



## SAFETY DATA SHEET (1907/2006)

**R0718448**

**Revision Date:** 2018-09-26

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**BLO<sup>®</sup>**

**ANNEX**

### 1. Manufacture of $\gamma$ -Butyrolactone and Other Substances

Section 1	Exposure Scenario Title
<b>Title</b>	<b>Manufacture of <math>\gamma</math>-Butyrolactone and Other Substances; CASRN: 96-48-0</b>
<b>Use Descriptor</b>	Sector of Use: Industrial (SU3, SU8, SU9)
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC15
	Environmental Release Categories: ERC1
<b>Processes, tasks, activities covered</b>	Manufacture of Substance A or use as an intermediate or process chemical or extraction agent. Includes recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container).
Section 2	Operational conditions and risk management measures
<i>Field for additional statements to explain scenario if required.</i>	As described below
Section 2.1	Control of worker exposure
<b>Product characteristics</b>	
- Physical form of product	Liquid
- Vapour pressure	0.344 hPa at 20°C
- Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
- Amounts used	<i>Not applicable</i>
<b>Frequency and duration of use</b>	Covers daily exposures up to 8 hours (unless stated differently) [G2]
<b>Human factors not influenced by risk management</b>	<i>Not applicable</i>
<b>Other Operational Conditions affecting worker exposure</b>	Assumes a good basic standard of occupational hygiene is implemented [G1].
<b>Risk Management Measures</b>	<b><i>Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment.</i></b>
General exposures (closed systems) [CS15]. >4 hours, ambient temp. to <62°C	No specific measures identified [E18]. {Wear suitable gloves tested to EN374 [PPE15]}.
General exposures (closed systems) [CS15]. >4 hours, ambient temp. to <62°C	Handle substance within a predominantly closed system provided with extract ventilation [E49]. {Ensure material transfers are under containment or extract ventilation [E66]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
General exposures (closed systems) [CS15]. >4 hours, ambient temp. to <62°C	Handle substance within a closed system [E47]. {Ensure material transfers are under containment or extract ventilation [E66]}. {Ensure the ventilation system is regularly maintained and tested [E74]}.
General exposures (open systems) [CS16]. >4 hours, ambient temp. to <62°C	Handle substance within a closed system [E47]. {Provide extract ventilation to points where emissions occur [E54]}. {Ensure the ventilation system is regularly maintained

	and tested [E74]]. {Wear suitable gloves tested to EN374 [PPE15]}.
Process sampling [CS2]. >4 hours, ambient temp. to <62°C	No specific measures identified [E18]. {Provide extract ventilation to points where emissions occur [E54]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. >4 hours, ambient temp. to <62°C	No specific measures identified [E18]. {Handle in a fume cupboard or under extract ventilation [E83]}. {Ensure the ventilation system is regularly maintained and tested [E74]}.
Bulk transfers [CS14]. ; (open systems) [CS108]>4 hours, ambient temp. to <62°C	Handle substance within a closed system [E47].{Wear suitable gloves tested to EN374 [PPE15]}.
Bulk transfers [CS14]. ; (open systems) [CS108]>4 hours, ambient temp. to <62°C Aerosols.	Handle substance within a closed system [E47].; Clear transfer lines prior to de-coupling [E39].Provide extract ventilation to material transfer points and other openings [E82].{Wear suitable gloves tested to EN374 [PPE15]}.
Bulk transfers [CS14]. ; (closed systems) [CS107] daily; ambient temp. to <62°C	No specific measures identified [E18]. {Clear transfer lines prior to de-coupling [E39]}. {Ensure material transfers are under containment or extract ventilation [E66]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Equipment cleaning and maintenance [CS39]. >4 hours; ambient temp. to <62°C	Drain down system prior to equipment break-in or maintenance [E65].Use suitable eye protection and gloves [PPE14]. ; Wear suitable coveralls to prevent exposure to the skin [PPE27].{Ensure material transfers are under containment or extract ventilation [E66]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Retain drain downs in sealed storage pending disposal or for subsequent recycle [ENVT4]}.
Storage [CS67] daily; ambient temp. to <62°C	No specific measures identified [E18]. {Avoid dip sampling [E42]}. {Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour) [E40]}. {Wear suitable gloves tested to EN374 [PPE15]}.
<b>Section 2.2</b>	<b>Control of environmental exposure</b>
As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.	
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>Health</b>	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.
<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>Health</b>	Confirm that RMMs and OCs are as described.
<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 5</b>	<b>Additional good practice advice beyond the REACH Chemical Safety Assessment</b>
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH.	
Control of Worker Exposure	Good practice RMM phrases are {indicated} and incorporated within the ES Section 2 or consolidated into the main sections of the SDS.
Control of environmental exposure	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.

## 2. Manufacture of $\gamma$ -Butyrolactone as intermediate under strictly controlled conditions

Section 1		Exposure Scenario Title
Title	Manufacture of $\gamma$ -Butyrolactone as intermediate under SCC; CASRN: 96-48-0	
Use Descriptor	Sector of Use: Industrial (SU3, SU8, SU9)	
	Process Categories: PROC1, PROC2, PROC3	
	Environmental Release Categories: N/A under SCC	
Processes, tasks, activities covered	Manufacture of Substance A or use as an intermediate or process chemical or extraction agent. Includes recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container). All tasks take place under SCC.	
Section 2		Operational conditions and risk management measures
<i>Field for additional statements to explain scenario if required.</i>		As described below
Section 2.1		Control of worker exposure
<b>Product characteristics</b>		
- Physical form of product	Liquid	
- Vapour pressure	0.344 hPa at 20°C	
- Concentration of substance in product	<i>Not applicable</i>	
- Amounts used	<i>Not applicable</i>	
Frequency and duration of use	<i>Not applicable</i>	
Human factors not influenced by risk management	<i>Not applicable</i>	
Other Operational Conditions affecting worker exposure	The processes are performed under strictly controlled conditions.	
<b>Risk Management Measures</b>		
<i>Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment.</i>		
PROC 1 - Use in closed process, no likelihood of exposure, as solution or molten liquid, Continuous; daily;	Handle substance within a closed system [E47].	
PROC 2 - Use in closed, continuous process with occasional controlled exposure, as solution or molten	Handle substance within a closed system [E47].	
PROC 3 - Use in closed batch process (synthesis or formulation), as solution or molten liquid, daily; >4 hours, ambient temp. to <100°C	Handle substance within a closed system [E47].	
Section 2.2		Control of environmental exposure
As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.		
Section 3		Exposure Estimation
Health	As strictly controlled conditions are applied no exposure is anticipated.	
Environment	As strictly controlled conditions are applied no exposure is anticipated.	
Section 4		Guidance to check compliance with the Exposure Scenario
Health	Confirm that strictly controlled conditions are applied.	
Environment	Confirm that strictly controlled conditions are applied.	
Section 5		Additional good practice advice beyond the REACH Chemical Safety Assessment
Note: Because strictly controlled conditions are applied, no further safety assessment is necessary.		

