title	Contributing Scenario [CS] 3
Product (sub) category(ies)	PC1 - Adhesives, sealants Glues DIY-use (carpet glue, tile glue, wood parquet glue)
Covers concentrations up to	2%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <9000g
Exposure duration	Avoid carrying out operation for more than 1.25h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid direct eye contact with product, also via contamination on hands IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	53m <sup>3</sup>
Operational conditions	Use in well ventilated areas Covers use at ambient temperatures

Title	Contributing Scenario [CS] 4
Product (sub) category(ies)	PC1 - Adhesives, sealants Glue from spray
Covers concentrations up to	30%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <550g
Exposure duration	Avoid carrying out operation for more than 4h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

Use in room with a volume of minimum	20m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 5
Product (sub) category(ies)	PC1 - Adhesives, sealants Sealant
Covers concentrations up to	12%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <390g
Exposure duration	Avoid carrying out operation for more than 4h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	20m <sup>3</sup>
Operational conditions	Use in well ventilated areas Covers use at ambient temperatures

Title	Contributing Scenario [CS] 6
Product (sub) category(ies)	PC31 - Polishes and wax blends Polishes, wax / cream (floor, furniture, shoes)
Covers concentrations up to	20%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <550g
Exposure duration	Avoid carrying out operation for more than 4h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	58m <sup>3</sup>
Operational conditions	Open windows during application to ensure natural ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 7
Product (sub) category(ies)	PC31 - Polishes and wax blends Polishes, spray (furniture, shoes)
Covers concentrations up to	50%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <550g
Exposure duration	Avoid carrying out operation for more than 4h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes

	After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	58m <sup>3</sup>
Operational conditions	Covers use under typical household ventilation Covers use at ambient temperatures

Title	Contributing Scenario [CS] 8
Product (sub) category(ies)	PC35 - Washing and cleaning products (including solvent based products) Laundry and dish washing products
Covers concentrations up to	5%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <15g
Exposure duration	Avoid carrying out operation for more than 0.50h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid direct eye contact with product, also via contamination on hands IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	20m <sup>3</sup>
Operational conditions	Covers use at ambient temperatures Covers use under typical household ventilation

Title	Contributing Scenario [CS] 9
Product (sub) category(ies)	PC35 - Washing and cleaning products (including solvent based products) Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners)
Covers concentrations up to	5%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <15g
Exposure duration	Avoid carrying out operation for more than 0.50h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid direct eye contact with product, also via contamination on hands IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	20m <sup>3</sup>
Operational conditions	Covers use at ambient temperatures Covers use under typical household ventilation

Title	Contributing Scenario [CS] 10
Product (sub) category(ies)	PC35 - Washing and cleaning products (including solvent based products) Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners)
Covers concentrations up to	8%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <880g
Exposure duration	Avoid carrying out operation for more than 4h
Use frequency	Covers use up to

	1 events per day
Risk management measures	Avoid direct eye contact with product, also via contamination on hands IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	58m <sup>3</sup>
Operational conditions	Covers use at ambient temperatures Covers use under typical household ventilation

Title	Contributing Scenario [CS] 11
Product (sub) category(ies)	PC35 - Washing and cleaning products (including solvent based products) Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners)
Covers concentrations up to	20%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <550g
Exposure duration	Avoid carrying out operation for more than 0.42h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	10m <sup>3</sup>
Operational conditions	Covers use at ambient temperatures Covers use under typical household ventilation

Title	Contributing Scenario [CS] 12
Product (sub) category(ies)	PC35 - Washing and cleaning products (including solvent based products) Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners)
Covers concentrations up to	20%
Physical form of product	Liquid
Vapour pressure	1 kPa
Amounts used	Amount per use <30g
Exposure duration	Avoid carrying out operation for more than 0.42h
Use frequency	Covers use up to 1 events per day
Risk management measures	Avoid contact with skin and eyes After contact with skin, wash immediately with plenty of water IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Use in room with a volume of minimum	10m <sup>3</sup>
Operational conditions	Covers use at ambient temperatures Covers use under typical household ventilation

