



SAFETY DATA SHEET (1907/2006)

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2-Butyne-1,4-diol pastilles

ANNEX

1. Overview of exposure scenarios.....	4
2. Exposure Scenario 1: Manufacture and processing of 1,4-butyne-1,3-diol as an isolated intermediate under strictly controlled conditions	5
2.1. Description of Exposure Scenario	5
2.2. Environment contributing scenario.....	5
2.2.1. Manufacture of the substance (ERC 1)	5
2.2.1.1. Conditions of use	5
2.2.1.2. Local releases to the environment.....	6
2.3. Worker contributing scenario	6
2.3.1. Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC 1)	6
2.3.1.1. Conditions of use	6
2.3.2. Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC 2).....	7
2.3.2.1. Conditions of use	7
2.3.3. Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC 3).....	7
2.3.3.1. Conditions of use	7
3. EXPOSURE SCENARIO 2: Manufacture - Manufacture and bulk handling of 1,4-Butyne-1,3-diol (flake) in continuous or batch processes	9
3.1. Description of Exposure scenario	9
3.2. Environment contributing scenario.....	9
3.2.1. Manufacture of the substance (ERC 1)	9
3.2.1.1. Conditions of use	9
3.2.1.2. Local releases to the environment.....	10
3.3. Worker contributing scenario	10
3.3.1. Mixing or blending in batch processes (PROC 5).....	10
3.3.1.1. Conditions of use	10
3.3.2. Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC 8a).....	11
3.3.2.1. Conditions of use	11
3.3.3. Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC 8b).....	11
3.3.3.1. Conditions of use	11
3.3.4. Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC 9)	12
3.3.4.1. Conditions of use	12
3.3.5. Tableting, compression, extrusion, pelletisation, granulation (PROC 14).....	13
3.3.5.1. Conditions of use	13
4. EXPOSURE SCENARIO 3: Formulation or re-packing - Manufacture and bulk handling of 1,4-Butyne-1,3-diol (flake) in continuous or batch processes	14
4.1. Description of Exposure scenario	14

4.2.	Environment contributing scenario.....	14
4.2.1.	Formulation into mixture (ERC 2).....	14
4.2.1.1.	Conditions of use	14
4.2.1.2.	Local releases to the environment.....	15
4.3.	Worker contributing scenario	15
4.3.1.	Mixing or blending in batch processes - 100% (PROC 5).....	15
4.3.1.1.	Conditions of use	15
4.3.2.	Mixing or blending in batch processes - 5% (PROC 5).....	16
4.3.2.1.	Conditions of use	16
4.3.3.	Mixing or blending in batch processes - 1% up to 60 °C (PROC 5).....	16
4.3.3.1.	Conditions of use	16
4.3.4.	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities – 100% (PROC 8a).....	17
4.3.4.1.	Conditions of use	17
4.3.5.	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - 5% (PROC 8a)	18
4.3.5.1.	Conditions of use	18
4.3.6.	Transfer of substance or mixture (charging and discharging) at dedicated facilities – 100% (PROC 8b).....	18
4.3.6.1.	Conditions of use	18
4.3.7.	Transfer of substance or mixture (charging and discharging) at dedicated facilities - 5% (PROC 8b)	19
4.3.7.1.	Conditions of use	19
4.3.8.	Transfer of substance or mixture into small containers (dedicated filling line, including weighing) – 100% (PROC 9)	20
4.3.8.1.	Conditions of use	20
4.3.9.	Transfer of substance or mixture into small containers (dedicated filling line, including weighing) – 25% (PROC 9)	20
4.3.9.1.	Conditions of use	20
4.3.10.	Transfer of substance or mixture into small containers (dedicated filling line, including weighing) – 5% up to 40 °C (PROC 9).....	21
4.3.10.1.	Conditions of use	21
4.3.11.	Transfer of substance or mixture into small containers (dedicated filling line, including weighing) – 5% up to 60 °C (PROC 9).....	22
4.3.11.1.	Conditions of use	22
4.3.12.	Tabletting, compression, extrusion, pelletisation, granulation (PROC 14).....	22
4.3.12.1.	Conditions of use	22
5.	EXPOSURE SCENARIO 4: Use at industrial sites - Use and handling of coatings, electroplating, cleaning / brightening, and surface application of anti-corrosion solutions containing 1,4-Butynediol	24
5.1.	Description of Exposure scenario.....	24
5.2.	Environment contributing scenario.....	24
5.2.1.	Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4).....	24
5.2.1.1.	Conditions of use	24
5.2.1.2.	Local releases to the environment.....	25
5.3.	Worker contributing scenario	25
5.3.1.	Industrial spraying - 5% (PROC 7).....	25
5.3.1.1.	Conditions of use	25
5.3.2.	Industrial spraying - 1% (PROC 7).....	26
5.3.2.1.	Conditions of use	26
5.3.3.	Transfer of substance or mixture (charging and discharging) at nondedicated facilities - 25% (PROC 8a).....	27
5.3.3.1.	Conditions of use	27
5.3.4.	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities- 5% (PROC 8a)	27
5.3.4.1.	Conditions of use	27
5.3.5.	Transfer of substance or mixture (charging and discharging) at dedicated facilities – 100% (PROC 8b).....	28
5.3.5.1.	Conditions of use	28
5.3.6.	Transfer of substance or mixture (charging and discharging) at dedicated facilities - 25% (PROC 8b)	29
5.3.6.1.	Conditions of use	29
5.3.7.	Transfer of substance or mixture (charging and discharging) at dedicated facilities - 5% (PROC 8b)	29
5.3.7.1.	Conditions of use	29
5.3.8.	Roller application and brushing - 25% (PROC 10).....	30
5.3.8.1.	Conditions of use	30
5.3.9.	Roller application or brushing - 5% (PROC 10).....	31
5.3.9.1.	Conditions of use	31