### 3. Formulation and Packing of Preparations and Mixtures Containing $\gamma$ -Butyrolactone

Section 1	Exposure Scenario Title
<b>Title</b>	<b>Formulation and Packing of Preparations and Mixtures Containing <math>\gamma</math>-Butyrolactone; CASRN: 96-48-0</b>
<b>Use Descriptor</b>	Sector of Use: Industrial (SU3, SU10)
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15
	Environmental Release Categories: ERC2
<b>Processes, tasks, activities covered</b>	Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, large and small scale packing, maintenance and associated laboratory activities
Section 2	Operational conditions and risk management measures
<i>Field for additional statements to explain scenario if required.</i>	As described below
Section 2.1	Control of worker exposure
<b>Product characteristics</b>	
- Physical form of product	Liquid
- Vapour pressure	0.344 hPa at 20°C
- Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
- Amounts used	<i>Not applicable</i>
<b>Frequency and duration of use</b>	Covers daily exposures up to 8 hours (unless stated differently) [G2]
<b>Human factors not influenced by risk management</b>	<i>Not applicable</i>
<b>Other Operational Conditions affecting worker exposure</b>	Assumes a good basic standard of occupational hygiene is implemented [G1].
<b>Risk Management Measures</b>	<b><i>Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment.</i></b>
General exposures (closed systems) [CS15]. >4 hours, ambient temp. to <62°C	Handle substance within a closed system [E47].
General exposures (closed systems) [CS15]. >4 hours, ambient temp. to <62°C	Handle substance within a closed system [E47].{Ensure material transfers are under containment or extract ventilation [E66]}. {Ensure the ventilation system is regularly maintained and tested [E74]}.
General exposures (closed systems) [CS15]. >4 hours, ambient temp. to <62°C	Handle substance within a closed system [E47].{Ensure material transfers are under containment or extract ventilation [E66]}. {Ensure the ventilation system is regularly maintained and tested [E74]}.
General exposures (open systems) [CS16]. >4 hours, ambient temp. to <62°C	No specific measures identified [E118]. {Provide extract ventilation to points where emissions occur [E54]}. ; {Ensure material transfers are under containment or extract ventilation [E76]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
General exposures (open systems) [CS16]. >4 hours, ambient temp. to <62°C. Aerosols.	No specific measures identified [E118]. {Provide extract ventilation to points where emissions occur [E54]}. ; {Ensure material transfers are under containment or extract ventilation [E76]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Process sampling [CS2]. >4 hours, ambient temp. to <62°C	Formulate in enclosed or ventilated mixing vessels [E46].{Ensure material transfers are under containment or extract ventilation [E66]}. {Ensure the ventilation system is regularly maintained and tested [E74]}.
Laboratory activities [CS36]. >4 hours, ambient temp. to <62°C	No specific measures identified [E118]. {Avoid dip sampling [E42]}. {Ensure material transfers are under containment or extract ventilation [E66]}. ; {Handle in a fume cupboard or under extract ventilation [E83]}.{Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Bulk transfers [CS14]. daily; ambient temp. to <62°C	No specific measures identified [E118]. {Handle in a fume cupboard or under extract ventilation [E83]}.{Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.

Mixing operations (open systems) [CS30]. daily; ambient temp. to <62°C	No specific measures identified [E118]. {Clear transfer lines prior to de-coupling [E39]}. {Ensure material transfers are under containment or extract ventilation [E66]}. ; {Handle in a fume cupboard or under extract ventilation [E83]}. {Clear spills immediately [C&H13]}. ; {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}. {Remotely vent displaced vapours [ENVT17]}.
Mixing operations (open systems) [CS30]. daily; ambient temp. to <62°C. Aerosols.	No specific measures identified [E118]. {Provide extract ventilation to points where emissions occur [E54]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Manual [CS34]. ; Transfer from/pouring from containers [CS22]. daily; ambient temp. to <62°C	No specific measures identified [E118]. {Provide extract ventilation to points where emissions occur [E54]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Drum/batch transfers [CS8]. daily; ambient temp. to <62°C	Use drum pumps or carefully pour from container [E64]. {Provide extract ventilation to points where emissions occur [E54]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Production or preparation or articles by tableting, compression, extrusion or pelletisation [CS100] daily; ambient temp. to <62°C	Use drum pumps or carefully pour from container [E64]. Avoid spillage when withdrawing pump [C&H16]. {Provide extract ventilation to points where emissions occur [E54]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Drum and small package filling [CS6]. daily; ambient temp. to <62°C	Handle substance within a predominantly closed system provided with extract ventilation [E49]. Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves tested to EN374 [PPE15]}.
Equipment cleaning and maintenance [CS39]. daily; ambient temp. to <62°C	Fill containers/cans at dedicated fill points supplied with local extract ventilation [E51]. Ensure the ventilation system is regularly maintained and tested [E74]. {Put lids on containers immediately after use [E9]}. ; {Clear spills immediately [C&H13]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Storage [CS67] daily; ambient temp. to <62°C	Drain down and flush system prior to equipment break-in or maintenance [E55]. Apply vessel entry procedures including use of forced supplied air [AP15]. {Transfer via enclosed lines [E52]}. {Ensure operation is undertaken outdoors [E69]}. {Wear suitable gloves tested to EN374 [PPE15]}. ; {Wear suitable coveralls to prevent exposure to the skin [PPE27]}. {Retain drain downs in sealed storage pending disposal or for subsequent recycle [ENVT4]}.
<b>Section 2.2</b>	<b>Control of environmental exposure</b>
As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.	
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>Health</b>	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.
<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>Health</b>	Confirm that RMMs and OCs are as described.
<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 5</b>	<b>Additional good practice advice beyond the REACH Chemical Safety Assessment</b>
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH.	
Control of Worker Exposure	Good practice RMM phrases are {indicated} and incorporated within the ES Section 2 or consolidated into the main sections of the SDS.
Control of environmental exposure	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.

## 4. Industrial Use of Coatings Containing $\gamma$ -Butyrolactone

Section 1	
<b>Title</b>	<b>Industrial Use of Coatings Containing <math>\gamma</math>-Butyrolactone; CASRN: 96-48-0</b>
<b>Use Descriptor</b>	Sector of Use: Industrial (SU3, SU10)
	Process Categories: PROC1, PROC2, PROC4, PROC5, PROC7, PROC8b, PROC 9, PROC10, PROC13, PROC 14, PROC15
	Environmental Release Categories: ERC 4
<b>Processes, tasks, activities covered</b>	Covers the use in coatings (paints, inks, adhesives, etc) including exposures during use (including materials receipt, storage, preparation and transfer from bulk and semi-bulk, application by spray, roller, spreader, dip, flow, fluidised bed on production lines and film formation) and equipment cleaning, maintenance and associated laboratory activities.
Section 2	
<i>Field for additional statements to explain scenario if required.</i>	As described below
Section 2.1	
<b>Product characteristics</b>	
- Physical form of product	Liquid
- Vapour pressure	0.344 hPa at 20°C
- Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
- Amounts used	<i>Not applicable</i>
<b>Frequency and duration of use</b>	Covers daily exposures up to 8 hours (unless stated differently) [G2]
<b>Human factors not influenced by risk management</b>	<i>Not applicable</i>
<b>Other Operational Conditions affecting worker exposure</b>	Assumes a good basic standard of occupational hygiene is implemented [G1].
Risk Management Measures	
<b>Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment.</b>	
General exposures (closed systems) [CS15]. ; With sample collection [CS56]. >4 hours, ambient temp. to <62°C	Handle substance within a closed system [E47].{Wear suitable gloves tested to EN374 [PPE15]}.
Film formation - force drying (50 - 100°C). Stoving (>100°C). UV/EB radiation curing [CS94]>4 hours, ambient temp. to <62°C	Handle substance within a closed system [E47].{Ensure material transfers are under containment or extract ventilation [E66]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Film formation - air drying [CS95] daily; ambient temp. to <62°C	No specific measures identified [E18]. {Provide extract ventilation to points where emissions occur [E54]}. {Avoid manual contact with wet work pieces [E17]}. ; {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Preparation of material for application [CS96]; Mixing operations (open systems) [CS30]. >4 hours, ambient temp. to <62°C	No specific measures identified [E18]. {Provide extract ventilation to points where emissions occur [E54]}. {Avoid manual contact with wet work pieces [E17]}. ; {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Spraying (automatic/robotic) [CS97] daily; ambient temp. to <62°C	Carry out in a vented booth provided with laminar airflow [E59]. ; Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60]. Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves tested to EN374 [PPE15]}.
Spraying/fogging by manual application [CS24]. > 4 hours; daily; ambient temp. to <62°C	Provide a good standard of general ventilation. Natural ventilation is from windows and doors etc. Controlled ventilation means air is supplied or removed by a powered fan. [E1]. ; Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour) [E40]. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training [PPE17].

Material transfers [CS3]. daily; ambient temp. to <62°C	Clear transfer lines prior to de-coupling [E39].{Provide extract ventilation to points where emissions occur [E54]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Additivition and stabilisation [CS69]> 4 hours; daily; ambient temp. to <62°C.	No specific measures identified [E18]. {Provide extract ventilation to points where emissions occur [E54]}. ; {Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Dipping, immersion and pouring [CS4]. daily; ambient temp. to <62°C	No specific measures identified [E18]. {Provide extract ventilation to points where emissions occur [E54]}. {Avoid manual contact with wet work pieces [E117]}. ; {Clear spills immediately [C&H13]}. ; {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. >4 hours, ambient temp. to <62°C	Avoid manual contact with wet work pieces [E17]. {Provide extract ventilation to points where emissions occur [E54]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Material transfers [CS3]. ; Drum/batch transfers [CS8]. ; Transfer from/pouring from containers [CS22]. >4 hours, ambient temp. to <62°C	No specific measures identified [E18]. {Provide extract ventilation to points where emissions occur [E54]}. ; {Ensure material transfers are under containment or extract ventilation [E76]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Production or preparation or articles by tableting, compression, extrusion or pelletisation [CS100]>4 hours, ambient temp. to <62°C	No specific measures identified [E18]. {Provide extract ventilation to points where emissions occur [E54]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Storage [CS67]>4 hours, ambient temp. to <62°C	Store substance within a closed system [E84].{Clear transfer lines prior to de-coupling [E39]}. {Ensure material transfers are under containment or extract ventilation [E66]}. {Ensure the ventilation system is regularly maintained and tested [E74]}.
<b>Section 2.2</b>	<b>Control of environmental exposure</b>
As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.	
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>Health</b>	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.
<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>Health</b>	Confirm that RMMs and OCs are as described.
<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 5</b>	<b>Additional good practice advice beyond the REACH Chemical Safety Assessment</b>
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH.	
Control of Worker Exposure	Good practice RMM phrases are {indicated} and incorporated within the ES Section 2 or consolidated into the main sections of the SDS.
Control of environmental exposure	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.

