SAFETY DATA SHEET (1907/2006)

R0704306

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ANNEX

1. OVERVIEW OF EXPOSURE SCENARIOS

Table 1: Overview of exposure scenarios and coverage of substance life cycle

ES number	Short Title and Volume (tonnes/y)	Manufacture	Identified uses			Resulting life cycle stage		Sector of Use (SU)	Product Category (PC)	Process Category (PROC)	Article Categories (AC)	Environ-mental Release Categories (ERC)
			Formulation	End use	Consumer use	Service life (for articles)	Waste stage					
ES 1	*Manufacture of dimethyl ether (20,000 per site)*	*X*						*SU3 SU8*	*NA*	*PROC 1, 2, 3, 4, 5, 8b, 9*	*NA*	*ERC 1*
ES 2	*Formulation of products (250 per site)*		*X*					*SU3 SU10*	*PC1, 3 ,4, 8, 9a, 14, 15, 21, 23, 24, 25, 26, 27, 29, 31, 32, 34, 35, 38, 39*	*PROC 1, 2, 3, 4, 5, 8b, 9*	*NA*	*ERC 2*
ES 3	*Use as intermediate without strict control (30,000 per site)*			*X*				*SU3*	*PC19*	*PROC 1, 2, 3, 4, 5, 8b, 9*	*NA*	*ERC6a*
ES 4	*Use as expansion agent in foam production (150 per site)*			*X*				*SU3 SU12*	*PC32*	*PROC 5, 12, 14*	*3*	*ERC 4 – Industrial*
ES 5	*Foam article service life (3,000 service life EU)*					*X*		*SU22*	*PC32*		*AC13*	*11a -service life*
ES 6	*Industrial/Professional Use of propellants [1,2] (7000 total EU)*			*X*				*SU3 SU22 SU 19*	*PC1, 3 ,4, 8, 9a, 14, 15, 21, 23, 24, 25, 26, 27, 29, 31, 32, 34, 35, 39*	*PROC 7, 11, 15*	*NA*	*ERC 8A, ERC 8D*
ES 7	*Consumer use of propellants [3] (30,000 total EU)*				*X*			*SU21*	*PC1, 3 ,4, 8, 9a, 24, 39*	*NA*	*NA*	*ERC 8A, ERC 8D*

NOTES:
NA = not applicable
[1] lab chemical use included under use of propellants, PC21= lab use (calibration equipment for industrial (PROC3), lab chemical use for professional (PROC 15))
[2] Includes PC32 for foam from can
[3] There are consumer uses for DME as medical inhalers which are not included here since not required under REACH. REACH Article 5(a), Title I, provides that Titles II (Registration of substance), V, VI and VII SHALL NOT apply if the substance is used in medicinal products for human use within the scope of Regulation EC 726/2004, EC. Therefore PC 29 and SU 20 are not included in ES 7.

Important note:
The measures reported for exposure scenarios ES1, ES2 and ES3 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. Thus, the downstream user is not obliged to i) carry out an own CSA and/or ii) to notify the use to the Agency, if he does not implement these measures.

Basic requirements for use as a liquefied gas:
Being a liquefied gas, the substance may cause frost bite. Hence, the following Personal Protection Equipment is recommended as good industrial practice advice:
- Protective clothing, gloves
- Face and Eye protection where contact with liquefied gas may occur
- Training of personnel

2. EXPOSURE SCENARIO 1 (ES 1): MANUFACTURE OF DIMETHYL ETHER

2.1. Exposure scenario description

1. Title	
Free short title	Manufacture of dimethyl ether
Systematic title based on use descriptor	SU 3, 8 PROC 1, 2, 3, 4, 5, 8b, 9 ERC 1
Processes, tasks, activities covered	Manufacture and storage

2. Operational conditions and risk management measures
2.1 Control of workers exposure
Product Characteristics
Physical state: gas/liquefied gas Concentration: max. 100%
Frequency and duration of use
Exposure frequency: daily for all PROCs, > 4 hours per day (default)
Human factors not influenced by risk management
None
Technical conditions and measures at process level (source) to prevent release
Handling in industrial settings Containment according to definition of PROCs for liquefied gas Flammability: - contained processes/closed systems to reduce exposure to air, ignition and energy sources - keep containers tightly closed - use (local exhaust) ventilation/sufficient air exchange for non-closed processes, particularly around eventual release points - use explosion proof and grounded equipment - take measures to prevent build-up of electrostatic charge - do not use sparkling tools - make sure ignition controls are in place regarding e.g. lightning strikes, open flames, welding, mechanical sparks, heaters

- Keep containers in cool areas (< 50C)
Technical conditions and measures to control dispersion from source towards workers
None
Conditions and measures related to personal protection, hygiene and health evaluation
All Contributing Scenarios: No PPE required
2.2 Control of environmental exposure
Amount used
Max. 20000 t/year or 62.5 tonnes/day [largest site tonnage]
Frequency and duration of use
Continuous, Release/emission: ≥ 320 days/year
Environmental conditions not influenced by risk management
Dilution factor river: 10 *[TRA/EUSES default]* Dilution factor marine: 100 *[TRA/EUSES default]*
Technical conditions and measures at process level (source) to prevent release [only those used to justify a refined release fraction]
Containment in process
Technical conditions and measures to reduce or limit discharges, air emissions and releases to soil
Air: 0.5% (based on 99.5% efficiency of flare), max release rate of 313 kg/day per site Waste water: Waste water sent to flare and burned so only releases to air Soil: No processes/process steps leading to release to soil
Conditions and measures related to sewage treatment plant
Effluent rate of municipal STP: 2000 m^3/days *[TRA/EUSES default]* River flow rate: 18000 m^3/days *[TRA/EUSES default]*
Conditions and measures related to external treatment of waste for disposal
No waste generated as substance is a gas and will evaporate to air.

2.2. Description of activities and processes covered in the exposure scenario

- DME is a by-product in synthesizing methyl cellulose using natural cellulose and methyl chloride.

- The methylation is performed by heating cellulose with aqueous concentrated NaOH for activating cellulose and treating it with liquid methyl chloride.

- During the reaction the methyl chloride also reacts with NaOH and water and forms (NaCl, methanol and) dimethylether as by product(s).

2.3. Operational conditions and risk management measures related to substance characteristics

Table 2: Duration, frequency and amount (ES 1)

Information type	Data field	Explanation
Use amount of substance (as such or in preparation) per worker [workplace] per day	NA	*Not relevant for estimating worker exposure*
Duration of exposure per day at workplace [for one worker]	8 hr/day	
Annual amount used per site	2.0E+07 kg/y	*Based on highest producer in EU*
Emission days per site	320 d/y	*Assumes worst case that site only operates 320 days/yr. This results in a higher use/day which is more conservative.*

Table 3: Characteristics of the substance (ES 1)

Information type	Data field	Explanation
Physical state	Gas	Substance is a gas at room temperature
Concentration of substance	100%	
Risk management measures related to the design of operations	Closed systems, strict management controls	

2.3.1. Operational conditions related to available dilution capacity and characteristics of exposed humans

Manufacturing occurs in a high-integrity closed system that is operated with strict controls so there is little potential for exposure.