5.3.10.	Treatment of articles by dipping and pouring - 25% (PROC 13).....	31
5.3.10.1.	Conditions of use	31
5.3.11.	Treatment of articles by dipping and pouring - 5% (PROC 13).....	32
5.3.11.1.	Conditions of use	32
6.	EXPOSURE SCENARIO 5: Use at industrial sites - Use of 1,4-Butynediol in laboratories.....	33
6.1.	Description of Exposure scenario	33
6.2.	Environment contributing scenario.....	33
6.2.1.	Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4).....	33
6.2.1.1.	Conditions of use	33
6.2.1.2.	Local releases to the environment.....	33
6.3.	Worker contributing scenario	34
6.3.1.	Use as laboratory reagent (PROC 15).....	34
6.3.1.1.	Conditions of use	34
7.	EXPOSURE SCENARIO 6: Widespread use by professional workers - Use and handling of coatings, electroplating, cleaning / brightening, and surface application of anti-corrosion solutions containing 1,4-Butynediol.....	35
7.1.	Description of Exposure scenario	35
7.2.	Environment contributing scenario.....	35
7.2.1.	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8a).....	35
7.2.1.1.	Conditions of use	35
7.2.1.2.	Local releases to the environment.....	35
7.2.2.	Widespread use of reactive processing aid (no inclusion into or onto article, indoor) (ERC 8b).....	36
7.2.2.1.	Conditions of use	36
7.2.2.2.	Local releases to the environment.....	36
7.2.3.	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC 8d).....	36
7.2.3.1.	Conditions of use	36
7.2.3.2.	Local releases to the environment.....	36
7.2.4.	Widespread use of reactive processing aid (no inclusion into or onto article, outdoor) (ERC 8e).....	37
7.2.4.1.	Conditions of use	37
7.2.4.2.	Local releases to the environment.....	37
7.3.	Worker contributing scenario	37
7.3.1.	Roller application or brushing - 5% (PROC 10).....	37
7.3.1.1.	Conditions of use	37
7.3.2.	Roller application or brushing - 1% (PROC 10).....	38
7.3.2.1.	Conditions of use	38
7.3.3.	Non industrial spraying - 1% (PROC 11).....	38
7.3.3.1.	Conditions of use	38
7.3.4.	Treatment of articles by dipping and pouring - 25% (PROC 13).....	39
7.3.4.1.	Conditions of use	39
7.3.5.	Treatment of articles by dipping and pouring - 5% (PROC 13).....	40
7.3.5.1.	Conditions of use	40
8.	EXPOSURE SCENARIO 7: Widespread use by professional workers - Use of 1,4-Butynediol in laboratories.....	41
8.1.	Description of Exposure scenario	41
8.2.	Environment contributing scenario.....	41
8.2.1.	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8a).....	41
8.2.1.1.	Conditions of use	41
8.2.1.2.	Local releases to the environment.....	41
8.3.	Worker contributing scenario	41
8.3.1.	Use as laboratory reagent - 100% (PROC 15).....	41
8.3.1.1.	Conditions of use	41
8.3.2.	Use as laboratory reagent - 25% formulation (PROC 15).....	42
8.3.2.1.	Conditions of use	42

1. OVERVIEW OF EXPOSURE SCENARIOS

ES#	Exposure scenario (ES) name
ES1 (M)	Manufacture and processing of 1,4-Butynediol as an isolated intermediate under strictly controlled conditions
ES2 (M)	Manufacture and bulk handling of 1,4-Butynediol (flake) in continuous or batch processes
ES3 (F)	Manufacture and bulk handling of 1,4-Butynediol (flake) in continuous or batch processes
ES4 (IS)	Use and handling of coatings, electroplating, cleaning / brightening, and surface application of anti-corrosion solutions containing 1,4-Butynediol
ES5 (IS)	Use of 1,4-Butynediol in laboratories
ES6 (PW)	Use and handling of coatings, electroplating, cleaning / brightening, and surface application of anti-corrosion solutions containing 1,4-Butynediol
ES7 (PW)	Use of 1,4-Butynediol in laboratories

2. EXPOSURE SCENARIO 1: MANUFACTURE AND PROCESSING OF 1,4-BUTYNEEDIOL AS AN ISOLATED INTERMEDIATE UNDER STRICTLY CONTROLLED CONDITIONS

2.1. DESCRIPTION OF EXPOSURE SCENARIO

Environment contributing scenario(s):	
Manufacture of the substance	ERC 1
Worker contributing scenario(s):	
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions.	PROC 1
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	PROC 2
Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	PROC 3

The activities take place in rigorously contained system with minimisation of release to the environment.
The activities take place in rigorously contained system with strict control for manual interventions.