## 5. Professional Use of Coatings Containing $\gamma$ -Butyrolactone

<b>Section 1</b>	<b>Exposure Scenario Title</b>
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Title	Professional Use of Coatings Containing $\gamma$ -Butyrolactone; CASRN: 96-48-0
Use Descriptor	Sector of Use: Professional (SU22)
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC10, PROC11, PROC13, PROC15, PROC19
	Environmental Release Categories: ERC 8A, ERC 8D
Processes, tasks, activities covered	Covers the use in coatings (paints, inks, adhesives, etc) including exposures during use (including materials receipt, storage, preparation and transfer from bulk and semi-bulk, application by spray, roller, brush, spreader by hand or similar methods, and film formation), and equipment cleaning, maintenance and associated laboratory activities.
<b>Section 2</b>	<b>Operational conditions and risk management measures</b>
<i>Field for additional statements to explain scenario if required.</i>	As described below
<b>Section 2.1</b>	<b>Control of worker exposure</b>
<b>Product characteristics</b>	
- Physical form of product	Liquid
- Vapour pressure	0.344 hPa at 20°C
- Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
- Amounts used	<i>Not applicable</i>
<b>Frequency and duration of use</b>	Covers daily exposures up to 8 hours (unless stated differently) [G2]
<b>Human factors not influenced by risk management</b>	<i>Not applicable</i>
<b>Other Operational Conditions affecting worker exposure</b>	Assumes a good basic standard of occupational hygiene is implemented [G1].
<b>Risk Management Measures</b>	<b><i>Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment.</i></b>
Filling / preparation of equipment from drums or containers. [CS45]. >4 hours, ambient temp. to <62°C	Handle substance within a closed system [E47].{Ensure material transfers are under containment or extract ventilation [E66]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
General exposures (closed systems) [CS15]. >4 hours, ambient temp. to <62°C	Handle substance within a closed system [E47].{Ensure material transfers are under containment or extract ventilation [E66]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Preparation of material for application [CS96]; Mixing operations (closed systems) [CS29]. daily; ambient temp. to <62°C	Clear up spills immediately and dispose of waste safely [E19]. {Use drum pumps or carefully pour from container [E64]}. {Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings (professional use) [E60]}. ; {Ensure operation is undertaken outdoors [E69]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves (tested to EN374) and eye protection [PPE19]}. ; {Wear suitable coveralls to prevent exposure to the skin [PPE27]}.
Film formation - air drying [CS95] daily; ambient temp. to <62°C	Avoid manual contact with wet work pieces [E17]. {Ensure operation is undertaken outdoors [E69]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Film formation - air drying [CS95] daily; ambient temp. to <62°C	{Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour) [E40]}. ; {Provide extract ventilation to points where emissions occur [E54]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Preparation of material for application [CS96]; Mixing operations (open systems) [CS30]. ; Pouring from small containers [CS9]. >4 hours, ambient temp. to <62°C	Wear suitable gloves tested to EN374 [PPE15]. {Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour) [E40]}. {Use suitable eye protection [PPE26]}. ; {Wear suitable coveralls to prevent exposure to the skin [PPE27]}.
Preparation of material for application [CS96]; Mixing operations (open systems) [CS30]. ; Pouring from small containers [CS9]. >4 hours, ambient temp. to <62°C	Wear suitable gloves tested to EN374 [PPE15]. {Ensure operation is undertaken outdoors [E69]}. {Use suitable eye protection [PPE26]}. ; {Wear suitable coveralls to prevent exposure to the skin [PPE27]}.
Material transfers [CS3]. ; (closed systems) [CS107]; Drum/batch transfers [CS8]. daily; ambient temp. to <62°C	Wear suitable gloves tested to EN374 [PPE15]. {Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan [E1]}. ; {Provide enhanced mechanical ventilation by mechanical means [E48]}.



Roller, spreader, flow application [CS98]> 4 hours; daily; ambient temp. to <62°C	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training [PPE16]. {Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan [E1]}. ; {Provide enhanced mechanical ventilation by mechanical means [E48].}
Roller, spreader, flow application [CS98]> 4 hours; daily; ambient temp. to <62°C	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training [PPE16]. {Ensure operation is undertaken outdoors [E69]}.
Spraying/fogging by manual application [CS24]. daily; ambient temp. to <62°C	Carry out in a vented booth or extracted enclosure [E57]. ; Provide extract ventilation to points where emissions occur [E54]. Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves tested to EN374 [PPE15]}.
Spraying/fogging by manual application [CS24]. daily; ambient temp. to <62°C	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training [PPE16]. ; Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]{Ensure operation is undertaken outdoors [E69]}. {Use suitable eye protection [PPE26]}.
Dipping, immersion and pouring [CS4]. daily; ambient temp. to <62°C	No specific measures identified [E18]. {Provide extract ventilation to points where emissions occur [E54]}. {Avoid manual contact with wet work pieces [E17]}. ; {Clear up spills immediately and dispose of waste safely [E9]}. ; {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Dipping, immersion and pouring [CS4]. daily; ambient temp. to <62°C	Avoid manual contact with wet work pieces [E17]. {Ensure operation is undertaken outdoors [E69]}. {Wear suitable gloves tested to EN374 [PPE15]}. ; {Wear suitable coveralls to prevent exposure to the skin [PPE27]}.
Laboratory activities [CS36]. daily; ambient temp. to <62°C	No specific measures identified [E18]. {Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour) [E40]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Hand application - fingerpaints, pastels, adhesives [CS72] daily; ambient temp. to <62°C	Provide enhanced mechanical ventilation by mechanical means [E48].Ensure doors and windows are opened [E72]. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training [PPE17].
Hand application - fingerpaints, pastels, adhesives [CS72] daily; ambient temp. to <62°C	Ensure operation is undertaken outdoors [E69]. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training [PPE17].
Storage [CS67] daily; ambient temp. to <62°C	Store substance within a closed system [E84].
<b>Section 2.2</b>	<b>Control of environmental exposure</b>
As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.	
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>Health</b>	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.
<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>Health</b>	Confirm that RMMs and OCs are as described.
<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 5</b>	<b>Additional good practice advice beyond the REACH Chemical Safety Assessment</b>
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH.	
Control of Worker Exposure	Good practice RMM phrases are {indicated} and incorporated within the ES Section 2 or consolidated into the main sections of the SDS.
Control of environmental exposure	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.

