

SAFETY DATA SHEET

According to Regulation (EC) No.1907/2006


INTERNATIONAL

HARP® 152a

Version: CLP03

Date: February 2018

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1. Identification of the substance / preparation and company / undertaking

Product name	Harp® 152a
REACH registration number	01-2119474440-43
Company	Harp International Ltd Gellihirion Industrial Estate Pontypridd Rhondda Cynon Taff CF37 5SX Tel: +44 (0) 1443 842255 Fax: +44 (0) 1443 841805 email: harp@harpintl.com
Emergency phone number	+44 (0) 1270 502891 (24 hour)
Use of the substance/Mixture	Propellant ES 1 – Formulation, blending, re-packaging – industrial use ES 2 – Propellant – industrial use ES 4 – Propellant (incl. one component foam) – professional use ES 5 – Propellant/one component foam – consumer use

2. Hazards identification

EC Classification of the substance or mixture

Hazard Class & category code:

Regulation (EC) No. 1272/2008 (CLP):

- **Physical hazards**
Flammable gases - Category 1 – Extremely flammable gas (H220)
Gases under pressure - Contains gas under pressure; may explode if heated (H280)

Label Elements

Labelling Regulation EC 1272/2008 (CLP)

- **Hazard pictograms**



- **Signal word**
Danger
- **Hazard statements**
Extremely flammable gas.
Contains gas under pressure; may explode if heated.
Contains fluorinated greenhouse gas covered by the Kyoto Protocol
- **Precautionary statements**
Keep away from heat/sparks/open flames/hot surfaces – No smoking
Leaking gas fire: Do not extinguish unless leak can be stopped safely
Eliminate all ignition sources if safe to do so.
Store in a well-ventilated place
Protect from sunlight

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2. Hazards identification continued

Other hazards

This substance is not considered to be persistent, bio-accumulating nor toxic (PBT).

This substance is not considered to be very persistent, nor very bio-accumulating nor toxic (vPvB).

Rapid evaporation of the liquid may cause frostbite.

Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.

May cause cardiac arrhythmia.

3. Composition / information on ingredients

Substance /Preparation Substance.

Chemical name. 1,1-Difluoroethane.

Chemical formula CH₃CHF₂

Substance name	Contents	CAS no.	EC No	Registration no.	Classification according to Regulation 1272/2008 (CLP)
1,1-Difluoroethane	100%	75-37-6	200-866-1	01-2119474440-43	Flam. Gas; H220 Press. Gas; H280

For the full text of H-Statements mentioned in this Section, see Section 16.

4. First aid measures



Inhalation

Remove patient from exposure, keep warm and at rest. Administer oxygen if necessary. Apply artificial respiration if breathing has ceased or shows signs of failing. Obtain immediate medical attention.

Skin contact

Thaw affected areas with water. Remove contaminated clothing. Caution: clothing may adhere to the skin in the case of freeze burns. After contact with skin, wash immediately with plenty of warm water. If irritation or blistering occurs obtain medical attention.

Eye contact

Hold eyelids apart and immediately irrigate with eyewash solution or clean water, for at least 15 minutes. Obtain immediate medical attention.

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4. First aid measures continued

Ingestion	Unlikely route of exposure. Do not induce vomiting. Provided the patient is conscious, wash out mouth with water and give 200-300ml (half a pint) of water to drink. Obtain immediate medical attention.
Most important symptoms and effects both acute and delayed.	Skin contact may produce the following symptoms : Frostbite Inhalation may produce the following symptoms : Shortness of breath, dizziness, weakness, nausea, headache, narcosis, irregular cardiac activity.
Indication of any immediate medical attention and special treatment needed	Do not give adrenaline or similar drugs.

5. Fire-fighting measures

Specific hazards	Exposure to fire may cause containers to rupture/explode. Hazardous combustion products: hydrogen fluoride, fluorinated compounds
Hazardous combustion products	Incomplete combustion may form carbon monoxide.
Extinguishing media -Suitable extinguishing media Specific methods	Water spray, water mist, foam, dry chemical, carbon dioxide (CO ₂). If possible, stop flow of product. Move away from the container and cool with water from a protected position. Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire.
Special protective equipment for fire fighters	In confined space use self-contained breathing apparatus. Use personal protective equipment. Wear neoprene gloves during cleaning up work after a fire. Exposure to decomposition products may be hazardous to health.
Further information	Use fire extinguishing measures that are appropriate to local circumstances and the surrounding environment. Cool containers/tanks with water spray.