Title	Contributing Scenario [CS] 13
Product (sub) category(ies)	PC24 - Lubricants, greases, release products
Remarks	Use in closed process, no likelihood of exposure (closed systems)

Title	Contributing Scenario [CS] 14
Product (sub) category(ies)	PC6 - Automotive Care Products
Remarks	Covered by

PC31, PC35

## Section 3 - Exposure estimation

### Environmental exposure

#### Environmental release category(ies)

ERC8a - Wide dispersive indoor use of processing aids in open systems  
 ERC8d - Wide dispersive outdoor use of processing aids in open systems  
 ERC9a - Wide dispersive indoor use of substances in closed systems  
 ERC9b - Wide dispersive outdoor use of substances in closed systems

#### Remarks

Not relevant since not classified as dangerous for the environment.

### Control of consumer exposure

#### Calculation method

The Consexpo model has been used to estimate consumer exposures unless otherwise indicated

#### Exposure estimation

Title	Exposure route	Calculation method	predicted exposure level	Risk characterisation ratio (RCR)
Contributing Scenario [CS] 1	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	51.15 mg/m <sup>3</sup>	0.93
Contributing Scenario [CS] 2	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	42.60 mg/m <sup>3</sup>	0.77
Contributing Scenario [CS] 3	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	48.40 mg/m <sup>3</sup>	0.88
Contributing Scenario [CS] 4	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	0.09 mg/m <sup>3</sup>	0.002
Contributing Scenario [CS] 4	Consumer - oral, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	1.23 mg/kg	0.39
Contributing Scenario [CS] 5	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	48.70 mg/m <sup>3</sup>	0.89
Contributing Scenario [CS] 6	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	52 mg/m <sup>3</sup>	0.95
Contributing Scenario [CS] 7	Consumer - inhalative, long-term - local and	The Consexpo model has been used to	0.38 mg/m <sup>3</sup>	0.01



	systemic	estimate consumer exposures unless otherwise indicated		
Contributing Scenario [CS] 7	Consumer - oral, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	0.52 mg/kg	0.17
Contributing Scenario [CS] 8	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	32.40 mg/m <sup>3</sup>	0.59
Contributing Scenario [CS] 9	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	0.001 mg/m <sup>3</sup>	0.00001
Contributing Scenario [CS] 10	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	46.50 mg/m <sup>3</sup>	0.85
Contributing Scenario [CS] 11	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	0.0001 mg/m <sup>3</sup>	0.000002
Contributing Scenario [CS] 11	Consumer - oral, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	0.01 mg/kg	0.003
Contributing Scenario [CS] 12	Consumer - inhalative, long-term - local and systemic	The Consexpo model has been used to estimate consumer exposures unless otherwise indicated	6.37 mg/m <sup>3</sup>	0.12

## Section 4 - Guidance to check compliance with the exposure scenario

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

## Annex to the Safety Data Sheet according to Regulation (EC) No 1907/2006 [REACH]

*Product Name* n-Butanol  
*Chemical Name* Butan-1-ol  
*CAS No* 71-36-3  
*EC No* 200-751-6  
*REACH registration number* 01-2119484630-38-0008  
*Pure substance/mixture* Substance

### Exposure scenario

#### Section 1 - Title

**Title** ES7 - Use: Lubricant. Professional.  
**Version** 1  
**Product Name** n-Butanol  
**Revision Date** 12-Jun-2015  
**Sector(s) of use** SU22 - Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

### Section 2 - Operational conditions and risk management measures

#### Section 2.1 - Control of environmental exposure

**Environmental release category(ies)** ERC8a - Wide dispersive indoor use of processing aids in open systems  
 ERC8d - Wide dispersive outdoor use of processing aids in open systems  
 ERC9a - Wide dispersive indoor use of substances in closed systems  
 ERC9b - Wide dispersive outdoor use of substances in closed systems

#### Remarks

Not relevant since not classified as dangerous for the environment.