## 6. Industrial Use of Cleaning Agents Containing $\gamma$ -Butyrolactone

Section 1	
<b>Title</b>	<b>Industrial Use of Cleaning Agents Containing <math>\gamma</math>-Butyrolactone; CASRN: 96-48-0</b>
<b>Use Descriptor</b>	Sector of Use: Industrial (SU3, SU10)
	Process Categories: PROC1, PROC2, PROC4, PROC7, PROC8b, PROC10, PROC13
	Environmental Release Categories: ERC4
<b>Processes, tasks, activities covered</b>	Covers the use as a component of cleaning products including transfer from storage, pouring/unloading from drums or containers. Exposures during mixing/diluting in the preparatory phase and cleaning activities (including spraying, brushing, dipping, wiping, automated and by hand), related equipment cleaning and maintenance.
Section 2	
<b>Operational conditions and risk management measures</b>	As described below
<i>Field for additional statements to explain scenario if required.</i>	
Section 2.1	
<b>Control of worker exposure</b>	
<b>Product characteristics</b>	
- Physical form of product	Liquid
- Vapour pressure	0.344 hPa at 20°C
- Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
- Amounts used	<i>Not applicable</i>
<b>Frequency and duration of use</b>	Covers daily exposures up to 8 hours (unless stated differently) [G2]
<b>Human factors not influenced by risk management</b>	<i>Not applicable</i>
<b>Other Operational Conditions affecting worker exposure</b>	Assumes a good basic standard of occupational hygiene is implemented [G1].
<b>Risk Management Measures</b>	<b><i>Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment.</i></b>
Bulk transfers [CS14]. >4 hours, ambient temp.	Clear transfer lines prior to de-coupling [E39]. Clear up spills immediately and dispose of waste safely [E19]. Wear suitable gloves (tested to EN374) and eye protection [PPE19]. ; Wear suitable coveralls to prevent exposure to the skin [PPE27].
Use in contained systems [CS38]. ; Automated process with (semi) closed systems [CS93]>4 hours, ambient temp.	No specific measures identified [E18]. {Clear transfer lines prior to de-coupling [E39]. {Clear up spills immediately and dispose of waste safely [E19]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Filling / preparation of equipment from drums or containers. [CS45]. daily, ambient temp.	Wear suitable gloves (type EN374), coverall and eye protection. [PPE23]
Use in contained batch processes [CS37]. ; Automated process with (semi) closed systems [CS93]> 4 hours, temperature above boiling point	Clear transfer lines prior to de-coupling [E39]. Provide extract ventilation to points where emissions occur [E54]. Ensure the ventilation system is regularly maintained and tested [E74]. Wear suitable gloves (type EN374), coverall and eye protection. [PPE23]{Clear up spills immediately and dispose of waste safely [E19]}.
Dipping, immersion and pouring [CS4]. > 4 hours, ambient temp.	Wear suitable gloves (type EN374), coverall and eye protection. [PPE23]{Avoid manual contact with wet work pieces [E17]}.
Cleaning with low-pressure washers [CS42]. > 4 hours, ambient temp.	Wear suitable gloves (tested to EN374) and eye protection [PPE19]. {Avoid manual contact with wet work pieces [E17]}. ; {Clear up spills immediately and dispose of waste safely [E19]}. {Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training [PPE16]}.
Cleaning with high pressure washers [CS44]. > 4 hours, ambient temp.	Wear suitable respiratory protection (conforming to EN140 with Type A filter or better) and gloves (type EN374) if regular skin contact likely. [PPE21] ; Use suitable eye protection [PPE26].

Manual [CS34]. ; Surfaces [CS48]. ; Cleaning [CS47]. ; No spraying [CS60]. > 4 hours, ambient temp.	Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60]. Ensure the ventilation system is regularly maintained and tested [E74]. Wear suitable gloves (tested to EN374) and eye protection [PPE19].
Storage [CS67]>4 hours, ambient temp.	Avoid dip sampling. [E42].Store substance within a closed system [E84].{Use suitable eye protection and gloves [PPE14]}.
<b>Section 2.2</b>	<b>Control of environmental exposure</b>
As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.	
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>Health</b>	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.
<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>Health</b>	Confirm that RMMs and OCs are as described.
<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 5</b>	<b>Additional good practice advice beyond the REACH Chemical Safety Assessment</b>
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH.	
Control of Worker Exposure	Good practice RMM phrases are {indicated} and incorporated within the ES Section 2 or consolidated into the main sections of the SDS.
Control of environmental exposure	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.

## 7. Professional Use of Cleaning Agents Containing $\gamma$ -Butyrolactone

<b>Section 1</b>	<b>Exposure Scenario Title</b>
<b>Title</b>	<b>Professional Use of Cleaning Agents Containing <math>\gamma</math>-Butyrolactone; CASRN: 96-48-0</b>
<b>Use Descriptor</b>	Sector of Use: Professional (SU22)
	Process Categories: PROC1, PROC2, PROC4, PROC8a, PROC10, PROC11, PROC13
	Environmental Release Categories: ERC 8A, ERC 8D
<b>Processes, tasks, activities covered</b>	Covers the use as a component of cleaning products including pouring/unloading from drums or containers; and exposures during mixing/diluting in the preparatory phase and cleaning activities (including spraying, brushing, dipping, wiping automated and by hand).
<b>Section 2</b>	<b>Operational conditions and risk management measures</b>
<i>Field for additional statements to explain scenario if required.</i>	As described below
<b>Section 2.1</b>	<b>Control of worker exposure</b>
<b>Product characteristics</b>	
- Physical form of product	Liquid

- Vapour pressure	0.344 hPa at 20°C
- Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
- Amounts used	<i>Not applicable</i>
<b>Frequency and duration of use</b>	Covers daily exposures up to 8 hours (unless stated differently) [G2]
<b>Human factors not influenced by risk management</b>	<i>Not applicable</i>
<b>Other Operational Conditions affecting worker exposure</b>	Assumes a good basic standard of occupational hygiene is implemented [G1].
<b>Risk Management Measures</b>	<b><i>Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment.</i></b>
Filling / preparation of equipment from drums or containers. [CS45]. ambient temp. diluted (water based) product. OC8. Ventilation.	Wear suitable gloves (type EN374), coverall and eye protection. [PPE23]
Use in contained systems [CS38]. ; Initial factory fill of equipment [CS75]8 hours. Ventilation.	Handle substance within a predominantly closed system provided with extract ventilation [E49].Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves tested to EN374 [PPE15]}.
Use in contained batch processes [CS37]. ; Semi Automated process. (e.g.: Semi automatic application of floor care and maintenance products) [CS76]8 hours. Ventilation.	No specific measures identified [E118]. {Wear suitable gloves tested to EN374 [PPE15]}.
Filling / preparation of equipment from drums or containers. [CS45]. > 4 hours, ambient temp. OC9. Ventilation.	Wear suitable gloves tested to EN374 [PPE15].
Manual [CS34]. ; Surfaces [CS48]. ; Cleaning [CS47]. ; Dipping, immersion and pouring [CS4]. > 4 hours, ambient temp. Ventilation.	Avoid manual contact with wet work pieces [E117]. Wear suitable gloves (type EN374), coverall and eye protection. [PPE23]Retain drain downs in sealed storage pending disposal or for subsequent recycle [ENVT4].
Cleaning with low-pressure washers [CS42]. ; Equipment maintenance [CS5]. ; No spraying [CS60]. > 4 hours, ambient temp. Ventilation.	Wear suitable gloves (type EN374), coverall and eye protection. [PPE23]{Wear a respirator conforming to EN140 with Type A/P2 filter or better {PPE29}}.
Cleaning with high pressure washers [CS44]. ; Spraying [CS10]. > 4 hours, ambient temp. OC8. Ventilation.	Wear suitable gloves (type EN374), coverall and eye protection. [PPE23]; Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]
Large surfaces [CS46]. ; Large surfaces [CS46]. ; Spraying [CS10]. > 4 hours, ambient temp. OC9. Ventilation.	Wear suitable gloves (type EN374), coverall and eye protection. [PPE23]; Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]
Manual [CS34]. ; Surfaces [CS48]. ; Cleaning [CS47]. ; Wiping [CS50]. ; Rolling, Brushing [CS51]. > 4 hours, ambient temp. Ventilation.	Wear suitable gloves (type EN374), coverall and eye protection. [PPE23]
Degreasing small objects in cleaning station [CS41]. ; Wiping [CS50]. ; Rolling, Brushing [CS51]. ; Ad hoc manual application via trigger sprays, dipping, etc. [CS27]. > 4 hours, ambient temp.	Wear suitable gloves tested to EN374 [PPE15].
Ad hoc manual application via trigger sprays, dipping, etc. [CS27]. > 4 hours, ambient temp.	Wear suitable gloves tested to EN374 [PPE15].
Cleaning of medical devices [CS74]>4 hours, ambient temp.	{Use suitable eye protection and gloves [PPE14]}.
Batch process [CS55]. daily; ambient temp.	Store substance within a closed system [E84].{Wear suitable gloves tested to EN374 [PPE15]}.
<b>Section 2.2</b>	<b>Control of environmental exposure</b>
As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.	
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>Health</b>	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.

<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>Health</b>	Confirm that RMMs and OCs are as described.
<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 5</b>	<b>Additional good practice advice beyond the REACH Chemical Safety Assessment</b>
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH.	
Control of Worker Exposure	Good practice RMM phrases are {indicated} and incorporated within the ES Section 2 or consolidated into the main sections of the SDS.
Control of environmental exposure	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.