Table 4: Summary of exposure conditions (ES 1)

Scenario name	Process Category (PROC)	Type of setting	Duration of activity [hours/day]	Use of ventilation	Use of PPE
Manufacturing in closed system	PROC 1	industrial	>4 hours (default)	Outdoors	No
Manufacturing in closed system; maintenance, sampling	PROC 2	industrial	>4 hours (default)	Outdoors	No
Formulating under pressurized receptacles (closed batch process)	PROC 3	industrial	>4 hours (default)	Outdoors	No
Batch process	PROC 4	industrial	>4 hours (default)	Outdoors	No
Blending in batch process	PROC 5	industrial	>4 hours (default)	Outdoors	No
Transfer of substance at dedicated facilities	PROC 8b	industrial	>4 hours (default)	Outdoors	No
Transfer to smaller containers	PROC 9	industrial	>4 hours (default)	Outdoors	No

2.3.2. Other operational conditions of use

Table 5: Technical fate of substance and losses from process/use to waste, waste water and air (ES 1)

Information type	Data field	Explanation
Amount lost from process/use to waste gas	313 kg/day	*An enclosed flare, if operated properly at temperature range of 1400°F- 2000°F, can reach destruction efficiencies of >99.5%. 6.25E+04 kg/d x 0.005 = 313kg/day*
Amount lost from process/use to waste water	none	*Substance is a gas at environmental conditions*
Amount lost from process/use to waste	none	*Substance is a gas at environmental conditions*
Fraction consumed in process/use	none	*Manufacturing process, substance is produced*
Amount leaving the site with products	6.25E+04 kg/day	*Estimated amount produced per day. Does not consider amount released to air as waste since this fraction is very small compared to daily production rate*

Table 6: Containment and local exhaust ventilation

Information type	Data field
Containment	Substance is contained during manufacturing, reducing exposure to air, ignitions sources, and energy sources
Ventilation	Manufacturing is carried out in a closed system that is situated outdoors with minimal obstruction of air movement
Ignition Sources	Manufacturing equipment used is explosion proof and is grounded (i.e., designed with enclosing arcing sources that control the energy in any possible arcs and limit the allowable surface temperature of electrical equipment). Ignition controls from other sources (e.g. lightning strikes, open flames, welding, mechanical sparks, and heaters) are also in place.

2.3.3. Risk management measures

Table 7: Risk management measures for industrial site (ES 1)

Information type	Data field	Explanation
Personal protective equipment (PPE)		
Type of PPE (gloves, respirator, face-shield etc)	None	*No dermal protection is required to protect against local or systemic effects. Gloves may still be required to protect against frostbites.*
Other risk management measures related to workers		
Proper training and management controls	Workers are trained in good work practice	

Risk management measures related to environmental emissions from industrial sites		
Air emission abatement	99.5 % destruction efficiency	*An enclosed flare, if operated properly at temperature range of 1400°F- 2000°F, can reach destruction efficiencies of >99.5%.*
Resulting fraction of applied amount in waste gas released to environment	0.5% (313 kg/day)	

2.3.4. Waste related measures

There is no solid or liquid waste containing DME. There are emissions to air, which are estimated based on the efficiency of an enclosed flare and previously addressed.

3. EXPOSURE SCENARIO 2 (ES 2): FORMULATION OF PRODUCTS CONTAINING DME

3.1. Exposure scenario description

1. Title	
Free short title	Formulation of Products
Systematic title based on use descriptor	SU 3, 10 PC1, 3 ,4, 8, 9a, 14, 15, 21, 23, 24, 25, 26, 27, 29, 31, 32, 34, 35, 38, 39 PROC 1, 2, 3, 4, 5, 8b, 9 ERC 2
Processes, tasks, activities covered	Formulation/blending in batch processes, transfers and packaging

2. Operational conditions and risk management measures
2.1 Control of workers exposure
Product Characteristics
Physical state: gas/liquefied gas Concentration: max. 100%
Frequency and duration of use
Exposure frequency daily for all PROCs: >4 hours (default)
Human factors not influenced by risk management
None
Technical conditions and measures at process level (source) to prevent release
Handling in industrial settings Containment according to definition of PROCs for liquefied gas Flammability: - contained processes/closed systems to reduce exposure to air, ignition and energy sources - keep containers tightly closed - use (local exhaust) ventilation/sufficient air exchange for non-closed processes, particularly around eventual release points - use explosion proof and grounded equipment - take measures to prevent build-up of electrostatic charge - do not use sparkling tools

- make sure ignition controls are in place regarding e.g. lightning strikes, open flames, welding, mechanical sparks, heaters - keep containers in cool areas (< 50C)
Technical conditions and measures to control dispersion from source towards workers
None
Conditions and measures related to personal protection, hygiene and health evaluation
All Contributing Scenarios: No PPE required.
2.2 Control of environmental exposure
Amount used
Max. 250 t/year or 0.83 tonnes/day [largest site tonnage]
Frequency and duration of use
Continuous, Release/emission: ≥ 300 days/year
Environmental conditions not influenced by risk management
Dilution factor river: 10 *[TRA/EUSES default]* Dilution factor marine: 100 *[TRA/EUSES default]*
Technical conditions and measures at process level (source) to prevent release [only those used to justify a refined release fraction]
Containment in process
Technical conditions and measures to reduce or limit discharges, air emissions and releases to soil
Air: Release max 5% (SPERC ESVOC4), max release rate of 20.8 kg/day per site Waste water: spERC ESVOC4 assumes 0.5%, max release rate of 4.17 kg/day per site Soil: No processes/process steps leading to local releases to soil
Conditions and measures related to sewage treatment plant
Effluent rate of municipal STP: 2000 m^3/days *[TRA/EUSES default]* River flow rate: 18000 m^3/days *[TRA/EUSES default]*
Conditions and measures related to external treatment of waste for disposal
No waste generated as substance is a gas and will evaporate to air.

3.2. Description of activities and processes covered in the exposure scenario

- DME is shipped in bulk to distributors, where it is further shipped to packagers who formulate DME into different propellant blends.

- Bulk DME stored in tanks is transferred to aerosol units or one-component foam units using pumps in a close pipe system.

- For formulation of laboratory chemicals, DME is transferred to small cylinders. Little worker exposure is expected because formulation is carried out in closed systems located indoors, typically with LEV. No PPE is required even when using these conservative operating conditions.