6. Accidental release measures

Personal precautions	Evacuate personnel to safe areas. Ventilate area.. Refer to protective measures listed in sections 7 and 8.
Environmental precautions Clean up measures	Should not be released into the environment. Evaporates.

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7. Handling and storage

Precautions for safe handling

Advice for safe handling

Avoid breathing vapours or mist. Avoid contact with skin, eyes and clothing. Provide sufficient air exchange and/or exhaust in work rooms. For personal protection see section 8. See Annex – Section 2.2

Advice on protection against fire and explosion

Vapours are heavier than air and may spread along floors. Vapours may form explosive mixtures with air. The products should only be used in areas from which all naked lights and other sources of ignition have been excluded. Electrical equipment should be protected to the appropriate standard. No sparking tools should be used. Take measures to prevent the build of electrostatic charge. Keep away from heat and sources of ignition. Keep away from open flames., hot surfaces and sources of ignition. When using do not smoke.
Avoid breathing vapours or mist. Avoid contact with skin, eyes and clothing.

Conditions for safe storage, including any incompatibilities

Requirements for storage areas and Containers

Keep containers tightly closed in a cool, well ventilated place. Store in original container.

Advice on common storage

No materials to be especially mentioned.

Storage temperature

< 52°C

Specific end uses

No data available.

8. Exposure controls / personal protection

Control parameters

Derived No Effect Level

- 1,1-Difluoroethane

Type of Application (Use): Workers exposure routes: Inhalation Health effect: Chronic effects, systemic toxicity value: 2713mg/m³

Type of Application (Use): Consumers exposure routes: Inhalation health effect: Chronic effects, systemic toxicity value: 675mg/m³

Predicted No Effect Concentration

- 1,1-Difluoroethane

Value: 0,048 mg/l
Compartment: Fresh water

Value: 0,0048 mg/l
Compartment: Marine water

Value: 0.48 mg/l
Compartment: Water
Remarks: Intermittent use/release

Value: 0,19 mg/l
Compartment: Fresh water sediment

Value: 0,019 mg/l
Compartment: Marine sediment

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8. Exposure controls / personal protection continued

Value: 0,141 mg/l

Compartment: Soil

Personal protection

Wear suitable protective clothing, gloves and eye/face protection. Wear thermal insulating gloves when handling liquefied gases. In cases of insufficient ventilation, where exposure to high concentrations of vapour is possible, suitable respiratory protective equipment with positive air supply should be used. Do not smoke while handling product.



Safety glasses. Additionally wear a face shield where the possibility exists for face contact due to splashing, spraying or airborne contact with this material.



Heat insulating gloves

9. Physical and chemical properties

Form	Liquefied gas
Colour	Clear, colourless
Odour	Slight ether-like.
Molecular weight [g/mol]	66.05
Solubility in water [g/l]	3.2 at 21°C at 1013 hPa
Boiling point (°C)	-24.7 at 1013 hPa
Freezing point/ (°C)	-117 at 1013 hPa
Density	0,0027g/cm ³ at 25°C (1013 hPa)
Vapour pressure (25°C)	5146,24 hPa
Lower flammability limit [vol% in air]	4.32
Upper flammability limit [vol% in air]	17.35
Auto ignition temperature [°C]	440
Partition coefficient: n-octanol/water	POW 1,13 at 25°C
Other data	No data available.

10. Stability and reactivity

Reactivity	Extremely flammable gas.
Chemical Stability	The product is chemically stable
Possibility of hazardous reactions	Vapours may form explosive mixture with air.
Conditions to avoid	Temperatures > 52°C
Incompatible materials	Incompatible products Alkali metals and Alkaline earth metals, powdered metals and powdered metal salts..
Hazardous decomposition products	Hazardous thermal decomposition products may include: Carbon oxides, Hydrogen Fluoride, Carbonyl Fluoride, Fluorocarbons.

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11. Toxicological information

Information on toxicological effects

Acute oral toxicity

Acute inhalation toxicity

- 1,1-Difluoroethane LC50/rat: 437 500 ppm

/ dog
Cardiac sensitization.

Skin irritation

- 1,1-Difluoroethane

Not tested on animals.
Classification: Not classified as irritant.
Result: No skin irritation.
Not expected to cause skin irritation based on expert review of the properties of the substance.

Eye irritation

- 1,1-Difluoroethane

Not tested on animals.
Classification: Not classified as irritant.
Result: No eye irritation.
Not expected to cause eye irritation based on expert review of the properties of the substance.