## 8. Industrial Use of Binders and Release Agents Containing $\gamma$ -Butyrolactone

<b>Section 1</b>	<b>Exposure Scenario Title</b>
<b>Title</b>	<b>Industrial Use of Binders and Release Agents Containing <math>\gamma</math>-Butyrolactone; CASRN: 96-48-0</b>
<b>Use Descriptor</b>	Sector of Use: Industrial (SU3)
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC6, PROC7, PROC8b, PROC10, PROC14
	Environmental Release Categories: Industrial (SU3)
<b>Processes, tasks, activities covered</b>	Covers the use as binders and release agents including material transfers, mixing, application (including spraying and brushing), mould forming and casting, and handling of waste.
<b>Section 2</b>	<b>Operational conditions and risk management measures</b>
<i>Field for additional statements to explain scenario if required.</i>	As described below
<b>Section 2.1</b>	<b>Control of worker exposure</b>
<b>Product characteristics</b>	
- Physical form of product	Liquid
- Vapour pressure	0.344 hPa at 20°C
- Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
- Amounts used	<i>Not applicable</i>
<b>Frequency and duration of use</b>	Covers daily exposures up to 8 hours (unless stated differently) [G2]
<b>Human factors not influenced by risk management</b>	<i>Not applicable</i>
<b>Other Operational Conditions affecting worker exposure</b>	Assumes a good basic standard of occupational hygiene is implemented [G1].
<b>Risk Management Measures</b>	<b><i>Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment.</i></b>

Material transfers [CS3]. 1-4 hours, ambient temp. to <62°C	Transfer via enclosed lines [E52].{Clear transfer lines prior to de-coupling [E39]}. {Remotely vent displaced vapours [ENVT17]}.
Drum/batch transfers [CS8]. daily; ambient temp. to <62°C	Use drum pumps [E53].{Avoid spillage when withdrawing pump [C&H16]}. {Wear suitable gloves (type EN374), coverall and eye protection. [PPE23]}.
Mixing operations (closed systems) [CS29]. > 4 hours daily; ambient temp. to <62°C	No special precautions [E119].
Mixing operations (open systems) [CS30]. > 4 hours daily; ambient temp. to <62°C	No special precautions [E119].{Wear suitable gloves (tested to EN374) and eye protection [PPE19]}.
Mold forming [CS31]. > 4 hours daily; ambient temp. to <62°C	No other specific measures identified [E120]. {Wear suitable gloves (tested to EN374) and eye protection [PPE19]}.
Casting operations [CS32]. > 4 hours daily; ambient temp. to <62°C	Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour) [E40].; Provide extract ventilation to points where emissions occur [E54]. Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves (tested to EN374) and eye protection [PPE19]}.
Casting operations [CS32]. > 4 hours daily; ambient temp. to <62°C Aerosols.	Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour) [E40].; Provide extract ventilation to points where emissions occur [E54]. Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves (tested to EN374) and eye protection [PPE19]}.
Spraying [CS10]. ; Machine [CS33]. > 4 hours daily; ambient temp. to <62°C	Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60]. Ensure the ventilation system is regularly maintained and tested [E74]. {Segregate the activity away from other operations [E63]}. ; {Automate activity where possible [AP16]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Spraying [CS10]. ; Machine [CS33]. > 4 hours daily; ambient temp. to <62°C Aerosols.	Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60]. Ensure the ventilation system is regularly maintained and tested [E74]. {Segregate the activity away from other operations [E63]}. ; {Automate activity where possible [AP16]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Manual roller application or brushing [CS13].> 4 hours; daily; ambient temp. to <62°C	Wear suitable gloves tested to EN374 [PPE15]. {Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan [E1]}.
Spraying [CS10]. ; Manual [CS34]. > 4 hours daily; ambient temp. to <62°C	Wear suitable gloves (type EN374), coverall and eye protection. [PPE23]; Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]{Segregate the activity away from other operations [E63]}.
Spraying [CS10]. ; Manual [CS34]. > 4 hours daily; ambient temp. to <62°C Aerosols.	Wear suitable gloves (type EN374), coverall and eye protection. [PPE23]; Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]{Segregate the activity away from other operations [E63]}.
Storage [CS67] daily; ambient temp. to <62°C	Store substance within a closed system [E84].{Ensure material transfers are under containment or extract ventilation [E66]}. {Ensure the ventilation system is regularly maintained and tested [E74]}.
<b>Section 2.2</b>	<b>Control of environmental exposure</b>
As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.	
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>Health</b>	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.
<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>Health</b>	Confirm that RMMs and OCs are as described.

<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 5</b>	<b>Additional good practice advice beyond the REACH Chemical Safety Assessment</b>
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH.	
Control of Worker Exposure	Good practice RMM phrases are {indicated} and incorporated within the ES Section 2 or consolidated into the main sections of the SDS.
Control of environmental exposure	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.

## 9. Professional Use of Binders and Release Agents Containing $\gamma$ -Butyrolactone

<b>Section 1</b>	<b>Exposure Scenario Title</b>
<b>Title</b>	<b>Professional Use of Binders and Release Agents Containing <math>\gamma</math>-Butyrolactone; CASRN: 96-48-0</b>
<b>Use Descriptor</b>	Sector of Use: Professional (SU22)
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC6, PROC8b, PROC10, PROC11, PROC14
	Environmental Release Categories: ERC 8 series (A, B, C, D, E, F)
<b>Processes, tasks, activities covered</b>	Covers the use as binders and release agents including material transfers, mixing, application by spraying, brushing, and handling of waste
<b>Section 2</b>	<b>Operational conditions and risk management measures</b>
<i>Field for additional statements to explain scenario if required.</i>	As described below
<b>Section 2.1</b>	<b>Control of worker exposure</b>
<b>Product characteristics</b>	
- Physical form of product	Liquid
- Vapour pressure	0.344 hPa at 20°C
- Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
- Amounts used	<i>Not applicable</i>
<b>Frequency and duration of use</b>	Covers daily exposures up to 8 hours (unless stated differently) [G2]
<b>Human factors not influenced by risk management</b>	<i>Not applicable</i>
<b>Other Operational Conditions affecting worker exposure</b>	Assumes a good basic standard of occupational hygiene is implemented [G1].
<b>Risk Management Measures</b>	<b><i>Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment.</i></b>
Material transfers [CS3]. ; (closed systems) [CS107]1-4 hours, ambient temp. to <62°C	No specific measures identified [E118]. {Clear transfer lines prior to de-coupling [E39]}. {Wear suitable gloves tested to EN374 [PPE15]}. {Retain drain downs in sealed storage pending disposal or for subsequent recycle [ENVT4]}.
Drum/batch transfers [CS8]. daily; ambient temp. to <62°C	Transfer materials directly to mixing vessels [E45].{Wear suitable gloves (tested to EN374) and eye protection [PPE19]}.
Mixing operations (closed systems) [CS29]. > 4 hours daily; ambient temp. to <62°C	Handle substance within a closed system [E47].{Wear suitable gloves tested to EN374 [PPE15]}.
Mixing operations (open systems) [CS30]. > 4 hours daily; ambient temp. to <62°C	No specific measures identified [E118]. {Provide enhanced mechanical ventilation by mechanical means [E48].}{Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves (type EN374), coverall and eye protection. [PPE23]}.

Mold forming [CS31]. > 4 hours daily; ambient temp. to <62°C	No specific measures identified [E18]. {Wear suitable gloves tested to EN374 [PPE15]}.
Casting operations [CS32]. ; (open systems) [CS108]> 4 hours daily; ambient temp. to <62°C	Provide extract ventilation to points where emissions occur [E54]. Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves (tested to EN374) and eye protection [PPE19]}.
Casting operations [CS32]. ; (open systems) [CS108]> 4 hours daily; ambient temp. to <62°C Aerosols.	Provide extract ventilation to points where emissions occur [E54]. Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves (tested to EN374) and eye protection [PPE19]}.
Spraying [CS10]. ; Manual [CS34]. > 4 hours daily; ambient temp. to <62°C	Carry out in a vented booth or extracted enclosure [E57]. Ensure the ventilation system is regularly maintained and tested [E74]. {Segregate the activity away from other operations [E63]}. ; {Ensure operatives are trained to minimise exposures [E119]}. {Wear suitable gloves (tested to EN374) and eye protection [PPE19]}.
Spraying [CS10]. ; Manual [CS34]. > 4 hours daily; ambient temp. to <62°C Aerosols.	Carry out in a vented booth or extracted enclosure [E57]. Ensure the ventilation system is regularly maintained and tested [E74]. Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]{Wear suitable gloves (tested to EN374) and eye protection [PPE19]}.
Manual roller application or brushing [CS13].1-4 hours, ambient temp. to <62°C	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training [PPE16]. {Provide enhanced mechanical ventilation by mechanical means [E48].}{Ensure the ventilation system is regularly maintained and tested [E74]}.
Spraying [CS10]. ; Manual [CS34]. > 4 hours daily; ambient temp. to <62°C	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training [PPE16]. ; Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]{Use suitable eye protection [PPE26]}. ; {Wear suitable coveralls to prevent exposure to the skin [PPE27]}.
Spraying [CS10]. ; Manual [CS34]. > 4 hours daily; ambient temp. to <62°C Aerosols.	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training [PPE16]. ; Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]{Segregate the activity away from other operations [E63]}. ; {Ensure operatives are trained to minimise exposures [E119]}.
Storage [CS67] daily; ambient temp. to <62°C	Store substance within a closed system [E84].{Use suitable eye protection and gloves [PPE14]}.
<b>Section 2.2</b>	<b>Control of environmental exposure</b>
As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.	
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>Health</b>	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.
<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>Health</b>	Confirm that RMMs and OCs are as described.
<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 5</b>	<b>Additional good practice advice beyond the REACH Chemical Safety Assessment</b>
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH.	
Control of Worker Exposure	Good practice RMM phrases are {indicated} and incorporated within the ES Section 2 or consolidated into the main sections of the SDS.