3.3. Expected environmental releases

The category for environmental release at the formulation level is ERC2. Default percent releases associated with this ERC are 2.5% to air, 2.0% to water, and 0.01% to soil. Since DME is a gas which only has appreciable water solubility under pressure, actual release will be mainly occur to air. In addition, blending is performed in closed systems so little release to the environment, air or water, is expected, and no direct release to soil. Wastewater releases, if any, are assumed to be sent through a Sewage Treatment Plant (STP).

3.4. Operational conditions and risk management measures related to product characteristics

Table 8: Duration, frequency and amount (ES 2)

Information type	Data field	Explanation
Used amount of substance (as such or in preparation) per worker [workplace] per day		*Not relevant for estimating worker exposure*
Duration of exposure per day at workplace [for one worker]	8 hr/workday	
Frequency of exposure at workplace [for one worker]	daily	
Annual amount used per site	250 000 kg/y	*Estimated highest tonnage user*
Emission days per site	300 d/y	*Based on ESVOC spERC2.2.v1*

Table 9: Characteristics of the substance or preparation (ES 2)

Information type	Data field	Explanation
Physical state	gas	*Substance is a gas at room temperature*
Concentration of substance in preparation	Varies, use 100%	*For worst case, assumed 100% DME in the preparation. This is a conservative assumption.*

3.4.1. Operational conditions related to available dilution capacity and characteristics of exposed humans

The following PROCS are used for DME formulation activities. No PPE is considered for this use.

Table 10: Summary of exposure conditions (ES 2)

Scenario name	Process Category (PROC)	Type of setting	Is Substance a solid?	Duration of activity [hours/day]	Use of ventilation?
Use in closed process	PROC 1	industrial	No	>4 hours	Indoors without LEV
Used in closed, continuous process w/ occasional controlled exposure	PROC 2	industrial	No	>4 hours	Indoors without LEV
Use in closed batch process	PROC 3	industrial	No	>4 hours	Indoors without LEV
Use in batch and other process where opportunity for exposure	PROC 4	industrial	No	>4 hours	Indoors without LEV
Mixing and blending	PROC 5	industrial	No	>4 hours	Indoors without LEV
Transfer to small containers	PROC 9	industrial	No	>4 hours	Indoors without LEV
Transfer at dedicated	PROC 8b	industrial	No	>4 hours	Indoors

Scenario name	Process Category (PROC)	Type of setting	Is Substance a solid?	Duration of activity [hours/day]	Use of ventilation?
facilities					without LEV

3.4.2. Other operational conditions of use

Table 11: Technical fate of substance and losses from process/use to waste, waste water and air (ES 2)

Information type	Data field	Explanation
Amount lost from process/use to waste gas	20.8 kg/day	*Based on SPERC ESVOC 4 , emissions to air of 0.025 fraction of tonnage (250 000 kg/y x0.025 = 6250 kg/300 days = 20.8 kg/day*
Amount lost from process/use to waste water	4.17 kg/day	*Based on SPERC ESVOC 4, emissions to air of 0.005 fraction of tonnage (250 000 kg/y x0.005 = 1250 kg/300 days = 4.17 kg/day*
Amount lost from process/use to waste	0	*DME is not lost to solid waste since it is a gas at environmental conditions*
Amount leaving the site with products	808 kg/day	*The use amount is 833/day and 25 kg/day ends up as air or water waste*

Table 12: Containment and local exhaust ventilation

Information type	Data field
Containment	DME is contained in a closed system reducing exposure to air, ignition sources, and energy sources. Containers are kept tightly closed.
Ventilation	Formulating is predominantly carried out in a closed system that is situated indoors with local exhaust ventilation. Containers are kept in a well-ventilated place. Sufficient air exchange and/or exhaust are provided in work rooms. Increased ventilation is provided around the extruder.
Ignition Sources	Equipment used in formulating processes is explosion proof and is grounded (i.e., designed with enclosing arcing sources that control the energy in any possible arcs and limit the allowable surface temperature of electrical equipment). Measures are taken to prevent the build up of electrostatic charge (e.g., management of static build-up in handling the plastics). No sparking tools are used. Ignition controls from other sources (e.g. lightning strikes, open flames, welding, mechanical sparks, and heaters) are also in place. Containers are kept in a cool area (<50°C).

3.4.3. Risk management measures

Table 13: Risk management measures for industrial site (ES 2)

Information type	Data field	Explanation
Personal protective equipment (PPE)		
Type of PPE (gloves, respirator, face-shield etc)	None required	No dermal protection is required to protect against local or systemic effects. Gloves may still be required to protect against frostbites.
Other risk management measures related to workers		
Proper training and management controls	Workers are trained in good work practice	
Risk management measures related to environmental emissions from industrial sites		
Air emission abatement	None	
Municipal or other type of external waste water treatment	Standard default STP is used for waste water	ECETOC defaults
Effluent (of the waste water treatment plant) discharge rate	2000 m^3/d	ECETOC Default: 2000 m^3/d
Recovery of sludge for agriculture or horticulture	Yes	Worst case assumption

3.4.4. Waste related measures

There is no solid or liquid waste containing DME. There are emissions to air and waste water which are estimated using release fractions based on spERC ESVOC 4.

4. EXPOSURE SCENARIO 3 (ES 3): USE AS INTERMEDIATE WITHOUT STRICT CONTROL

4.1. Exposure scenario description

1. Title	
Free short title	Use as intermediate without strict control
Systematic title based on use descriptor	SU 3 PROC 1, 2, 3, 4, 5, 8b, 9 PC 19 ERC 6[a]
Processes, tasks, activities covered	Various closed and batch processes at different containment levels, blending, transfers

2. Operational conditions and risk management measures
2.1 Control of workers exposure
Product Characteristics
Physical state: gas/liquefied gas Concentration: max. 100%