#### Section 2.2 - Control of worker exposure

##### Control of worker exposure

Title	Contributing Scenario [CS] 1
Process category(ies)	PROC1 - Use in closed process, no likelihood of exposure
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent/limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 2
Process category(ies)	PROC2 - Use in closed, continuous process with occasional controlled exposure
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 3
Process category(ies)	PROC3 - Use in closed batch process (synthesis or formulation)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 4
Process category(ies)	PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 5
Process category(ies)	PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa

Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 6
Process category(ies)	PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 7
Process category(ies)	PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 8
Process category(ies)	PROC10 - Roller application or brushing
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands

health evaluation	Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 9
Process category(ies)	PROC11 - Non industrial spraying
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Ensure that a spraying booth is used Minimisation of manual phases/work tasks Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m)
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed Regular inspection and maintenance of equipment and machines
Additional good practice advice beyond the REACH Chemical Safety Report	Clean equipment and the work area every day
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 10
Process category(ies)	PROC11 - Non industrial spraying
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 6h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 47%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed Regular inspection and maintenance of equipment and machines
Additional good practice advice beyond the REACH Chemical Safety Report	Clean equipment and the work area every day
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 11
Process category(ies)	PROC11 - Non industrial spraying
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 47%
Conditions and measures related to personal protection, hygiene and	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands

health evaluation	Respiratory protection Efficiency of at least 80% Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed Regular inspection and maintenance of equipment and machines
Additional good practice advice beyond the REACH Chemical Safety Report	Clean equipment and the work area every day
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 12
Process category(ies)	PROC13 - Treatment of articles by dipping and pouring
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 13
Process category(ies)	PROC17 - Lubrication at high energy conditions and in partly open process
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 14
Process category(ies)	PROC17 - Lubrication at high energy conditions and in partly open process
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 1h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent	Supervision in place to check that the RMMs in place are being used correctly and OCs

/limit releases, dispersion and exposure	followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 15
Process category(ies)	PROC17 - Lubrication at high energy conditions and in partly open process
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Operation is carried out at elevated temperature (> 20°C above ambient temperature)

Title	Contributing Scenario [CS] 16
Process category(ies)	PROC17 - Lubrication at high energy conditions and in partly open process
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves Wear a respirator providing a minimum efficiency of 90%
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Operation is carried out at elevated temperature (> 20°C above ambient temperature)

Title	Contributing Scenario [CS] 17
Process category(ies)	PROC18 - Greasing at high energy conditions
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS]
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	18
Process category(ies)	PROC18 - Greasing at high energy conditions
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 1h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 19
Process category(ies)	PROC18 - Greasing at high energy conditions
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Operation is carried out at elevated temperature (> 20°C above ambient temperature)

Title	Contributing Scenario [CS] 20
Process category(ies)	PROC18 - Greasing at high energy conditions
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves Wear a respirator providing a minimum efficiency of 90%
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Operation is carried out at elevated temperature (> 20°C above ambient temperature)

Title	Contributing Scenario [CS] 21
Process category(ies)	PROC20 - Heat and pressure transfer fluids in dispersive, professional use but closed systems
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa



Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

### Section 3 - Exposure estimation

**Environmental exposure**

**Environmental release category(ies)**

ERC8a - Wide dispersive indoor use of processing aids in open systems  
 ERC8d - Wide dispersive outdoor use of processing aids in open systems  
 ERC9a - Wide dispersive indoor use of substances in closed systems  
 ERC9b - Wide dispersive outdoor use of substances in closed systems

**Remarks**

Not relevant since not classified as dangerous for the environment.