Control of environmental exposure

As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.

## 10. Professional Use of Agrochemicals Containing $\gamma$ -Butyrolactone

Section 1	Exposure Scenario Title
<b>Title</b>	<b>Professional Use of Agrochemicals Containing <math>\gamma</math>-Butyrolactone; CASRN: 96-48-0</b>
<b>Use Descriptor</b>	Sector of Use: Professional (SU22)
	Process Categories: PROC1, PROC4, PROC8a, PROC8b, PROC11, PROC13
	Environmental Release Categories: ERC8A, ERC 8D
<b>Processes, tasks, activities covered</b>	Use as an agrochemical excipient for application by manual or machine spraying, smokes and fogging; including storage, equipment clean-downs and disposal.
Section 2	Operational conditions and risk management measures
<i>Field for additional statements to explain scenario if required.</i>	As described below
Section 2.1	Control of worker exposure
<b>Product characteristics</b>	
- Physical form of product	Liquid
- Vapour pressure	0.344 hPa at 20°C
- Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
- Amounts used	<i>Not applicable</i>
<b>Frequency and duration of use</b>	Covers daily exposures up to 8 hours (unless stated differently) [G2]
<b>Human factors not influenced by risk management</b>	<i>Not applicable</i>
<b>Other Operational Conditions affecting worker exposure</b>	Assumes a good basic standard of occupational hygiene is implemented [G1].
<b>Risk Management Measures</b>	<b><i>Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment.</i></b>
Transfer from/pouring from containers [CS22]. Daily; 15 mins - 1 hour; ambient temp	No specific measures identified [E18]. {Carefully pour from containers [E62]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Mixing in containers [CS23]. Daily; 15 mins - 1 hour; ambient temp	No specific measures identified [E18]. {Wear suitable gloves tested to EN374 [PPE15]}.
Spraying/fogging by manual application [CS24]. Daily; 1-4 hours; ambient temp;	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training [PPE16]. ; Wear suitable coveralls to prevent exposure to the skin [PPE27].; Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]
Spraying/fogging by manual application [CS24]. Daily; 1-4 hours; ambient temp; Aerosols	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training [PPE16]. ; Wear suitable coveralls to prevent exposure to the skin [PPE27].; Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]
Spraying/fogging by machine application [CS25]. Daily; 1-4 hours; ambient temp;	Apply within a vented cab supplied with filtered air under positive pressure and with a protection factor of >20 [E70]. {Wear suitable gloves tested to EN374 [PPE15]}.
Spraying/fogging by machine application [CS25]. Daily; 1-4 hours; ambient temp; Aerosols	Apply within a vented cab supplied with filtered air under positive pressure and with a protection factor of >20 [E70]. {Wear suitable gloves tested to EN374 [PPE15]}.
Ad hoc manual application via trigger sprays, dipping, etc. [CS27]. <1 hours daily; ambient temp.	Use suitable eye protection and gloves [PPE14].

Clean down and maintenance [CS26]. <1 hours daily; ambient temp.	Use suitable eye protection and gloves [PPE14]. {Drain down system prior to equipment break-in or maintenance [E65]}. {Retain drain downs in sealed storage pending disposal or for subsequent recycle [ENV4]}.
Disposal of wastes [CS28]. <1 hours daily; ambient temp.	Use suitable eye protection and gloves [PPE14].
Storage [CS67] daily; ambient temp.	Store substance within a closed system [E84]. {Use suitable eye protection and gloves [PPE14]}.
<b>Section 2.2</b>	<b>Control of environmental exposure</b>
As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.	
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>Health</b>	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.
<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>Health</b>	Confirm that RMMs and OCs are as described.
<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 5</b>	<b>Additional good practice advice beyond the REACH Chemical Safety Assessment</b>
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH.	
Control of Worker Exposure	Good practice RMM phrases are {indicated} and incorporated within the ES Section 2 or consolidated into the main sections of the SDS.
Control of environmental exposure	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.

## 11. Industrial Use of $\gamma$ -Butyrolactone in Laboratory Settings

<b>Section 1</b>	<b>Exposure Scenario Title</b>
<b>Title</b>	<b>Industrial Use of <math>\gamma</math>-Butyrolactone in Laboratory Settings; CASRN: 96-48-0</b>
<b>Use Descriptor</b>	Sector of Use: Industrial (SU3, SU10)
	Process Categories: PROC10, PROC15
	Environmental Release Categories: ERC 4
<b>Processes, tasks, activities covered</b>	Use of the substance within laboratory settings, including material transfers and equipment cleaning
<b>Section 2</b>	<b>Operational conditions and risk management measures</b>
<i>Field for additional statements to explain scenario if required.</i>	As described below
<b>Section 2.1</b>	<b>Control of worker exposure</b>

<b>Product characteristics</b>	
- Physical form of product	Liquid
- Vapour pressure	0.344 hPa at 20°C
- Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
- Amounts used	<i>Not applicable</i>
<b>Frequency and duration of use</b>	Covers daily exposures up to 8 hours (unless stated differently) [G2]
<b>Human factors not influenced by risk management</b>	<i>Not applicable</i>
<b>Other Operational Conditions affecting worker exposure</b>	Assumes a good basic standard of occupational hygiene is implemented [G1].
<b>Risk Management Measures</b>	<b><i>Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment.</i></b>
Laboratory activities [CS36]. Normal good standard fume cupboard (97%)	Handle in a fume cupboard or under extract ventilation [E83]. Put lids on containers immediately after use [E9]. ; Carefully pour from containers [E62].; Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Bench-mounted local extract ventilation; selected disposable gloves	Ensure material transfers are under containment or extract ventilation [E66]. Put lids on containers immediately after use [E9]. ; Carefully pour from containers [E62].; Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Controlled general ventilation (10 ACH); selected disposable gloves	No specific measures identified [E18]. {Put lids on containers immediately after use [E9]}. ; {Carefully pour from containers [E62]}. ; {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Normal good standard fume cupboard (97%); Duration 0.6	Handle in a fume cupboard or under extract ventilation [E83]. Put lids on containers immediately after use [E9]. ; Carefully pour from containers [E62].; Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Bench-mounted local extract ventilation; selected disposable gloves; Duration 0.6	Ensure material transfers are under containment or extract ventilation [E66]. Ensure the ventilation system is regularly maintained and tested [E74]. ; Carefully pour from containers [E62].{Put lids on containers immediately after use [E9]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Controlled general ventilation (10 ACH); selected disposable gloves; Duration 0.6	No specific measures identified [E18]. {Ensure material transfers are under containment or extract ventilation [E66]}. {Put lids on containers immediately after use [E9]}. ; {Carefully pour from containers [E62]}. ; {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Normal good standard fume cupboard; Duration 0.2	Handle in a fume cupboard or under extract ventilation [E83]. Put lids on containers immediately after use [E9]. ; Carefully pour from containers [E62].; Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Bench-mounted local extract ventilation; selected disposable gloves; Duration 0.2	Ensure material transfers are under containment or extract ventilation [E66]. Ensure the ventilation system is regularly maintained and tested [E74]. ; Carefully pour from containers [E62].{Put lids on containers immediately after use [E9]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Controlled general ventilation (10 ACH); selected disposable gloves; Duration 0.2	No specific measures identified [E18]. {Provide enhanced mechanical ventilation by mechanical means [E48].}{Put lids on containers immediately after use [E9]}. ; {Carefully pour from containers [E62]}. ; {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Normal good standard fume cupboard; Duration 0.1	Handle in a fume cupboard or under extract ventilation [E83]. Put lids on containers immediately after use [E9]. ; Carefully pour from containers [E62].; Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Bench-mounted local extract ventilation; selected disposable gloves; Duration 0.1	Ensure material transfers are under containment or extract ventilation [E66]. Ensure the ventilation system is regularly maintained and tested [E74]. {Ensure material transfers are under containment or extract ventilation [E66]}. {Put lids on containers immediately after use [E9]}. ; {Carefully pour from containers [E62]}. {Wear suitable gloves tested to EN374