Frequency and duration of use
Exposure frequency daily for all PROCs: > 4 hours (default)
Human factors not influenced by risk management
None
Technical conditions and measures at process level (source) to prevent release
Handling in industrial settings Containment according to definition of PROCs for liquefied gas Flammability: - contained processes/closed systems to reduce exposure to air, ignition and energy sources - keep containers tightly closed - use (local exhaust) ventilation/sufficient air exchange for non-closed processes - use explosion proof and grounded equipment - take measures to prevent build-up of electrostatic charge - do not use sparkling tools - make sure ignition controls are in place regarding e.g. lightning strikes, open flames, welding, mechanical sparks, heaters - keep containers in cool areas (< 50C)
Technical conditions and measures to control dispersion from source towards workers
None
Conditions and measures related to personal protection, hygiene and health evaluation
All Contributing Scenarios: No PPE required.
2.2 Control of environmental exposure
Amount used
Max. 30000 t/year or 94 tonnes/day [largest site tonnage]
Frequency and duration of use
Continuous, Release/emission: ≥ 320 days/year
Environmental conditions not influenced by risk management
Dilution factor river: 10 *[TRA/EUSES default]* Dilution factor marine: 100 *[TRA/EUSES default]*
Technical conditions and measures at process level (source) to prevent release [only those used to justify a refined release fraction]
Containment in process
Technical conditions and measures to reduce or limit discharges, air emissions and releases to soil
Air: Release estimate is 0.5% (based on 99.5% efficiency of flare for wastewater), max release rate of 469 kg/day per site Waste water: Waste water sent to flare and burned so only releases to air Soil: No processes/process steps leading to release to soil
Conditions and measures related to sewage treatment plant
Effluent rate of municipal STP: 2000 m^3/days *[TRA/EUSES default]* River flow rate: 18000 m^3/days *[TRA/EUSES default]*
Conditions and measures related to external treatment of waste for disposal
No waste generated as substance is a gas and will evaporate to air.

4.2. Description of activities and processes covered in the exposure scenario

- Dimethyl ether (DME) is used as an intermediate in the synthesis of other compounds. One example is the conversion of DME to dimethyl sulfate.

- The process activities are very similar to the manufacture of DME. The DME is received and stored as a liquid, transferred through closed systems and kept in a closed system as it is reacted to another substance.

- DME is purged from the waste water prior to the WWTP and sent to an enclosed flare that operates with 99.5% destruction efficiency.

- The final product does not contain DME.

- For this use, no STP or WWTP is considered since all DME releases go to the air.

4.3. Operational conditions and risk management measures related to substance characteristics

Table 14: Duration, frequency and amount (ES 3)

Information type	Data field	Explanation
Use amount of substance (as such or in preparation) per worker [workplace] per day		*Not relevant for estimating worker exposure*
Duration of exposure per day at workplace [for one worker]	8 hr/day	
Annual amount used per site	3.0E+07 kg/y	*Based on EU total use estimates*
Emission days per site	320 d/y	*Assumes worst case that site only operates 320 days/yr. This results in a higher use/day which is more conservative.*

Table 15: Characteristics of the substance (ES 3)

Information type	Data field	Explanation
Physical state	gas	*Substance is a gas at room temperature*
Concentration of substance	100%	
Risk management measures related to the design of operations	Closed systems, strict management controls	

4.3.1. Operational conditions related to available dilution capacity and characteristics of exposed humans

Manufacturing occurs in a high integrity closed system that is operated with strict controls so there is little potential for exposure.

Table 16: Summary of exposure conditions (ES 3)

Scenario name	Process Category (PROC)	Type of setting	Duration of activity [hours/day]	Use of ventilation	Use of PPE
processing in closed system	PROC 1	industrial	>4 hours (default)	Outdoors	No
processing in closed system; maintenance, sampling	PROC 2	industrial	>4 hours (default)	Outdoors	No
Formulating under pressurized receptacles (closed batch process)	PROC 3	industrial	>4 hours (default)	Outdoors	No
Batch process	PROC 4	industrial	>4 hours (default)	Outdoors	No
Blending in batch process	PROC 5	industrial	>4 hours (default)	Outdoors	No
Transfer of substance at dedicated facilities	PROC 8b	industrial	>4 hours (default)	Outdoors	No
Transfer to smaller containers	PROC 9	industrial	>4 hours (default)	Outdoors	No

4.3.2. Other operational conditions of use

Table 17: Technical fate of substance and losses from process/use to waste, waste water and air (ES 3)

Information type	Data field	Explanation
Amount lost from process/use to waste gas	469 kg/day	*An enclosed flare, if operated properly at temperature range of 1400°F- 2000°F, can reach destruction efficiencies of >99.5%. 9.38E+04 kg/d x 0.005 = 469 kg/day*
Amount lost from process/use to waste water	none	*Substance is a gas at environmental conditions*
Amount lost from process/use to waste	none	*Substance is a gas at environmental conditions*
Fraction consumed in process/use	none	*Manufacturing process, substance is produced*
Amount leaving the site with products	9.38E+04 kg/day	*Manufactured as a pure substance and shipped in containers to downstream users. Amount going to air as waste is very small compared to daily production rate since mainly a closed system*

Table 18: Containment and local exhaust ventilation

Information type	Data field
Containment	Substance is contained during use as an intermediate, reducing exposure to air, ignitions sources, and energy sources
Ventilation	Operations are carried out in a closed system that is situated outdoors with minimal obstruction of air movement
Ignition Sources	Manufacturing equipment used is explosion proof and is grounded (i.e., designed with enclosing arcing sources that control the energy in any possible arcs and limit the allowable surface temperature of electrical equipment). Ignition controls from other sources (e.g. lightning strikes, open flames, welding, mechanical sparks, and heaters) are also in place.

4.3.3. Risk management measures

Table 19: Risk management measures for industrial site (ES 3)

Information type	Data field	Explanation
Personal protective equipment (PPE)		
Type of PPE (gloves, respirator, face-shield etc)	None	*No dermal protection is required to protect against local or systemic effects. Gloves may still be required to protect against frostbites.*
Other risk management measures related to workers		
Proper training and management controls	Workers are trained in good work practice	
Risk management measures related to environmental emissions from industrial sites		
Air emission abatement	99.5 % destruction efficiency	*An enclosed flare, if operated properly at temperature range of 1400^{o}F- 2000^{o}F, can reach destruction efficiencies of >99.5%.*
Resulting fraction of applied amount in waste gas released to environment	500 kg/day	

4.3.4. Waste related measures

There is no solid or liquid waste containing DME. There are emissions to air which are estimated based on the efficiency of an enclosed flare and previously addressed.

5. EXPOSURE SCENARIO 4 (ES 4): USE AS EXPANSION AGENT IN FOAM PRODUCTION

5.1. Exposure scenario description

1. Title	
Free short title	Use as expansion agent in foam production
Systematic title based on use descriptor	SU 3, 12 PROC 5, 12, 14 PC 32 AC 13 ERC 4
Processes, tasks, activities covered	Various mixing, blending, foam blowing/extrusion and article production by in industrial settings

2. Operational conditions and risk management measures
2.1 Control of workers exposure
Product Characteristics
Physical state: gas/liquefied gas Concentration: max. 100%
Frequency and duration of use
Exposure frequency: daily for all PROCs, > 4 hours per day (default)
Human factors not influenced by risk management
None
Technical conditions and measures at process level (source) to prevent release
Handling in industrial settings Containment according to definition of PROCs for liquefied gas Flammability: - contained processes/closed systems to reduce exposure to air, ignition and energy sources - keep containers tightly closed - use (local exhaust) ventilation/sufficient air exchange for non-closed processes, particularly around extruders - use explosion proof and grounded equipment - take measures to prevent build-up of electrostatic charge - do not use sparkling tools - make sure ignition controls are in place regarding e.g. lightning strikes, open flames, welding, mechanical sparks, heaters - keep containers in cool areas (< 50C)
Technical conditions and measures to control dispersion from source towards workers
None
Conditions and measures related to personal protection, hygiene and health evaluation
All Contributing Scenarios: No PPE required.