2.2. ENVIRONMENT CONTRIBUTING SCENARIO

2.2.1. Manufacture of the substance (ERC 1)

2.2.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
<ul style="list-style-type: none"> Daily use amount at site: <= 366.7 tonnes/day Annual use amount at site: <= 110000 tonnes/year
Conditions and measures related to biological sewage treatment plant
<ul style="list-style-type: none"> Biological STP: Site specific [Effectiveness Water: 87.34%] Discharge rate of STP: >= 2000 m3/day Application of the STP sludge on agricultural soil: No
Conditions and measures related to external treatment of waste (including article waste)
<ul style="list-style-type: none"> Particular considerations on the waste treatment operations: Closed system required to minimise release to the environment.
Other conditions affecting environmental exposure
<ul style="list-style-type: none"> Receiving surface water flow rate: >= 18000 m3/day

Fate (release percentage) in the biological sewage treatment plant

The biological STP is site specific and the releases to the various compartments are distributed in the following way:

Release to water	12.66%
Release to air	3.02E-4%
Release to sludge	9.45E-3%
Release degraded	87.33%

2.2.1.2. Local releases to the environment

Release	Release estimation method	Explanations
Water	Estimated release factor	Release factor before on site RMM: 0% Release factor after on site RMM: 0% Local release rate: 0 kg/day Explanation: strictly controlled conditions
Air	Estimated release factor	Release factor before on site RMM: 0% Release factor after on site RMM: 0% Local release rate: 0 kg/day Explanation: strictly controlled conditions
Non agricultural soil	ERC based	Release factor after on site RMM: 0.01%

2.3. WORKER CONTRIBUTING SCENARIO

2.3.1. Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC 1)

2.3.1.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> Percentage (w/w) of substance in mixture/article: <= 100.0 % Physical form of the used product: Solid (non or low dusty form) <i>solid in aqueous solution</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> Duration of activity: <= 8.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> Occupational Health and Safety Management System: Advanced General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> Respiratory Protection: No [Effectiveness Inhalation: 0%] Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm. Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> Place of use: Indoor Operating temperature: <= 40.0 °C Skin surface potentially exposed: One hand face only (240 cm²)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

2.3.2. Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC 2)

2.3.2.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> Percentage (w/w) of substance in mixture/article: <= 100.0 % Physical form of the used product: Solid (non or low dusty form) <i>solid in aqueous solution</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> Duration of activity: <= 8.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> Occupational Health and Safety Management System: Advanced General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] Local exhaust ventilation: Yes [Effectiveness Inhalation: 90%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> Respiratory Protection: No [Effectiveness Inhalation: 0%] Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm. Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> Place of use: Indoor Operating temperature: <= 40.0 °C Skin surface potentially exposed: Two hands face (480 cm²)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

2.3.3. Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC 3)

2.3.3.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> Percentage (w/w) of substance in mixture/article: <= 100.0 % Physical form of the used product: Solid (non or low dusty form) <i>solid in aqueous solution</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> Duration of activity: <= 8.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> Occupational Health and Safety Management System: Advanced General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] Local exhaust ventilation: Yes [Effectiveness Inhalation: 90%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> Respiratory Protection: No [Effectiveness Inhalation: 0%] Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other)

<p>appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i></p>
<p>Other conditions affecting workers exposure</p>
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: One hand face only (240 cm²)

PPE is recommended against local dermal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

3. EXPOSURE SCENARIO 2: MANUFACTURE - MANUFACTURE AND BULK HANDLING OF 1,4-BUTYNEEDIOL (FLAKE) IN CONTINUOUS OR BATCH PROCESSES

3.1. DESCRIPTION OF EXPOSURE SCENARIO

Environment contributing scenario(s):	
Manufacture of the substance	ERC 1
Worker contributing scenario(s):	
Mixing or blending in batch processes	PROC 5
Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC 8a
Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC 8b
Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC 9
Tableting, compression, extrusion, pelletisation, granulation	PROC 14

The activities take place in rigorously contained system with minimisation of release to the environment.
 The activities take place in rigorously contained system with strict control for manual interventions.

3.2. ENVIRONMENT CONTRIBUTING SCENARIO

3.2.1. Manufacture of the substance (ERC 1)

3.2.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
<ul style="list-style-type: none"> Daily use amount at site: <= 35.0 tonnes/day Annual use amount at site: <= 700.0 tonnes/year
Conditions and measures related to biological sewage treatment plant
<ul style="list-style-type: none"> Biological STP: Site specific [Effectiveness Water: 87.34%] Discharge rate of STP: >= 2000 m3/day Application of the STP sludge on agricultural soil: No
Conditions and measures related to external treatment of waste (including article waste)
<ul style="list-style-type: none"> Particular considerations on the waste treatment operations: Closed system required to minimise release to the environment.
Other conditions affecting environmental exposure
<ul style="list-style-type: none"> Receiving surface water flow rate: >= 18000 m3/day

Fate (release percentage) in the biological sewage treatment plant

The biological STP is site specific and the releases to the various compartments are distributed in the following way:

Release to water	12.66%
Release to air	3.02E-4%
Release to sludge	9.45E-3%
Release degraded	87.33%

3.2.1.2. Local releases to the environment

Release	Release estimation method	Explanations
Water	Estimated release factor	Release factor before on site RMM: 0% Release factor after on site RMM: 0% Local release rate: 0 kg/day Explanation: manufacturing of butynediol takes place in a closed system with no releases to the environment
Air	ERC based	Release factor before on site RMM: 5% Release factor after on site RMM: 5% Local release rate: 1.75E3 kg/day
Non agricultural soil	ERC based	Release factor after on site RMM: 0.01%

3.3. WORKER CONTRIBUTING SCENARIO

3.3.1. Mixing or blending in batch processes (PROC 5)

3.3.1.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 100.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 1.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 90%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands face (480 cm²)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

3.3.2. Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC 8a)

3.3.2.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 100.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 1.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 90%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands (960 cm²)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

3.3.3. Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC 8b)

3.3.3.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 100.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 1.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 95%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training)

and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> <ul style="list-style-type: none"> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands (960 cm2)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

3.3.4. Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC 9)

3.3.4.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 100.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 1.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 90%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> <ul style="list-style-type: none"> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands face (480 cm2)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