**worker**

**Control of worker exposure**

**Calculation method**

Risk management measures are based on qualitative risk characterization  
 Used ECETOC TRA model  
 Used Stoffenmanager model

Title	Exposure route	Calculation method	predicted exposure level	Risk characterisation ratio (RCR)
Contributing Scenario [CS] 1	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	0.03 mg/m <sup>3</sup>	0.0001
Contributing Scenario [CS] 2	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	61.75 mg/m <sup>3</sup>	0.1992
Contributing Scenario [CS] 3	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	77.19 mg/m <sup>3</sup>	0.249
Contributing Scenario [CS] 4	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	154.38 mg/m <sup>3</sup>	0.498
Contributing Scenario [CS] 5	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	185.25 mg/m <sup>3</sup>	0.5976
Contributing Scenario [CS] 6	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	92.63 mg/m <sup>3</sup>	0.2988
Contributing Scenario [CS] 7	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	185.25 mg/m <sup>3</sup>	0.5976
Contributing Scenario [CS] 8	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	185.25 mg/m <sup>3</sup>	0.5976

Contributing Scenario [CS] 9	Worker - inhalative, long-term - local and systemic	Used Stoffenmanager model	0 mg/m <sup>3</sup>	0
Contributing Scenario [CS] 10	Worker - inhalative, long-term - local and systemic	Used Stoffenmanager model	300 mg/m <sup>3</sup>	0.9677
Contributing Scenario [CS] 11	Worker - inhalative, long-term - local and systemic	Used Stoffenmanager model	187.5 mg/m <sup>3</sup>	0.6048
Contributing Scenario [CS] 12	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	185.25 mg/m <sup>3</sup>	0.5976
Contributing Scenario [CS] 13	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	61.75 mg/m <sup>3</sup>	0.1992
Contributing Scenario [CS] 14	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	123.5 mg/m <sup>3</sup>	0.3984
Contributing Scenario [CS] 15	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	154.38 mg/m <sup>3</sup>	0.4980
Contributing Scenario [CS] 16	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	154.38 mg/m <sup>3</sup>	0.4980
Contributing Scenario [CS] 17	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	61.75 mg/m <sup>3</sup>	0.1992
Contributing Scenario [CS] 18	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	123.5 mg/m <sup>3</sup>	0.3984
Contributing Scenario [CS] 19	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	154.38 mg/m <sup>3</sup>	0.4980
Contributing Scenario [CS] 20	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	154.38 mg/m <sup>3</sup>	0.4980
Contributing Scenario [CS] 21	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	61.75 mg/m <sup>3</sup>	0.1992

## Section 4 - Guidance to check compliance with the exposure scenario

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

## Annex to the Safety Data Sheet according to Regulation (EC) No 1907/2006 [REACH]

Product Name	n-Butanol
Chemical Name	Butan-1-ol
CAS No	71-36-3
EC No	200-751-6
REACH registration number	01-2119484630-38-0008
Pure substance/mixture	Substance

### Exposure scenario

#### Section 1 - Title

Title	ES8 - Use: Metal working fluids/rolling oils. Industrial.
Version	1
Product Name	n-Butanol
Revision Date	12-Jun-2015
Sector(s) of use	SU3 - Industrial uses: Uses of substances as such or in preparations at industrial sites

### Section 2 - Operational conditions and risk management measures

#### Section 2.1 - Control of environmental exposure

Environmental release category(ies)	ERC4 - Industrial use of processing aids in processes and products, not becoming part of articles
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**Remarks**  
Not relevant since not classified as dangerous for the environment.

#### Section 2.2 - Control of worker exposure

##### Control of worker exposure

Title	Contributing Scenario [CS] 1
Process category(ies)	PROC1 - Use in closed process, no likelihood of exposure
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent/limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 2
Process category(ies)	PROC2 - Use in closed, continuous process with occasional controlled exposure
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa

Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 3
Process category(ies)	PROC3 - Use in closed batch process (synthesis or formulation)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 4
Process category(ies)	PROC5 - Mixing or blending in batch processes for formulation of preparations and articles (multi-stage and/or significant contact)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 5
Process category(ies)	PROC7 - Industrial spraying
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Ensure that a spraying booth is used Minimisation of manual phases/work tasks Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m)
Conditions and measures related to	Assumes a good basic standard of occupational hygiene is implemented

personal protection, hygiene and health evaluation	Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed Regular inspection and maintenance of equipment and machines
Additional good practice advice beyond the REACH Chemical Safety Report	Clean equipment and the work area every day
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 6
Process category(ies)	PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 7
Process category(ies)	PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 97%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 8
Process category(ies)	PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to	Assumes a good basic standard of occupational hygiene is implemented

personal protection, hygiene and health evaluation	Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 9
Process category(ies)	PROC10 - Roller application or brushing
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 10
Process category(ies)	PROC13 - Treatment of articles by dipping and pouring
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 11
Process category(ies)	PROC17 - Lubrication at high energy conditions and in partly open process
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 12
Process category(ies)	PROC17 - Lubrication at high energy conditions and in partly open process
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Efficiency of at least 95%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Operation is carried out at elevated temperature (> 20°C above ambient temperature)