2.2 Control of environmental exposure
Amount used
Max. 150 t/year or 0.5 tonnes/day [largest site tonnage]
Frequency and duration of use
Continuous, Release/emission: ≥ 300 days/year
Environmental conditions not influenced by risk management
Dilution factor river: 10 *[TRA/EUSES default]* Dilution factor marine: 100 *[TRA/EUSES default]*
Technical conditions and measures at process level (source) to prevent release [only those used to justify a refined release fraction]
Containment in process until release for foam production/extrusion.
Technical conditions and measures to reduce or limit discharges, air emissions and releases to soil
Air: spERC ESVOC 23 (refinement of ERC4): Release to air is 100% or 500 kg/day per site Waste water: No processes/process steps leading to release to waste water or aquatic environment but spERC ESVOC23 has a release of 0.1% to water via STP or 0.5 kg/day for conservatism Soil: No processes/process steps leading to release to soil.
Conditions and measures related to sewage treatment plant
Effluent rate of municipal STP: 2000 m^3/days *[TRA/EUSES default]* River flow rate: 18000 m^3/days *[TRA/EUSES default]*
Conditions and measures related to external treatment of waste for disposal
No waste generated as substance is a gas and will evaporate to air.

5.2. Description of activities and processes covered in the exposure scenario

DME is used as a foam expansion agent (blowing agent) in the production of insulating, packaging, and cushioning materials at industrial facilities. Generally, the foam blowing process involves feeding thermoplastics into an extruder to which the blowing agent is fed into the melt. Some of the blowing agent remains entrapped in the plastic upon cooling. Special containments such as pressurised pipe-work are often used to prevent loss of the physical blowing agent.

- Activities are assumed to be performed indoors without any local exhaust ventilation, which is the worst case assumption.
- No specific PPE is required.
- Releases to water, if any, are assumed to be sent through a Sewage Treatment Plant (STP).
- No direct releases to soil are expected since operations are indoors.

5.3. Expected environmental releases

Release category ERC 4 is used for industrial use of processing aids. However, since DME is entrapped in the foam article, ERC 5 may be a better description as it is intended to include uses of a substance that become physically bound into the material. Instead, for this use,

environmental release fractions are defined using spERC ESVOC 23 developed by ESIG. This spERC provides environmental release fractions for substances used as a foam expansion agent (use as a blowing agent, including material transfers, curing, storage and maintenance). SpERC ESVOC 23 estimates 100% is released to the air and 0.1% is released to the water. A fraction of DME becomes entrapped in the foam - residual levels in foam articles range from 5 to 15% depending on the use -. Hence, the actual release fraction to air will be significantly less than 100%, and thus spERC ESVOC 23 describes a worst case situation.

- After foam production, service life of the foam will need to be considered because some DME is entrapped in the foam article.

- For human exposure, the only exposure pathway of concern is inhalation as the DME is released slowly over time.

- For environmental releases, air is the only pathway of concern. Exposures from releases during article service life are addressed in the next exposure scenario.

- The life cycle stage of insulation used in consumer homes is assessed for a worst case use of foam. The foam retains a small amount of DME in the closed polymer cells which slowly leaks out during the lifetime of the insulation.

5.4. Operational conditions and risk management measures related to product characteristics

Table 20: Industrial use duration, frequency and amount (ES 4)

Information type	Data field	Explanation
Used amount of substance (as such or in preparation) per worker [workplace] per day		*Not relevant for estimating worker exposure*
Duration of exposure per day at workplace [for one worker]	8 h/day	
Frequency of exposure at workplace [for one worker]	Daily (5 days/week for workers)	
Annual amount used per site	1.5E+05 kg/y	
Emission days per site	300 d/y	*Based on ESVOC spERC ESVOC4.9.v1*

Table 21: Characteristics of the substance or preparation (ES 4)

Information type	Data field	Explanation
Physical state	gas	*Substance is a gas at room temperature*
Concentration of substance in preparation	100%	*Based on information that DME is often sold in bulk*

5.4.1. Operational conditions related to available dilution capacity and characteristics of exposed humans

The following PROCs are used for DME as a blowing agent. No PPE is considered for this use.

Table 22: Summary of exposure conditions (ES 4)

Scenario name	Process Category (PROC)	Type of setting	Duration of activity [hours/day]	Use of ventilation?	Use of PPE
Mixing and blending for blowing agents	PROC 5	professional	>4 hours	Indoors without LEV	No
Use as blowing agents in manufacture of foam	PROC 12	professional	>4 hours	Indoors without LEV	No
Production of articles. At this stage, DME is in foam and being cut, most concern will be vaporization, not inhalation of DME in dust	PROC 14	professional	>4 hours	Indoors without LEV	No

5.4.2. Other operational conditions of use

Table 23: Technical fate of substance and losses from process/use to waste, waste water and air (ES 4)

Information type	Data field	Explanation
Amount lost from process/use to waste gas	500 kg/day	*Based on SPERC ESVOC 23 (100% of tonnage)*
Amount lost from process/use to waste water	0.5 kg/day	*Based on SPERC ESVOC 23 (0.1% of tonnage)*
Amount lost from process/use to waste	0	*DME is not lost to solid waste since it is a gas at environmental conditions*
Amount leaving the site with products	0 kg/day	*SPERC assumes all DME is released which is extremely conservative*

Table 24: Containment and local exhaust ventilation

Information type	Data field
Containment	DME is contained in a closed system reducing exposure to air, ignition sources, and energy sources. Containers are kept tightly closed.
Ventilation	Foam production is predominantly carried out in a closed system that is situated indoors with local exhaust ventilation. Containers are kept in a well-ventilated place. Sufficient air exchange and/or exhaust are provided in work rooms. Increased ventilation is provided around the extruder.
Ignition Sources	Equipment used in foam production processes is explosion proof and is grounded (i.e., designed with enclosing arcing sources that control the energy in any possible arcs and limit the allowable surface temperature of electrical equipment). Measures are taken to prevent the build up of electrostatic charge (e.g., management of static build-up in handling the plastics). No sparking tools are used. Ignition controls from other sources (e.g. lightning strikes, open flames, welding, mechanical sparks, and heaters) are also in place. Containers are kept in a cool area (<50°C).