3.3.5. Tableting, compression, extrusion, pelletisation, granulation (PROC 14)

3.3.5.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none">• Percentage (w/w) of substance in mixture/article: $\leq 100.0\%$• Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none">• Duration of activity: ≤ 8.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none">• Occupational Health and Safety Management System: Advanced• General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%]• Local exhaust ventilation: Yes [Effectiveness Inhalation: 90%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none">• Respiratory Protection: No [Effectiveness Inhalation: 0%]• Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i>• Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none">• Place of use: Indoor• Operating temperature: $\leq 40.0\text{ }^{\circ}\text{C}$• Skin surface potentially exposed: Two hands face (480 cm²)

PPE is recommended against local dermal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

4. EXPOSURE SCENARIO 3: FORMULATION OR RE-PACKING - MANUFACTURE AND BULK HANDLING OF 1,4-BUTYNEEDIOL (FLAKE) IN CONTINUOUS OR BATCH PROCESSES

4.1. DESCRIPTION OF EXPOSURE SCENARIO

Product category formulated: PC 14: Metal surface treatment products, including galvanic and electroplating products; PC 35: Washing and Cleaning Products (including solvent based products); PC 37: Water treatment chemicals; PC 9a: Coatings and Paints, Thinners, paint removers

Environment contributing scenario(s):	
Formulation into mixture	ERC 2
Worker contributing scenario(s):	
Mixing or blending in batch processes	PROC 5
Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC 8a
Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC 8b
Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC 9
Tabletting, compression, extrusion, pelletisation, granulation	PROC 14

The activities take place in rigorously contained system with strict control for manual interventions.

4.2. ENVIRONMENT CONTRIBUTING SCENARIO

4.2.1. Formulation into mixture (ERC 2)

4.2.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
<ul style="list-style-type: none"> Annual use amount at site: <= 20.0 tonnes/year Daily use amount at site: <= 0.1 tonnes/day <i>Annual amount divided per 200 days of use a year.</i>
Technical and organisational conditions and measures
<ul style="list-style-type: none"> Indoor/outdoor use: Indoor use Process efficiency: Process with efficient use of raw materials.
Conditions and measures related to biological sewage treatment plant
<ul style="list-style-type: none"> Application of the STP sludge on agricultural soil: No Biological STP: Site specific [Effectiveness Water: 87.34%] Discharge rate of STP: >= 2000 m3/day
Conditions and measures related to external treatment of waste (including article waste)
<ul style="list-style-type: none"> Particular considerations on the waste treatment operations: Closed system required to minimise release to the environment.

Fate (release percentage) in the biological sewage treatment plant

The biological STP is site specific and the releases to the various compartments are distributed in the following way:

Release to water	12.66%
Release to air	3.02E-4%
Release to sludge	9.45E-3%

Release degraded	87.33%
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4.2.1.2. Local releases to the environment

Release	Release estimation method	Explanations
Water	ERC based	Release factor before on site RMM: 2% Release factor after on site RMM: 2% Local release rate: 2 kg/day
Air	ERC based	Release factor before on site RMM: 2.5% Release factor after on site RMM: 2.5% Local release rate: 2.5 kg/day
Non agricultural soil	ERC based	Release factor after on site RMM: 0.01%

4.3. WORKER CONTRIBUTING SCENARIO

4.3.1. Mixing or blending in batch processes - 100% (PROC 5)

4.3.1.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 100.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 1.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 90%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands face (480 cm²)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

4.3.2. Mixing or blending in batch processes - 5% (PROC 5)

4.3.2.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 5.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 8.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 90%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands face (480 cm²)

PPE is recommended against local dermal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

4.3.3. Mixing or blending in batch processes - 1% up to 60 °C (PROC 5)

4.3.3.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 1.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 4.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 90%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: Yes (Respirator with APF of 20) [Effectiveness Inhalation: 95%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness</i>

<i>approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
• Place of use: Indoor • Operating temperature: <= 60.0 °C • Skin surface potentially exposed: Two hands face (480 cm2)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

4.3.4. Transfer of substance or mixture (charging and discharging) at non-dedicated facilities – 100% (PROC 8a)

4.3.4.1. Conditions of use

Product (Article) characteristics
• Percentage (w/w) of substance in mixture/article: <= 100.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
• Duration of activity: <= 1.0 h/day
Technical and organisational conditions and measures
• Occupational Health and Safety Management System: Advanced • General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 90%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
• Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
• Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands (960 cm2)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

4.3.5. Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - 5% (PROC 8a)

4.3.5.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 5.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 8.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 90%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands (960 cm²)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

4.3.6. Transfer of substance or mixture (charging and discharging) at dedicated facilities – 100% (PROC 8b)

4.3.6.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 100.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 1.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 95%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training)

and (other) appropriate dermal protection [Effectiveness Dermal: 95%] EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm. Chemical protection suit: EN 14605 and EN 13982 Dense rubber boots for cleaning • Use of eye protection: Yes Eye and face protection acc. to EN 166
Other conditions affecting workers exposure
• Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands (960 cm2)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

4.3.7. Transfer of substance or mixture (charging and discharging) at dedicated facilities - 5% (PROC 8b)

4.3.7.1. Conditions of use

Product (Article) characteristics
• Percentage (w/w) of substance in mixture/article: <= 5.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
• Duration of activity: <= 8.0 h/day
Technical and organisational conditions and measures
• Occupational Health and Safety Management System: Advanced • General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 95%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
• Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm. Chemical protection suit: EN 14605 and EN 13982 Dense rubber boots for cleaning • Use of eye protection: Yes Eye and face protection acc. to EN 166
Other conditions affecting workers exposure
• Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands (960 cm2)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