## Section 3 - Exposure estimation

### Environmental exposure

#### Environmental release category(ies)

ERC4 - Industrial use of processing aids in processes and products, not becoming part of articles

#### Remarks

Not relevant since not classified as dangerous for the environment.

### worker

#### Control of worker exposure

#### Calculation method

Risk management measures are based on qualitative risk characterization  
Used ECETOC TRA model  
Used Stoffenmanager model

Title	Exposure route	Calculation method	predicted exposure level	Risk characterisation ratio (RCR)
Contributing Scenario [CS] 1	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	0.03 mg/m <sup>3</sup>	0.0001
Contributing Scenario [CS] 2	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	30.88 mg/m <sup>3</sup>	0.0996
Contributing Scenario [CS] 3	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	77.19 mg/m <sup>3</sup>	0.249
Contributing Scenario [CS] 4	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0498
Contributing Scenario [CS] 5	Worker - inhalative, long-term - local and systemic	Used Stoffenmanager model	0 mg/m <sup>3</sup>	0
Contributing Scenario [CS] 6	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0498
Contributing Scenario [CS] 7	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	4.63 mg/m <sup>3</sup>	0.0149
Contributing Scenario [CS] 8	Worker - inhalative, long-term - local and	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0498

	systemic			
Contributing Scenario [CS] 9	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0498
Contributing Scenario [CS] 10	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0498
Contributing Scenario [CS] 11	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	154.38 mg/m <sup>3</sup>	0.498
Contributing Scenario [CS] 12	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	15.44 mg/m <sup>3</sup>	0.0498

#### Section 4 - Guidance to check compliance with the exposure scenario

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.



## Annex to the Safety Data Sheet according to Regulation (EC) No 1907/2006 [REACH]

*Product Name* n-Butanol  
*Chemical Name* Butan-1-ol  
*CAS No* 71-36-3  
*EC No* 200-751-6  
*REACH registration number* 01-2119484630-38-0008  
*Pure substance/mixture* Substance

### Exposure scenario

#### Section 1 - Title

**Title** ES8 - Use: Metal working fluids/rolling oils. Professional.  
**Version** 1  
**Product Name** n-Butanol  
**Revision Date** 12-Jun-2015  
**Sector(s) of use** SU22 - Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

### Section 2 - Operational conditions and risk management measures

#### Section 2.1 - Control of environmental exposure

**Environmental release category(ies)** ERC8a - Wide dispersive indoor use of processing aids in open systems

**Remarks**  
Not relevant since not classified as dangerous for the environment.

#### Section 2.2 - Control of worker exposure

##### Control of worker exposure

Title	Contributing Scenario [CS] 1
Process category(ies)	PROC1 - Use in closed process, no likelihood of exposure
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 2
Process category(ies)	PROC2 - Use in closed, continuous process with occasional controlled exposure
Covers concentrations up to	100%
Physical form of product	Liquid

Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 3
Process category(ies)	PROC3 - Use in closed batch process (synthesis or formulation)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 4
Process category(ies)	PROC5 - Mixing or blending in batch processes for formulation of preparations and articles (multi-stage and/or significant contact)
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 5
Process category(ies)	PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to	Assumes a good basic standard of occupational hygiene is implemented

personal protection, hygiene and health evaluation	Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 6
Process category(ies)	PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 7
Process category(ies)	PROC10 - Roller application or brushing
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 8
Process category(ies)	PROC11 - Non industrial spraying
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Ensure that a spraying booth is used Minimisation of manual phases/work tasks Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m)
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed Regular inspection and maintenance of equipment and machines
Additional good practice advice beyond the REACH Chemical Safety	Clean equipment and the work area every day