5.4.3. Risk management measures

Table 25: Risk management measures for industrial site (ES 4)

Information type	Data field	Explanation
Personal protective equipment (PPE)		
Type of PPE (gloves, respirator, face-shield etc)	None required	No dermal protection is required to protect against local or systemic effects. Gloves may still be required to protect against frostbites.
Other risk management measures related to workers		
Proper training and management controls	Workers are trained in good work practice	
Risk management measures related to environmental emissions from industrial sites		
Air emission abatement	none	
Municipal or other type of external waste water treatment	Standard default STP is used for waste water treatment	ECETOC Defaults used
Effluent (of the waste water treatment plant) discharge rate	2000 m^3/d	ECETOC Default: 2000 m^3/d
Recovery of sludge for agriculture or horticulture	Yes	Worst case assumption

5.4.4. Waste related measures

There is no solid or liquid waste containing DME shipped offsite. There are emissions to air and waste water, which are estimated based on the SPERC ESVOC 23.

6. EXPOSURE SCENARIO 5 (ES 5): SERVICE LIFE OF FOAM ARTICLE

6.1. Exposure scenario description

1. Title	
Free short title	Service life of foam article
Systematic title based on use descriptor	SU 21 PC 32 AC13 ERC 11a, 10a (ERC 11a covered by ERC 10a)
Processes, tasks activities covered	Article service life of foam boards in construction - consumer and environmental exposure by low releases during service life

2. Operational conditions and risk management measures
2.1 Control of consumers exposure
Product characteristics
Concentration: ≤15% substance in foam product Physical state: gas – physically entrapped in foam matrix
Amounts used
Assumes 3.6 kg DME in 45 m^2 of home insulation foam
Frequency and duration of use/exposure
Frequency: continuous Duration [for contact]: 24 hrs/day
Human factors not influenced by risk management
None
Other given operational conditions affecting consumers exposure
The product is used indoors and outdoors. Only indoor use is considered since it leads to worst case potential exposure. Indoor air volume: min. 27 m^3, 0.3/hr air exchange rate
Conditions and measures related to information and behavioural advice to consumers
None
Conditions and measures related to personal protection and hygiene
None

2.2 Control of environmental exposure
Amounts used
Annual amount supplied to use: max. 3000 t/year or 8.2 tonnes/day (conservative estimate based on amount of foam produced – actual amount of substance <450 tonnes/year) Fraction to region 0.1 (wide-dispersive use default) Fraction of the main local source: 0.002 (ERC default for wide dispersive uses)
Frequency and duration of use/exposure from service life
Continuous release – wide dispersive use; 365 days/year (ERC default)
Environmental factors not influenced by risk management
Dilution factor river: 10 *[TRA/EUSES default]* Dilution factor marine: 100 *[TRA/EUSES default]*
Technical conditions and measures at level of article production process to prevent release during service life
None
Technical conditions and measures to reduce or limit discharges, air emissions and releases to soil
Air: amount released to air 0.05%, max release rate of 0.411 kg/day at the regional scale Wastewater: amount released to wastewater 3.2%, max release rate of 0.0526 kg/day Soil: no direct release to soil at local level

Conditions and measures related to sewage treatment plant
Effluent rate of municipal STP: 2000 m^3/days *[TRA/EUSES default]* River flow rate: 18000 m^3/days *[TRA/EUSES default]*
Conditions and measures related to disposal of articles at the end of service life
Very little DME will remain in article at end of service life. Any solid waste generated to be disposed of according to official local and regional regulations.

6.2. Description of activities and processes covered in the exposure scenario

See Section 0 for a description of the foam blowing process. As mentioned, foam articles can retain a small amount of the physical blowing agent in closed cells. The amount of DME remaining in foam articles is estimated to range from 5-15% depending on the size and type of foam. For large articles such as insulation foams used in homes, it normally takes decades for DME to be released. It is unlikely for DME to be released directly into a room as the insulation is located behind walls.

While professional workers may be exposed to DME during installation of foam materials, exposure is expected to be negligible when compared to consumers whose exposure duration will be higher. Furthermore, room ventilation in completed and lived-in homes is most likely lower than during construction or renovation. Therefore, exposure estimates for consumer exposure will also address any potential health concerns to workers.

For a worst-case assumption, it is assumed a maximum of 15% by weight of the DME is trapped in the foam cells and slowly leaks out over the service life of the insulation material. The scenario used to estimate amount of DME released from home insulation foam is based on a small room (27 m^3) with four walls and the ceiling covered by insulation material. A consumer is assumed to spend one year in this room using the lowest air exchange rate recommended by ConsExpo 4.1 for residential homes.

Default environmental release factors for ERC 10a are used to estimate releases to the environment. This ERC is for articles used outdoors and has higher release fractions to wastewater and soil than those of articles used indoors. These are extremely conservative assumptions and serve to demonstrate that there are no health risk concerns either to human health or the environment.

6.3. Estimated consumer exposure

Table 26: Parameters defining consumer exposure to DME released during foam article service life (ES 5)

Parameter	Value	Justification
Exposure	24 hrs/day for 1 year.	worst-case scenario
Room size	27 m^3	A small room of 3m x 3m x3m
Volume of foam board used in room	1 m^3	Each wall is 3m x 3m = 9 m^2 5 walls (including ceiling) = 9x5 = 45 m^2. Thickness = 2 cm = 0.02 m (Energysaver, 2010) Vol = 45 m^2 x 0.02 m = 0.9 m^3 round up to 1 m^3 for conservatism
Air exchange rate	0.3 /hr	*Use low end estimate for residential housing from ConsExpo*
Amount of DME present in foam	3.6 kg	*Average foam board density is 24 kg/m^3 (Energysavers, 2010). The highest density results in the highest amount of DME.* *1m^3 x 24 kg/m^3 = 24 kg of foam board. Assume DME is 25% by weight: 24 kg x 0.15 = 3.6 kg DME present to off gas over time*

7. EXPOSURE SCENARIO 6 (ES 6): INDUSTRIAL/ PROFESSIONAL USE OF PROPELLANTS

7.1. Exposure scenario description

1. Title	
Free short title	Industrial/Professional use of propellants
Systematic title based on use descriptor	SU 3, 19, 22 PROC 7, 11, 15 PC1, 3 ,4, 8, 9a, 14, 15, 21, 23, 24, 25, 26, 27, 29, 31, 32, 34, 35, 39 ERC 8a, 8d (ERC 8a assessment covering 8d)
Processes, tasks, activities covered	Spraying of propellant and laboratory use as a chemical

2. Operational conditions and risk management measures
2.1 Control of workers exposure
Product Characteristics
Physical state: gas/liquefied gas Concentration: >25% (ECETOC TRAM does not modify exposure estimates for substances in mixtures if >25%)
Frequency and duration of use
Exposure frequency: daily for all PROCs, > 4 hours per day (default)
Human factors not influenced by risk management