4.3.8. Transfer of substance or mixture into small containers (dedicated filling line, including weighing) – 100% (PROC 9)

4.3.8.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 100.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 1.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 90%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands face (480 cm²)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

4.3.9. Transfer of substance or mixture into small containers (dedicated filling line, including weighing) – 25% (PROC 9)

4.3.9.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 25.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 4.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 90%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training)

and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> <ul style="list-style-type: none"> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands face (480 cm²)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

4.3.10. Transfer of substance or mixture into small containers (dedicated filling line, including weighing) – 5% up to 40 °C (PROC 9)

4.3.10.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 5.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 8.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 90%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> <ul style="list-style-type: none"> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands face (480 cm²)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

4.3.11. Transfer of substance or mixture into small containers (dedicated filling line, including weighing) – 5% up to 60 °C (PROC 9)

4.3.11.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 5.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 4.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 90%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: Yes (Respirator with APF of 20) [Effectiveness Inhalation: 95%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 60.0 °C • Skin surface potentially exposed: Two hands face (480 cm²)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

4.3.12. Tableting, compression, extrusion, pelletisation, granulation (PROC 14)

4.3.12.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Physical form of the used product: Solid (non or low dusty form) • Percentage (w/w) of substance in mixture/article: <= 100.0 %
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 8.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 90%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%]

<i>Gloves: Uvex Rubiflex S or equivalent</i> <i>Chemical protection suit: Microchem 3000 or equivalent</i> <ul style="list-style-type: none"> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: ≤ 40.0 °C • Skin surface potentially exposed: Two hands face (480 cm²)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

5. EXPOSURE SCENARIO 4: USE AT INDUSTRIAL SITES - USE AND HANDLING OF COATINGS, ELECTROPLATING, CLEANING / BRIGHTENING, AND SURFACE APPLICATION OF ANTI-CORROSION SOLUTIONS CONTAINING 1,4-BUTYNEEDIOL

5.1. DESCRIPTION OF EXPOSURE SCENARIO

Product category used: PC 14: Metal surface treatment products, including galvanic and electroplating products; PC 35: Washing and Cleaning Products (including solvent based products); PC 9a: Coatings and Paints, Thinners, paint removers
Sector of use: SU 15: Manufacture of fabricated metal products, except machinery and equipment; SU 16: Manufacture of computer, electronic and optical products, electrical equipment

Environment contributing scenario(s):	
Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):	
Industrial spraying	PROC 7
Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC 8a
Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC 8b
Roller application or brushing	PROC 10
Treatment of articles by dipping and pouring	PROC 13

The activities take place in rigorously contained system with minimisation of release to the environment.

5.2. ENVIRONMENT CONTRIBUTING SCENARIO

5.2.1. Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

5.2.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
<ul style="list-style-type: none"> Daily use amount at site: ≤ 3.0 tonnes/day Annual use amount at site: ≤ 650.0 tonnes/year
Technical and organisational conditions and measures
<ul style="list-style-type: none"> Process efficiency: Process optimized for highly efficient use of raw materials (II) <i>Typical measures may include e.g.</i> <ul style="list-style-type: none"> Closed automated process and/or Closed transfer system and/or Centralized process control and/or re-use of process grey water for cleaning optimized and/or automated systems for the transport and handling of raw materials, that minimize overall exposure levels and incidental spills Reduced number of transfer and cleaning operations through e.g. Manufacturing of different products from one premix (masterbatch), to which certain ingredients are added to yield the final products. Dedicated storage tanks for raw materials, premixes and final products Recovery of materials through e.g. <ul style="list-style-type: none"> Recycling Residues of granular detergents in cleaning steps at packaging or transfer lines into the slurries. Process efficiency: Optimized water use due to e.g. re-use of rinsing water
Conditions and measures related to biological sewage treatment plant
<ul style="list-style-type: none"> Biological STP: Site specific [Effectiveness Water: 87.34%] Discharge rate of STP: ≥ 2000 m³/day Application of the STP sludge on agricultural soil: No

Conditions and measures related to external treatment of waste (including article waste)
<ul style="list-style-type: none"> Particular considerations on the waste treatment operations: Closed system required to minimise release to the environment.
Other conditions affecting environmental exposure
<ul style="list-style-type: none"> Receiving surface water flow rate: ≥ 18000 m³/day

Fate (release percentage) in the biological sewage treatment plant

The biological STP is site specific and the releases to the various compartments are distributed in the following way:

Release to water	12.66%
Release to air	3.02E-4%
Release to sludge	9.45E-3%
Release degraded	87.33%

5.2.1.2. Local releases to the environment

Release	Release estimation method	Explanations
Water	Estimated release factor	Release factor before on site RMM: 0.07% Release factor after on site RMM: 0.07% Local release rate: 2.1 kg/day Explanation: Closed system: - negligible wastewater emissions as process operates without water contact; - no free product in wastewater stream.
Air	Estimated release factor	Release factor before on site RMM: 40% Release factor after on site RMM: 40% Local release rate: 1.2E3 kg/day Explanation: Negligible air emissions as process operates in a contained system.
Non agricultural soil	ERC based	Release factor after on site RMM: 5%

5.3. WORKER CONTRIBUTING SCENARIO

5.3.1. Industrial spraying - 5% (PROC 7)

5.3.1.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> Percentage (w/w) of substance in mixture/article: ≤ 5.0 % Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> Duration of activity: ≤ 1.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> Occupational Health and Safety Management System: Advanced General ventilation: Good general ventilation (3-5 air changes per hour) [Effectiveness Inhalation: 30%] Local exhaust ventilation: Yes [Effectiveness Inhalation: 95%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> Respiratory Protection: No [Effectiveness Inhalation: 0%]