	[PPE15]}.
Laboratory activities [CS36]. Controlled general ventilation (10 ACH); selected disposable gloves; Duration 0.1	No specific measures identified [E18]. {Provide enhanced mechanical ventilation by mechanical means [E48].}{Put lids on containers immediately after use [E9]}. ; {Carefully pour from containers [E62]}. ; {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Normal good standard fume cupboard (97%); Duration 0.2	Handle in a fume cupboard or under extract ventilation [E83].Put lids on containers immediately after use [E9]. ; Carefully pour from containers [E62].; Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Bench-mounted local extract ventilation; selected disposable gloves; Duration 0.2	Ensure material transfers are under containment or extract ventilation [E66]. Ensure the ventilation system is regularly maintained and tested [E74]. {Put lids on containers immediately after use [E9]}. ; {Carefully pour from containers [E62]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Controlled general ventilation (10 ACH); selected disposable gloves; Duration 0.2	Wear suitable gloves tested to EN374 [PPE15]. {Provide enhanced mechanical ventilation by mechanical means [E48].}{Put lids on containers immediately after use [E9]}. ; {Carefully pour from containers [E62]}. ; {Ensure the ventilation system is regularly maintained and tested [E74]}.
Laboratory activities [CS36]. Normal good standard fume cupboard (97%); Duration 0.1	Handle in a fume cupboard or under extract ventilation [E83].Put lids on containers immediately after use [E9]. ; Carefully pour from containers [E62].; Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Bench-mounted local extract ventilation; selected disposable gloves; Duration 0.1	Ensure material transfers are under containment or extract ventilation [E66]. Ensure the ventilation system is regularly maintained and tested [E74]. {Put lids on containers immediately after use [E9]}. ; {Carefully pour from containers [E62]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Controlled general ventilation (10 ACH); selected disposable gloves; Duration 0.1	Wear suitable gloves tested to EN374 [PPE15]. {Provide enhanced mechanical ventilation by mechanical means [E48].}{Put lids on containers immediately after use [E9]}. ; {Carefully pour from containers [E62]}. ; {Ensure the ventilation system is regularly maintained and tested [E74]}.
<b>Section 2.2</b>	<b>Control of environmental exposure</b>
As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.	
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>Health</b>	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.
<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>Health</b>	Confirm that RMMs and OCs are as described.
<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 5</b>	<b>Additional good practice advice beyond the REACH Chemical Safety Assessment</b>
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH.	
Control of Worker Exposure	Good practice RMM phrases are {indicated} and incorporated within the ES Section 2 or consolidated into the main sections of the SDS.
Control of environmental exposure	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.

## 12. Professional Use of $\gamma$ -Butyrolactone in Laboratory Settings

Section 1	Exposure Scenario Title
<b>Title</b>	<b>Professional Use of <math>\gamma</math>-Butyrolactone in Laboratory Settings; CASRN: 96-48-0</b>
<b>Use Descriptor</b>	Sector of Use: Professional (SU22)
	Process Categories: PROC10, PROC15
	Environmental Release Categories: ERC 8A
<b>Processes, tasks, activities covered</b>	Use of small quantities within laboratory settings, including material transfers and equipment cleaning.
Section 2	Operational conditions and risk management measures
<i>Field for additional statements to explain scenario if required.</i>	As described below
Section 2.1	Control of worker exposure
<b>Product characteristics</b>	
- Physical form of product	Liquid
- Vapour pressure	0.344 hPa at 20°C
- Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
- Amounts used	<i>Not applicable</i>
<b>Frequency and duration of use</b>	Covers daily exposures up to 8 hours (unless stated differently) [G2]
<b>Human factors not influenced by risk management</b>	<i>Not applicable</i>
<b>Other Operational Conditions affecting worker exposure</b>	Assumes a good basic standard of occupational hygiene is implemented [G1].
<b>Risk Management Measures</b>	<b><i>Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment.</i></b>
Laboratory activities [CS36]. Normal good standard fume cupboard (97%)	Handle in a fume cupboard or under extract ventilation [E83]. Put lids on containers immediately after use [E9]. ; Carefully pour from containers [E62].; Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Bench-mounted local extract ventilation; selected disposable gloves	Ensure material transfers are under containment or extract ventilation [E66]. Put lids on containers immediately after use [E9]. ; Carefully pour from containers [E62].; Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Controlled general ventilation (10 ACH); selected disposable gloves	No specific measures identified [E18]. {Provide enhanced mechanical ventilation by mechanical means [E48].}{Put lids on containers immediately after use [E9]. ; {Carefully pour from containers [E62]. ; {Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Normal good standard fume cupboard (97%); Duration 0.6	Handle in a fume cupboard or under extract ventilation [E83]. Put lids on containers immediately after use [E9]. ; Carefully pour from containers [E62].; Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Bench-mounted local extract ventilation; selected disposable gloves; Duration 0.6	Ensure material transfers are under containment or extract ventilation [E66]. Ensure the ventilation system is regularly maintained and tested [E74]. ; Carefully pour from containers [E62].{Put lids on containers immediately after use [E9]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Controlled general ventilation (10 ACH); selected disposable gloves; Duration 0.6	No specific measures identified [E18]. {Ensure material transfers are under containment or extract ventilation [E66]}. {Put lids on containers immediately after use [E9]. ; {Carefully pour from containers [E62]. ; {Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves tested to EN374 [PPE15]}.

Laboratory activities [CS36]. Normal good standard fume cupboard; Duration 0.2	Handle in a fume cupboard or under extract ventilation [E83].Put lids on containers immediately after use [E9]. ; Carefully pour from containers [E62].; Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Bench-mounted local extract ventilation; selected disposable gloves; Duration 0.2	Ensure material transfers are under containment or extract ventilation [E66]. Ensure the ventilation system is regularly maintained and tested [E74]. ; Carefully pour from containers [E62].{Put lids on containers immediately after use [E9]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Controlled general ventilation (10 ACH); selected disposable gloves; Duration 0.2	No specific measures identified [E18]. {Provide enhanced mechanical ventilation by mechanical means [E48].}{Put lids on containers immediately after use [E9]}. ; {Carefully pour from containers [E62]}. ; {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Normal good standard fume cupboard; Duration 0.1	Handle in a fume cupboard or under extract ventilation [E83].Put lids on containers immediately after use [E9]. ; Carefully pour from containers [E62].; Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Bench-mounted local extract ventilation; selected disposable gloves; Duration 0.1	Ensure material transfers are under containment or extract ventilation [E66]. Ensure the ventilation system is regularly maintained and tested [E74]. {Ensure material transfers are under containment or extract ventilation [E66]}. {Put lids on containers immediately after use [E9]}. ; {Carefully pour from containers [E62]}. ; {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Controlled general ventilation (10 ACH); selected disposable gloves; Duration 0.1	No specific measures identified [E18]. {Provide enhanced mechanical ventilation by mechanical means [E48].}{Put lids on containers immediately after use [E9]}. ; {Carefully pour from containers [E62]}. ; {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Normal good standard fume cupboard (97%); Duration 0.2	Handle in a fume cupboard or under extract ventilation [E83].Put lids on containers immediately after use [E9]. ; Carefully pour from containers [E62].; Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Bench-mounted local extract ventilation; selected disposable gloves; Duration 0.2	Ensure material transfers are under containment or extract ventilation [E66]. Ensure the ventilation system is regularly maintained and tested [E74]. {Put lids on containers immediately after use [E9]}. ; {Carefully pour from containers [E62]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Controlled general ventilation (10 ACH); selected disposable gloves; Duration 0.2	Wear suitable gloves tested to EN374 [PPE15]. {Provide enhanced mechanical ventilation by mechanical means [E48].}{Put lids on containers immediately after use [E9]}. ; {Carefully pour from containers [E62]}. ; {Ensure the ventilation system is regularly maintained and tested [E74]}.
Laboratory activities [CS36]. Normal good standard fume cupboard (97%); Duration 0.1	Handle in a fume cupboard or under extract ventilation [E83].Put lids on containers immediately after use [E9]. ; Carefully pour from containers [E62].; Ensure the ventilation system is regularly maintained and tested [E74]. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Bench-mounted local extract ventilation; selected disposable gloves; Duration 0.1	Ensure material transfers are under containment or extract ventilation [E66]. Ensure the ventilation system is regularly maintained and tested [E74]. {Put lids on containers immediately after use [E9]}. ; {Carefully pour from containers [E62]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Laboratory activities [CS36]. Controlled general ventilation (10 ACH); selected disposable gloves; Duration 0.1	Wear suitable gloves tested to EN374 [PPE15]. {Provide enhanced mechanical ventilation by mechanical means [E48].}{Put lids on containers immediately after use [E9]}. ; {Carefully pour from containers [E62]}. ; {Ensure the ventilation system is regularly maintained and tested [E74]}.
<b>Section 2.2</b>	<b>Control of environmental exposure</b>
As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.	
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>Health</b>	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.