None
Technical conditions and measures at process level (source) to prevent release
Handling in industrial/professional settings Containment according to definition of PROCs for liquefied gas Flammability: - keep containers tightly closed - do not pierce or burn, even after use - provide sufficient air exchange and/or exhaust in work rooms. - well ventilate after use. - keep away from open flames or sources of sparks or ignition - when using do not smoke - do not use or store near sources of heat or electrical devices - do not spray on a naked flame or any incandescent material. - protect from sunlight and do not expose to temperatures exceeding 50°C.
Technical conditions and measures to control dispersion from source towards workers
None
Conditions and measures related to personal protection, hygiene and health evaluation
All Contributing Scenarios: No PPE required.
2.2 Control of environmental exposure
Amount used
Annual amount supplied to use: max. 7000 t/year – wide dispersive use, fraction to region 0.1 (ERC 8a default) Fraction of the main local source: 0.002 (ERC default for wide dispersive uses)
Frequency and duration of use
Continuous release – wide dispersive use; 365 days/year (ERC default)
Environmental conditions not influenced by risk management
Dilution factor river: 10 *[TRA/EUSES default]* Dilution factor marine: 100 *[TRA/EUSES default]*
Technical conditions and measures at process level (source) to prevent release [only those used to justify a refined release fraction]
None
Technical conditions and measures to reduce or limit discharges, air emissions and releases to soil
Air: 100% (ERC 8a default), max release rate of 1920 kg/day (regional release) Wastewater: 100% (ERC 8a default), max release rate of 1530 kg/day (regional release) Soil: No direct release to soil (ERC 8a default)
Conditions and measures related to sewage treatment plant
Effluent rate of municipal STP: 2000 m^3/days *[TRA/EUSES default]* River flow rate: 18000 m^3/days *[TRA/EUSES default]*
Conditions and measures related to external treatment of waste for disposal
No waste generated as substance is a gas and will evaporate to air

7.2. Description of activities and processes covered in the exposure scenario

DME is used by industrial/professionals as a propellant for spraying and as a laboratory chemical. These activities are defined as

- PROC 7 industrial spraying,
- PROC 11 professional spraying, and
- PROC 15 for use of laboratory reagents in small scale laboratories.

Important note:
Industrial and professional uses are combined because use at the industrial level is not expected to be significantly different than that at the professional level. Although industrial uses are normally characterised by local releases, for the purpose of estimating environmental releases, it is assumed that use of propellants at industrial sites are also dispersed widely. No underestimation of releases to the environment is expected as no unique use of propellants has been identified at industrial sites.

7.3. Expected environmental releases

For environmental releases, both indoor and outdoor uses of propellants are considered using ERCs 8a (wide dispersive indoor use of processing aids in open systems, includes aerosol propellants) and 8d (wide dispersive outdoor use of processing aids in open systems, includes aerosol propellants). Since there will not be any direct release to soil as DME discharged from an aerosol spray will primarily discharge to the air, release fractions for ERC 8a are used. This ERC still assumes a 100% release to wastewater although DME will preferentially release to the air rather than to water.

7.4. Operational conditions and risk management measures related to product characteristics

Table 27: Duration, frequency and amount (ES 6)

Information type	Data field	Explanation
Duration of exposure per day at workplace [for one worker]	1-4 hrs/day indoors >4 hrs/day outdoors	*Industrial/Professional use, note industrial users can work indoors without LEV for >4 hrs but professionals can only work 1-4 hrs.*
Frequency of exposure at workplace [for one worker]	daily	
Total annual amount of substance supplied per relevant preparation category	7.0E+06 kg/y	
Emission days per year related to that preparation category	365 d/y	*Defined in ERC 8a*

Table 28: Characteristics of the substance or preparation (ES 6)

Information type	Data field	Explanation
Physical state	gas	*Gas contained as liquid under pressure in container*
Concentration of substance in preparation	>25%	*ECETOC TRAM does not modify exposure estimates for substances in preparations if >25%*
Risk management measures related to the design of product	Product supplied in container of limited volume	*Size of container limits amount of substance available*

7.4.1. Operational conditions related to available dilution capacity and characteristics of exposed humans

Table 29: Operational conditions related to potential exposure (ES 6)

Scenario name	Process Category (PROC)	Type of setting	Duration of activity [hours/day]	Use of ventilation	Use of PPE
Industrial spraying	PROC 7	industrial	> 4 hours	Outdoors	No
Industrial spraying	PROC 7	industrial	> 4 hours	Indoors without LEV	No
professional spraying	PROC 11	professional	> 4 hours	Outdoors	No
professional spraying	PROC 11	professional	1-4 hours	Indoors without LEV	No
Use of laboratory in small scale laboratory	PROC 15	professional	> 4 hours	Indoors without LEV	No

7.4.2. Other operational conditions of use

Table 30: Technical fate of substance and losses from process/use to waste, waste water and air (ES 6)

Information type	Data field	Explanation
Fraction of applied amount lost from process/use to waste gas,	1	*All DME is considered released to the air during professional spraying*
Fraction of applied amount lost from process/use to waste water	0	
Fraction of applied amount lost from process/use to waste	0	
Fraction consumed in process/use	1	*DME is consumed during the use in that it is all released to the air*
Fraction of applied amount leaving the site with products	0	

Table 31: Containment and local exhaust ventilation

Information type	Data field
Containment	Keep containers tightly closed. Do not pierce or burn, even after use.
Ventilation	Provide sufficient air exchange and/or exhaust in work rooms. Well ventilate after use. Laboratory ventilation systems need to ensure that fire hazards and risks are minimized. Laboratory units and laboratory hoods in which chemicals are present need to be continuously ventilated under normal operating conditions .
Ignition Sources	Protect from sunlight and do not expose to temperatures exceeding 50°C. Keep away from open flames or sources of sparks or ignition. When using do not smoke. Do not use or store near sources of heat or electrical devices. Do not spray on a naked flame or any incandescent material.

7.4.3. Risk management measures

Table 32: Risk management measures for wide dispersive use (ES 6)

Information type	Data field	Explanation
Personal protective equipment (PPE)		
Type of PPE (gloves, respirator, face-shield etc)	none	
Risk management measures related to environmental emissions from wide dispersive use		
Municipal or other type of waste water treatment	no	All emissions to air
Other risk management measures		
none		

7.4.4. Waste related measures

There is no solid or liquid waste containing DME for professional use. The only waste is the emissions to air and waste water which is estimated based on the defaults contained in ERC 8a or ERC 8d.