<ul style="list-style-type: none"> • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands and upper wrists (1500 cm2)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

5.3.2. Industrial spraying - 1% (PROC 7)

5.3.2.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 1.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 4.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 95%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands and upper wrists (1500 cm2)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

5.3.3. Transfer of substance or mixture (charging and discharging) at nondedicated facilities - 25% (PROC 8a)

5.3.3.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 25.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 1.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Good general ventilation (3-5 air changes per hour) [Effectiveness Inhalation: 30%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 90%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands (960 cm²)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

5.3.4. Transfer of substance or mixture (charging and discharging) at non-dedicated facilities- 5% (PROC 8a)

5.3.4.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 5.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 8.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 90%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%]

<p>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm. Chemical protection suit: EN 14605 and EN 13982 Dense rubber boots for cleaning • Use of eye protection: Yes Eye and face protection acc. to EN 166</p>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands (960 cm2)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

5.3.5. Transfer of substance or mixture (charging and discharging) at dedicated facilities – 100% (PROC 8b)

5.3.5.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 100.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 1.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%] • Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm. Chemical protection suit: EN 14605 and EN 13982 Dense rubber boots for cleaning • Use of eye protection: Yes Eye and face protection acc. to EN 166
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 20.0 °C • Skin surface potentially exposed: Two hands (960 cm2)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

5.3.6. Transfer of substance or mixture (charging and discharging) at dedicated facilities - 25% (PROC 8b)

5.3.6.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 25.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 1.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Good general ventilation (3-5 air changes per hour) [Effectiveness Inhalation: 30%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 95%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands (960 cm²)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

5.3.7. Transfer of substance or mixture (charging and discharging) at dedicated facilities - 5% (PROC 8b)

5.3.7.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 5.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 8.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 95%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%]

<p><i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i></p> <p><i>Chemical protection suit: EN 14605 and EN 13982</i></p> <p><i>Dense rubber boots for cleaning</i></p> <ul style="list-style-type: none"> • Use of eye protection: Yes <p><i>Eye and face protection acc. to EN 166</i></p>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands (960 cm2)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

5.3.8. Roller application and brushing - 25% (PROC 10)

5.3.8.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 25.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 1.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Good general ventilation (3-5 air changes per hour) [Effectiveness Inhalation: 30%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 90%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <p><i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i></p> <p><i>Chemical protection suit: EN 14605 and EN 13982</i></p> <p><i>Dense rubber boots for cleaning</i></p> <ul style="list-style-type: none"> • Use of eye protection: Yes <p><i>Eye and face protection acc. to EN 166</i></p>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands (960 cm2)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

5.3.9. Roller application or brushing - 5% (PROC 10)

5.3.9.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 5.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 4.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 90%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands (960 cm²)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

5.3.10. Treatment of articles by dipping and pouring - 25% (PROC 13)

5.3.10.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 25.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 1.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Good general ventilation (3-5 air changes per hour) [Effectiveness Inhalation: 30%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 90%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness</i>

<i>approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> <ul style="list-style-type: none"> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands face (480 cm²)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

5.3.11. Treatment of articles by dipping and pouring - 5% (PROC 13)

5.3.11.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 5.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 1.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Advanced • General ventilation: Good general ventilation (3-5 air changes per hour) [Effectiveness Inhalation: 30%] • Local exhaust ventilation: Yes [Effectiveness Inhalation: 90%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> <ul style="list-style-type: none"> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands face (480 cm²)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

6. EXPOSURE SCENARIO 5: USE AT INDUSTRIAL SITES - USE OF 1,4-BUTYNYEDIOL IN LABORATORIES

6.1. DESCRIPTION OF EXPOSURE SCENARIO

Product category used: PC 21: Laboratory Chemicals

Environment contributing scenario(s):	
Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):	
Use as laboratory reagent	PROC 15

6.2. ENVIRONMENT CONTRIBUTING SCENARIO

6.2.1. Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

6.2.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
<ul style="list-style-type: none"> Annual use amount at site: <= 1.0 tonnes/year Daily use amount at site: <= 0.001 tonnes/day <p><i>The default daily use amount is the substance maximum use rate in a typical operation (M_{sperc}). It is the typical maximum site tonnage, based on sector knowledge. 220 emission days/year are assumed.</i></p>
Technical and organisational conditions and measures
<ul style="list-style-type: none"> Indoor/outdoor use: Covers Indoor and Outdoor use Type of Process: Solvent based process Equipment cleaning: Equipment cleaned with organic solvent, washings are collected and disposed of as solvent waste. Process efficiency: Process with efficient use of raw materials.
Conditions and measures related to biological sewage treatment plant
<ul style="list-style-type: none"> Application of the STP sludge on agricultural soil: Yes Biological STP: Standard [Effectiveness Water: 87.34%] Discharge rate of STP: >= 2000 m³/day
Conditions and measures related to external treatment of waste (including article waste)
<ul style="list-style-type: none"> Particular considerations on the waste treatment operations

6.2.1.2. Local releases to the environment

Release	Release estimation method	Explanations
Water	ERC based	Release factor before on site RMM: 100% Release factor after on site RMM: 100% Local release rate: 1 kg/day
Air	ERC based	Release factor before on site RMM: 100% Release factor after on site RMM: 100% Local release rate: 1 kg/day
Non agricultural soil	ERC based	Release factor after on site RMM: 5%

6.3. WORKER CONTRIBUTING SCENARIO

6.3.1. Use as laboratory reagent (PROC 15)

6.3.1.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none">• Percentage (w/w) of substance in mixture/article: <= 100.0 %• Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none">• Duration of activity: <= 8.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none">• Occupational Health and Safety Management System: Advanced• General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%]• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none">• Respiratory Protection: No [Effectiveness Inhalation: 0%]• Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with specific activity training) and (other) appropriate dermal protection [Effectiveness Dermal: 95%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i>• Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none">• Place of use: Indoor• Operating temperature: <= 40.0 °C• Skin surface potentially exposed: One hand face only (240 cm²)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate gloves, goggles/face mask are recommended (described above).