Report	
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 9
Process category(ies)	PROC11 - Non industrial spraying
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 6h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 47%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed Regular inspection and maintenance of equipment and machines
Additional good practice advice beyond the REACH Chemical Safety Report	Clean equipment and the work area every day
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 10
Process category(ies)	PROC11 - Non industrial spraying
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Local exhaust ventilation - efficiency of at least 47%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Respiratory protection Efficiency of at least 80% Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed Regular inspection and maintenance of equipment and machines
Additional good practice advice beyond the REACH Chemical Safety Report	Clean equipment and the work area every day
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)
Title	Contributing Scenario [CS] 11
Process category(ies)	PROC13 - Treatment of articles by dipping and pouring
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves

Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 12
Process category(ies)	PROC17 - Lubrication at high energy conditions and in partly open process
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 13
Process category(ies)	PROC17 - Lubrication at high energy conditions and in partly open process
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 1h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 14
Process category(ies)	PROC17 - Lubrication at high energy conditions and in partly open process
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks Provide extract ventilation to points where emissions occur Efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Operation is carried out at elevated temperature (> 20°C above ambient temperature)

Title	Contributing Scenario [CS] 15
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Process category(ies)	PROC17 - Lubrication at high energy conditions and in partly open process
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves Wear a respirator providing a minimum efficiency of 90%
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Operation is carried out at elevated temperature (> 20°C above ambient temperature)

### Section 3 - Exposure estimation

**Environmental exposure**

**Environmental release category(ies)** ERC8a - Wide dispersive indoor use of processing aids in open systems

**Remarks**

Not relevant since not classified as dangerous for the environment.

**worker**

**Control of worker exposure**

**Calculation method**

Risk management measures are based on qualitative risk characterization  
Used ECETOC TRA model  
Used Stoffenmanager model

Title	Exposure route	Calculation method	predicted exposure level	Risk characterisation ratio (RCR)
Contributing Scenario [CS] 1	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	0.03 mg/m <sup>3</sup>	0.0001
Contributing Scenario [CS] 2	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	61.75 mg/m <sup>3</sup>	0.1992
Contributing Scenario [CS] 3	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	77.19 mg/m <sup>3</sup>	0.249
Contributing Scenario [CS] 4	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	185.25 mg/m <sup>3</sup>	0.5976
Contributing Scenario [CS] 5	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	185.25 mg/m <sup>3</sup>	0.5976
Contributing Scenario [CS] 6	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	92.63 mg/m <sup>3</sup>	0.2988
Contributing Scenario [CS] 7	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	185.25 mg/m <sup>3</sup>	0.5976
Contributing Scenario [CS] 8	Worker - inhalative, long-term - local and systemic	Used Stoffenmanager model	0 mg/m <sup>3</sup>	0

Contributing Scenario [CS] 9	Worker - inhalative, long-term - local and systemic	Used Stoffenmanager model	300 mg/m <sup>3</sup>	0.9677
Contributing Scenario [CS] 10	Worker - inhalative, long-term - local and systemic	Used Stoffenmanager model	187.5 mg/m <sup>3</sup>	0.6048
Contributing Scenario [CS] 11	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	185.25 mg/m <sup>3</sup>	0.5976
Contributing Scenario [CS] 12	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	61.75 mg/m <sup>3</sup>	0.1992
Contributing Scenario [CS] 13	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	123.50 mg/m <sup>3</sup>	0.3984
Contributing Scenario [CS] 14	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	154.38 mg/m <sup>3</sup>	0.498
Contributing Scenario [CS] 15	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	154.38 mg/m <sup>3</sup>	0.498

#### Section 4 - Guidance to check compliance with the exposure scenario

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

## Annex to the Safety Data Sheet according to Regulation (EC) No 1907/2006 [REACH]

Product Name	n-Butanol
Chemical Name	Butan-1-ol
CAS No	71-36-3
EC No	200-751-6
REACH registration number	01-2119484630-38-0008
Pure substance/mixture	Substance

### Exposure scenario

#### Section 1 - Title

Title	ES9 - Consumer use: personal care products, Disinfectant.
Version	1
Product Name	n-Butanol
Revision Date	12-Jun-2015

### Section 2 - Operational conditions and risk management measures

#### Section 2.1 - Control of environmental exposure

##### Remarks

Not relevant since not classified as dangerous for the environment.