<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>Health</b>	Confirm that RMMs and OCs are as described.
<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 5</b>	<b>Additional good practice advice beyond the REACH Chemical Safety Assessment</b>
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH.	
Control of Worker Exposure	Good practice RMM phrases are {indicated} and incorporated within the ES Section 2 or consolidated into the main sections of the SDS.
Control of environmental exposure	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.

### 13. Use of $\gamma$ -Butyrolactone in Polymer Production

<b>Section 1</b>	<b>Exposure Scenario Title</b>
<b>Title</b>	<b>Use of <math>\gamma</math>-Butyrolactone in Polymer Production; CASRN: 96-48-0</b>
<b>Use Descriptor</b>	Sector of Use: Industrial (SU3, SU10)
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b
	Environmental Release Categories: ERC6A, ERC6C
<b>Processes, tasks, activities covered</b>	Manufacture of polymers from monomers in continuous and batch processes, include sparging, discharging, and reactor maintenance and immediate polymer product formation (i.e. compounding, pelletisation, product off-gassing).
<b>Section 2</b>	<b>Operational conditions and risk management measures</b>
<i>Field for additional statements to explain scenario if required.</i>	As described below
<b>Section 2.1</b>	<b>Control of worker exposure</b>
<b>Product characteristics</b>	
- Physical form of product	Liquid
- Vapour pressure	0.344 hPa at 20°C
- Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
- Amounts used	<i>Not applicable</i>
<b>Frequency and duration of use</b>	Covers daily exposures up to 8 hours (unless stated differently) [G2]
<b>Human factors not influenced by risk management</b>	<i>Not applicable</i>
<b>Other Operational Conditions affecting worker exposure</b>	Assumes use at not > 20°C above ambient [G15]. Assumes a good basic standard of occupational hygiene is implemented [G1].
<b>Risk Management Measures</b>	<b><i>Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment.</i></b>
General exposures (closed systems) [CS15]. >8 hours, ambient temp. to <62°C	No specific measures identified [EI18].

Material transfers [CS3]. >8 hours, ambient temp. to <62°C	Transfer via enclosed lines [E52]. {Ensure material transfers are under containment or extract ventilation [E66]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Use suitable eye protection and gloves [PPE14]}. {Remotely vent displaced vapours [ENVT17]}.
Polymerisation (bulk and batch) [CS65]>8 hours, ambient temp. to <62°C	Handle substance within a closed system [E47]. {Ensure material transfers are under containment or extract ventilation [E76]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Remotely vent displaced vapours [ENVT17]}.
Polymerisation (bulk and batch) [CS65]>8 hours, ambient temp. to <62°C	Handle substance within a closed system [E47]. {Ensure material transfers are under containment or extract ventilation [E76]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Remotely vent displaced vapours [ENVT17]}.
General exposures (closed systems) [CS15]. >8 hours, ambient temp. to <62°C	Handle substance within a closed system [E47]. {Ensure material transfers are under containment or extract ventilation [E76]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Remotely vent displaced vapours [ENVT17]}.
General exposures (closed systems) [CS15]. >8 hours, ambient temp. to <62°C	Handle substance within a closed system [E47]. {Ensure material transfers are under containment or extract ventilation [E76]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Remotely vent displaced vapours [ENVT17]}.
Intermediate polymer storage [CS66]>8 hours, ambient temp. to <62°C	Handle substance within a closed system [E47]. {Provide extract ventilation to material transfer points and other openings [E82]}. {Ensure the ventilation system is regularly maintained and tested [E74]}.
Addition and stabilisation [CS69]>8 hours, ambient temp. to <62°C	Handle substance within a closed system [E47]. {Provide extract ventilation to material transfer points and other openings [E82]}. {Ensure the ventilation system is regularly maintained and tested [E74]}.
Mixing in containers [CS23].>8 hours, ambient temp. to <62°C	Wear suitable gloves tested to EN374 [PPE15]. {Provide extract ventilation to points where emissions occur [E54]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Use suitable eye protection [PPE26]}. {Wear suitable coveralls to prevent exposure to the skin [PPE27]}.
Storage [CS67]>8 hours, ambient temp. to <62°C	No specific measures identified [EI18].
Storage [CS67]>8 hours, ambient temp. to <62°C	No specific measures identified [EI18].
Process sampling [CS2]. >8 hours, ambient temp. to <62°C	{Ensure material transfers are under containment or extract ventilation [E76]}. {Ensure the ventilation system is regularly maintained and tested [E74]}. {Wear suitable gloves tested to EN374 [PPE15]}.
Equipment maintenance [CS5]. >8 hours, ambient temp. to <62°C	Drain or remove substance from equipment prior to break-in or maintenance [E81]. Wear suitable gloves tested to EN374 [PPE15].
<b>Section 2.2</b>	<b>Control of environmental exposure</b>
As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.	
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>Health</b>	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.
<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>Health</b>	Confirm that RMMs and OCs are as described.
<b>Environment</b>	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.
<b>Section 5</b>	<b>Additional good practice advice beyond the REACH Chemical Safety Assessment</b>
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH.	



Control of Worker Exposure	Good practice RMM phrases are {indicated} and incorporated within the ES Section 2 or consolidated into the main sections of the SDS.
Control of environmental exposure	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.

## 14. Industrial use of $\gamma$ -Butyrolactone as intermediate under strictly controlled conditions

Section 1	Exposure Scenario Title
Title	<b>Distribution of intermediate under strictly controlled conditions</b>
Use Descriptor	Sector of Use: Industrial (SU8, SU9, SU10)
	Process Categories: PROC1, PROC2, PROC3
	Environmental Release Categories: <i>not applicable</i>
Section 2	Operational conditions and risk management measures
	As described below
Section 2.1	Control of consumer exposure
<b>Product characteristics</b>	
- Physical form of product	Liquid
- Vapour pressure	0.344 hPa at 20°C
- Concentration of substance in product	<i>Not applicable</i> ; substance is used as an isolated intermediate
<b>Amounts used</b>	<i>Not applicable</i>
<b>Frequency and duration of use</b>	<i>Not applicable</i>
<b>Human factors not influenced by risk management</b>	<i>Not applicable</i>
<b>Other Operational Conditions affecting consumer exposure</b>	The processes are performed under strictly controlled conditions.
<b>Risk Management Measures</b>	<b><i>Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment.</i></b>
PROC 1 - Use in closed process, no likelihood of exposure, as solution or molten liquid, Continuous; daily; >4 hours, ambient	Handle substance within a closed system [E47].
PROC 2 - Use in closed, continuous process with occasional controlled exposure, as solution or molten liquid, Continuous;	Handle substance within a closed system [E47].
PROC 3 - Use in closed batch process (synthesis or formulation), as solution or molten liquid, daily; >4 hours, ambient temp. to	Handle substance within a closed system [E47].
Section 2.2	Control of environmental exposure
As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.	
Section 3	Exposure Estimation
3.1 Health	As strictly controlled conditions are applied no exposure is anticipated.
3.2 Environment	As strictly controlled conditions are applied no exposure is anticipated.
Section 4	Guidance to check compliance with the Exposure Scenario
4.1 Health	Confirm that strictly controlled conditions are applied.
4.2 Environment	Confirm that strictly controlled conditions are applied.

<b>Section 5</b>	<b>Additional good practice advice beyond the REACH Chemical Safety Assessment</b>
Note: Because strictly controlled conditions are applied, no further safety assessment is necessary.	

## 15. Table of Changes

Version	Changes	Date
1	First edition	17-07-2012
2	Format change	03-07-2013
3	Removal of consumer uses; addition of intermediate use	26-09-2018