7. EXPOSURE SCENARIO 6: WIDESPREAD USE BY PROFESSIONAL WORKERS - USE AND HANDLING OF COATINGS, ELECTROPLATING, CLEANING / BRIGHTENING, AND SURFACE APPLICATION OF ANTI-CORROSION SOLUTIONS CONTAINING 1,4-BUTYNE DIOL

7.1. DESCRIPTION OF EXPOSURE SCENARIO

Product category used: PC 14: Metal surface treatment products, including galvanic and electroplating products; PC 35: Washing and Cleaning Products (including solvent based products); PC 9a: Coatings and Paints, Thinners, paint removers
Sector of use: SU 15: Manufacture of fabricated metal products, except machinery and equipment; SU 16: Manufacture of computer, electronic and optical products, electrical equipment

Environment contributing scenario(s):	
Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8a
Widespread use of reactive processing aid (no inclusion into or onto article, indoor)	ERC 8b
Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)	ERC 8d
Widespread use of reactive processing aid (no inclusion into or onto article, outdoor)	ERC 8e
Worker contributing scenario(s):	
Roller application or brushing	PROC 10
Non industrial spraying	PROC 11
Treatment of articles by dipping and pouring	PROC 13

7.2. ENVIRONMENT CONTRIBUTING SCENARIO

7.2.1. Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8a)

7.2.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily local widespread use amount: <= 0.000017 tonnes/day
Conditions and measures related to biological sewage treatment plant
• Biological STP: Standard [Effectiveness Water: 87.34%]
Conditions and measures related to external treatment of waste (including article waste)
• Particular considerations on the waste treatment operations

7.2.1.2. Local releases to the environment

Release	Release estimation method	Explanations
Water	ERC based	Release factor before on site RMM: 100% Release factor after on site RMM: 100% Local release rate: 0.017 kg/day
Air	ERC based	Release factor before on site RMM: 100% Release factor after on site RMM: 100%
Non agricultural soil	ERC based	Release factor after on site RMM: 0%

7.2.2. Widespread use of reactive processing aid (no inclusion into or onto article, indoor) (ERC 8b)

7.2.2.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily local widespread use amount: <= 0.000017 tonnes/day
Conditions and measures related to biological sewage treatment plant
• Biological STP: Standard [Effectiveness Water: 87.34%]
Conditions and measures related to external treatment of waste (including article waste)
• Particular considerations on the waste treatment operations

7.2.2.2. Local releases to the environment

Release	Release estimation method	Explanations
Water	ERC based	Release factor before on site RMM: 2% Release factor after on site RMM: 2% Local release rate: 3.3E-4 kg/day
Air	ERC based	Release factor before on site RMM: 0.1% Release factor after on site RMM: 0.1%
Non agricultural soil	ERC based	Release factor after on site RMM: 0%

7.2.3. Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC 8d)

7.2.3.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily local widespread use amount: <= 0.000017 tonnes/day
Conditions and measures related to biological sewage treatment plant
• Biological STP: Standard [Effectiveness Water: 87.34%]
Conditions and measures related to external treatment of waste (including article waste)
• Particular considerations on the waste treatment operations

7.2.3.2. Local releases to the environment

Release	Release estimation method	Explanations
Water	ERC based	Release factor before on site RMM: 100% Release factor after on site RMM: 100% Local release rate: 0.017 kg/day
Air	ERC based	Release factor before on site RMM: 100% Release factor after on site RMM: 100%
Non agricultural soil	ERC based	Release factor after on site RMM: 20%

7.2.4. Widespread use of reactive processing aid (no inclusion into or onto article, outdoor) (ERC 8e)

7.2.4.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily local widespread use amount: ≤ 0.000017 tonnes/day
Conditions and measures related to biological sewage treatment plant
• Biological STP: Standard [Effectiveness Water: 87.34%]
Conditions and measures related to external treatment of waste (including article waste)
• Particular considerations on the waste treatment operations

7.2.4.2. Local releases to the environment

Release	Release estimation method	Explanations
Water	ERC based	Release factor before on site RMM: 2% Release factor after on site RMM: 2% Local release rate: $3.3E-4$ kg/day
Air	ERC based	Release factor before on site RMM: 0.1% Release factor after on site RMM: 0.1%
Non agricultural soil	ERC based	Release factor after on site RMM: 1%

7.3. WORKER CONTRIBUTING SCENARIO

7.3.1. Roller application or brushing - 5% (PROC 10)

7.3.1.1. Conditions of use

Product (Article) characteristics
• Percentage (w/w) of substance in mixture/article: ≤ 5.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
• Duration of activity: ≤ 1.0 h/day
Technical and organisational conditions and measures
• Occupational Health and Safety Management System: Basic • General ventilation: Good general ventilation (3-5 air changes per hour) [Effectiveness Inhalation: 30%] • Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
• Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with basic employee training) and (other) appropriate dermal protection [Effectiveness Dermal: 90%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
• Place of use: Indoor