#### Section 2.2 - Control of consumer exposure

##### Control of consumer exposure

Product (sub) category(ies)	PC28 - Perfumes, fragrances PC39 - Cosmetics, personal care products
Remarks	Consumer uses e.g. as a carrier in cosmetics/personal care products, perfumes and fragrances. Note: For cosmetic and personal care products, risk assessment only required for the environment under REACH as human health is covered by alternative legislation

### Section 3 - Exposure estimation

#### Environmental exposure

##### Remarks

Not relevant since not classified as dangerous for the environment.

#### Control of consumer exposure

##### Remarks

Consumer uses e.g. as a carrier in cosmetics/personal care products, perfumes and fragrances. Note: For cosmetic and personal care products, risk assessment only required for the environment under REACH as human health is covered by alternative legislation



## **Section 4 - Guidance to check compliance with the exposure scenario**

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

## Annex to the Safety Data Sheet according to Regulation (EC) No 1907/2006 [REACH]

Product Name	n-Butanol
Chemical Name	Butan-1-ol
CAS No	71-36-3
EC No	200-751-6
REACH registration number	01-2119484630-38-0008
Pure substance/mixture	Substance

### Exposure scenario

#### Section 1 - Title

Title	ES10 - Use: Laboratory chemicals. Professional.
Version	1
Product Name	n-Butanol
Revision Date	12-Jun-2015
Sector(s) of use	SU22 - Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

### Section 2 - Operational conditions and risk management measures

#### Section 2.1 - Control of environmental exposure

Environmental release category(ies)	ERC8a - Wide dispersive indoor use of processing aids in open systems
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**Remarks**  
 Not relevant since not classified as dangerous for the environment.

#### Section 2.2 - Control of worker exposure

##### Control of worker exposure

Title	Contributing Scenario [CS] 1
Process category(ies)	PROC10 - Roller application or brushing
Covers concentrations up to	100%
Physical form of product	Liquid
Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 4h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent /limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

Title	Contributing Scenario [CS] 2
Process category(ies)	PROC15 - Use as laboratory reagent
Covers concentrations up to	100%
Physical form of product	Liquid

Vapour pressure	0.5-10 kPa
Exposure duration	Avoid carrying out operation for more than 8h
Technical conditions and measures to control dispersion from source towards the worker	Minimisation of manual phases/work tasks
Conditions and measures related to personal protection, hygiene and health evaluation	Assumes a good basic standard of occupational hygiene is implemented Avoid direct eye contact with product, also via contamination on hands Use suitable eye protection and gloves
Organisational measures to prevent/limit releases, dispersion and exposure	Supervision in place to check that the RMMs in place are being used correctly and OCs followed
Operational conditions	Assumes activities are at ambient temperature (unless stated differently)

### Section 3 - Exposure estimation

**Environmental exposure**

**Environmental release category(ies)**

ERC8a - Wide dispersive indoor use of processing aids in open systems

**Remarks**

Not relevant since not classified as dangerous for the environment.

**worker**

**Control of worker exposure**

**Calculation method**

Risk management measures are based on qualitative risk characterization  
Used ECETOC TRA model

Title	Exposure route	Calculation method	predicted exposure level	Risk characterisation ratio (RCR)
Contributing Scenario [CS] 1	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	185.25 mg/m <sup>3</sup>	0.5976
Contributing Scenario [CS] 2	Worker - inhalative, long-term - local and systemic	Used ECETOC TRA model	30.88 mg/m <sup>3</sup>	0.0996

### Section 4 - Guidance to check compliance with the exposure scenario

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.