8. EXPOSURE SCENARIO 7 (ES 7): CONSUMER USE OF PROPELLANTS

8.1. Exposure scenario description

1. Title	
Free short title	Consumer use of propellants
Systematic title based on use descriptor	SU 21 PC1, 3 ,4, 8, 9a, 24, 39 ERC 8a, 8d (ERC 8a covered by ERC 8d)
Processes, tasks activities covered	Spraying of propellants indoors and outdoors

2. Operational conditions and risk management measures
2.1 Control of consumers exposure
Product characteristics
Concentration: typically <50% substance in preparation Physical state: gas/liquefied gas
Amounts used
Up to 10 g
Frequency and duration of use/exposure
Frequency: 4 times/day Duration [for contact]: 15 minutes
Human factors not influenced by risk management
None
Other given operational conditions affecting consumers exposure
The product is used indoors and outdoors. Only indoors is considered since it leads to worst case potential exposure Indoor air volume: min. >2.5 m^3, 1.5/hr air exchange rate
Conditions and measures related to information and behavioural advice to consumers
Label advices on safe use.
Conditions and measures related to personal protection and hygiene
Label advices on safe use.
2.2 Control of environmental exposure
Amounts used
30000 t/year – wide dispersive use, fraction to region 0.1 (default for wide-dispersive use) Fraction of the main local source: 0.002 (ESVOC spERC 8.23b.v1 [ESVOC 22])
Frequency and duration of use
Continuous release – wide dispersive use; 365 days/year (ERC default)
Environmental conditions not influenced by risk management
Dilution factor river: 10 *[TRA/EUSES default]* Dilution factor marine: 100 *[TRA/EUSES default]*
Other given operational conditions affecting environmental exposure
Air: spERC ESVOC 22 (refinement of ERC 8a): release to air is 100% or max release rate of 8220 kg/day (regional release) Wastewater: No release to wastewater as 100% goes to air Soil: No direct release to soil as 100 % goes to air
Conditions and measures related to sewage treatment plant
Effluent rate of municipal STP: 2000 m^3/days *[TRA/EUSES default]* River flow rate: 18000 m^3/days *[TRA/EUSES default]*
Conditions and measures related to external recovery of waste
No waste generated as substance is a gas and will evaporate to air

8.2. Description of activities and processes covered in the exposure scenario

There are many potential uses of DME as a propellant in consumer products. The propellant is contained as a liquid in a pressurized container and released as a gas when used properly. It is assumed the container is used until empty so there is no substance left and the end of consumer use.

8.3. Operational conditions and risk management measures related to product characteristics

8.3.1. Operational conditions related to frequency, duration and amount of use

- Since DME is used in different propellant products, several propellant scenarios are ran using different models to assess the range of exposures based on different use patterns.
- Only products that are clearly propellants are considered since some spray products may not be appropriate as they are liquid sprays and not propellants.
- Inhalation is the major exposure pathway of concern for all propellant uses although there is some potential for dermal exposure.

There are three only different product categories/subcategories that are clearly propellants:

- PC3: air care products, such as aerosol cans (aircare, instant action aerosol spray)
- PC9a: coatings, paints, thinners (aerosol spray can)
- PC24: lubricants, greases and release products (aerosol spray can)

Table 33: Default values for consumer exposure

Descriptor	PC3: Air care products	PC24: Lubricants, greases and release products
Product Subcategory	Aircare, instant action (aerosol sprays)	Sprays (based on aerosol spray can)
Product Ingredient (g/g)	0.5	0.5
Amount of product for formulation (g/event)	10	300
Exposure Time (hr)	0.25	4
Frequency of Use (events/day)	4	1

Table 34: Duration, frequency and amount (worst-case scenario) (ES 7)

Information type	Data field	Explanation
Number of uses/applications per day/year by one consumer	4/day	Based on PC3 use from ECETOC TRAM since it is worst case
Used amount of preparation per application	10g	Based on PC3 use from ECETOC TRAM since it is worst case
Duration of use per day or per year	0.25 hr (15 min)	Based on PC3 use from ECETOC TRAM since it is worst case
% of substance in preparation	50%	Based on PC3 use from ECETOC TRAM since it is worst case
Emission days per year related to that preparation category(ies)	365	Defined by ERC8a, 8d

Table 35: Characteristics of the substance or preparation (ES 7)

Information type	Data field	Explanation
Physical state	gas	*Substance is a gas at room temperate but is a liquefied gas when under pressure in an aerosol can*
Concentration of substance in preparation	<50 %	*Consumer end products typically contain less than 50% DME*
Risk management measures related to the design of product	Product supplied in container of limited volume	*Size of container limits amount of substance available*

8.3.2. Operational conditions related to available dilution capacity and characteristics of exposed humans

Table 36: Operational conditions related to respiration, skin contact and ingestion (ES 7)

Information type	Data field	Explanation
Respiration volume under conditions of use	>0.50 m^3/hour	*Depends on model used. AISE REACT uses 0.54 m^3/h; ConsExpo default12.2 m^3/d (0.51m^3/h); ECETOC TRAM 1.37 m^3/h*
Room size and air exchange rate	>2.5 m^3 ; 1.5 air changes per hour	*Smallest room volume of products evaluated. Based on use of air refresheners in toilets (AISE REACH). Air exchange rate based on ConsExpo default.*
Body weight	60 kg	*ECHA guidance R8 recommends 60 kg for adult consumers*

8.3.3. Other operational conditions of use

Table 37: Technical fate of substance and losses from process/use to waste, waste water and air (ES 7)

Information type	Data field	Explanation
Fraction of substance eventually released to the air	1	All DME is released as a gas during use. Based on ESVOC spERC8.23b.v1 [ESVOC 22]

8.3.4. Risk management measures

Table 38: Risk management measures related to consumer use (ES 7)

Information type	Data field	Explanation
Personal protective equipment (PPE) required under regular conditions of consumer use		
Type of PPE (gloves, etc)	None	
Instructions addressed to consumers		
RMM	Appropriate RMMs are described in product warning labels to control flammable risks. In addition, contact information (e.g. toll free phone number) is available to answer consumer questions	
Ignition	Protect from sunlight and do not expose to temperatures exceeding 50°C. Keep away from open flames or sources of sparks or ignition. When using do not smoke. Do not use or store near sources of heat or electrical devices. Do not spray on a naked flame or any incandescent material.	
Containment	Keep containers tightly closed. Do not pierce or burn, even after use.	
Risk management measures related to emissions to the environment		
Municipal or other type of waste water treatment	Yes	*Short description of technique including sludge disposal*
Effluent (of the waste water treatment plant) discharge rate	2000 m^3/d	*ECETOC TRAM Default: 2000 m^3/d*
Other risk management measures		
None		

8.3.5. Waste related measures

The consumer uses the product until none remains so all DME is released prior to disposal. No waste measures pertain to DME.