- Operating temperature: <= 40.0 °C
- Skin surface potentially exposed: Two hands (960 cm²)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

7.3.2. Roller application or brushing - 1% (PROC 10)

7.3.2.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 1.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 4.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Basic • General ventilation: Good general ventilation (3-5 air changes per hour) [Effectiveness Inhalation: 30%] • Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with basic employee training) and (other) appropriate dermal protection [Effectiveness Dermal: 90%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands (960 cm²)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

7.3.3. Non industrial spraying - 1% (PROC 11)

7.3.3.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 1.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 0.25 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Basic • General ventilation: Good general ventilation (3-5 air changes per hour) [Effectiveness Inhalation: 30%] • Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]

Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with basic employee training) and (other) appropriate dermal protection [Effectiveness Dermal: 90%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands and upper wrists (1500 cm2)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

7.3.4. Treatment of articles by dipping and pouring - 25% (PROC 13)

7.3.4.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 25.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none"> • Duration of activity: <= 0.25 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Basic • Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%] • General ventilation: Good general ventilation (3-5 air changes per hour) [Effectiveness Inhalation: 30%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with basic employee training) and (other) appropriate dermal protection [Effectiveness Dermal: 90%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: Two hands face (480 cm2)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

7.3.5. Treatment of articles by dipping and pouring - 5% (PROC 13)

7.3.5.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none">• Percentage (w/w) of substance in mixture/article: $\leq 5.0\%$• Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
<ul style="list-style-type: none">• Duration of activity: ≤ 1.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none">• Occupational Health and Safety Management System: Basic• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none">• Respiratory Protection: No [Effectiveness Inhalation: 0%]• Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with basic employee training) and (other) appropriate dermal protection [Effectiveness Dermal: 90%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> <i>Chemical protection suit: EN 14605 and EN 13982</i> <i>Dense rubber boots for cleaning</i>• Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none">• Place of use: Indoor• Operating temperature: ≤ 40.0 °C• Skin surface potentially exposed: Two hands face (480 cm²)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate chemical protection suit, gloves, goggles/face mask and boots are recommended (described above).

8. EXPOSURE SCENARIO 7: WIDESPREAD USE BY PROFESSIONAL WORKERS - USE OF 1,4-BUTYNEEDIOL IN LABORATORIES

8.1. DESCRIPTION OF EXPOSURE SCENARIO

Product category used: PC 21: Laboratory Chemicals

Environment contributing scenario(s):	
Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) ERC 8a	
Worker contributing scenario(s):	
Use as laboratory reagent	PROC 15

8.2. ENVIRONMENT CONTRIBUTING SCENARIO

8.2.1. Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8a)

8.2.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily local widespread use amount: ≤ 0.00000055 tonnes/day
Conditions and measures related to biological sewage treatment plant
• Biological STP: Standard [Effectiveness Water: 87.34%]
Conditions and measures related to external treatment of waste (including article waste)
• Particular considerations on the waste treatment operations

8.2.1.2. Local releases to the environment

Release	Release estimation method	Explanations
Water	ERC based	Release factor before on site RMM: 100% Release factor after on site RMM: 100% Local release rate: $5.5E-4$ kg/day
Air	ERC based	Release factor before on site RMM: 100% Release factor after on site RMM: 100%
Non agricultural soil	ERC based	Release factor after on site RMM: 0%

8.3. WORKER CONTRIBUTING SCENARIO

8.3.1. Use as laboratory reagent - 100% (PROC 15)

8.3.1.1. Conditions of use

Product (Article) characteristics
• Percentage (w/w) of substance in mixture/article: ≤ 100.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
• Duration of activity: ≤ 1.0 h/day
Technical and organisational conditions and measures
• Occupational Health and Safety Management System: Basic • General ventilation: Good general ventilation (3-5 air changes per hour) [Effectiveness Inhalation: 30%]

• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with basic employee training) and (other) appropriate dermal protection [Effectiveness Dermal: 90%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: One hand face only (240 cm²)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate gloves, goggles/face mask are recommended (described above)

8.3.2. Use as laboratory reagent - 25% formulation (PROC 15)

8.3.2.1. Conditions of use

Product (Article) characteristics
<ul style="list-style-type: none"> • Percentage (w/w) of substance in mixture/article: <= 25.0 % • Physical form of the used product: Solid (non or low dusty form)
Amount used (or contained in articles), frequency and duration of use/exposure
• Duration of activity: <= 4.0 h/day
Technical and organisational conditions and measures
<ul style="list-style-type: none"> • Occupational Health and Safety Management System: Basic • General ventilation: Good general ventilation (3-5 air changes per hour) [Effectiveness Inhalation: 30%] • Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]
Conditions and measures related to personal protection, hygiene and health evaluation
<ul style="list-style-type: none"> • Respiratory Protection: No [Effectiveness Inhalation: 0%] • Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with basic employee training) and (other) appropriate dermal protection [Effectiveness Dermal: 90%] <i>EN374 gloves, with protection index of at least 2 (breakthrough time >30 min). Nitrile rubber, thickness approx. 0.40 mm.</i> • Use of eye protection: Yes <i>Eye and face protection acc. to EN 166</i>
Other conditions affecting workers exposure
<ul style="list-style-type: none"> • Place of use: Indoor • Operating temperature: <= 40.0 °C • Skin surface potentially exposed: One hand face only (240 cm²)

PPE is recommended against local demal effects as well as local effects in eyes. Qualitative risk assessment has been done with regards to C&L. Appropriate gloves, goggles/face mask are recommended (described above).