Sensitisation

- 1,1-Difluoroethane

Not tested on animals.
Classification: Not classified as skin sensitizer.
Result: Does not cause skin sensitization.
Not expected to cause sensitization based on expert review of the properties of the substance.

Repeated dose toxicity

- 1,1-Difluoroethane

Inhalation rat: No toxicologically significant effects were found.

Mutagenicity assessment

- 1,1-Difluoroethane

Animal testing did not show mutagenic effects.

Carcinogenicity assessment

- 1,1-Difluoroethane
-

Animal testing did not show any carcinogenic effects.

Toxicity to reproduction assessment

- 1,1-Difluoroethane
-

No data available.

Human Experience

Excessive exposures may affect human health, as follows:

Inhalation – Severe shortness of breath, narcosis, irregular cardiac activity.

Further information

May cause cardiac arrhythmia. Rapid evaporation of the liquid may cause frostbite.

12. Ecological information

Toxicity

Toxicity to fish

- 1,1-Difluoroethane LC50/96 h/Fish (unspecified): 295,783 mg/l

Toxicity to aquatic invertebrates

- 1,1-Difluoroethane EC50/48 h/Daphnia: 146,695 mg/l

Persistence and degradability

No data available.

Bio-accumulative potential

Bio-accumulation

No data available.

Mobility in soil

Mobility in soil

Koc: 4,47

Results of PBT and vPvB assessment

PBT and vPvB assesment

This substance is not considered to be persistent, bio-accumulating nor toxic (PBT). This substance is not considered to be very persistent nor very bio-accumulating (vPvB).

Other adverse effects

Ozone depletion potential

0

Global warming potential (GWP)

124

13. Disposal information

Waste treatment methods

Product

Can be used after re-conditioning. See Annex – Section 2.1

Contaminated packaging

Empty pressure vessels should be returned to the supplier.

14. Transport information

UN No.

1030

Labelling ADR, IMDG, IATA



2.1: flammable gas

Land transport

ADR

Class

2

Classification code

2F

H.I.nr

23

UN No.

1030

UN Proper shipping name

1,1-Difluoroethane

Labelling No.

2.1

Tunnel instructions (B/D)

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14. Transport information continued

Sea transport

IMDG code

Proper shipping name 1,1-Difluoroethane

Class 2.1

UN No. 1030

Labelling No. 2.1

Air transport

IATA_C

-Proper shipping name 1,1-Difluoroethane

Class 2.1

UN No. 1030

Labelling No. 2.1

Further information ICAO/IATA cargo aircraft only.

15. Regulatory information

Safety, health and environmental regulations/legislation specific for the substance or mixture No data available.

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

16. Other information

Full text of H-Statements referred to Under Section 3 H220 - Extremely flammable gas.
H280 - Contains gas under pressure; may explode if heated.

16. Other information continued

Further information

Before use read Harp's safety information. For further information contact Harp International Limited.

This datasheet was prepared in accordance with Regulation (EC) No. 1907/2006.

This data sheet contains changes from the previous version, CLP02 dated June 2015 2011. Sections 1, 2, 3 & 16 were updated.

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Annex:

1 Exposure Scenario (1) [1,1-Difluoroethane]

Formulation, blending, re-packaging – Industrial use

SU 3, 10

PC 1, 3, 4, 8, 9a, 14, 15, 24, 25, 26, 27, 28, 29, 31, 32, 34, 35, 38, 39, 40

PROC 1, 2, 3, 4, 5, 8a, 8b, 9, 15

ERC 2

Formulation/blending in batch processes, transfers and packaging, sampling and laboratory use in industrial settings will describe will describe the group of contributing scenarios listed below:

Activity	Process Category (PROC)	Contributing scenario
Closed continuous process	PROC 1	CS 1
Closed continuous process - controlled exposure	PROC 2	CS 2
Closed batch process	PROC 3	CS 3
Batch/other process - opportunity for exposure	PROC 4	CS 4
Mixing and blending	PROC 5	CS 5
Transfers- non dedicated equipment	PROC 8a	CS 6
Transfer- dedicated equipment	PROC 8b	CS 7
Transfer and packaging	PROC 9	CS 8
Laboratory use	PROC 15	CS 9

2.1 Contributing scenario (1) controlling environmental exposure for formulation/blending in batch processes, transfers and packaging sampling and laboratory use in industrial settings.

Product characteristics

Physical state: gas/liquefied gas

Concentration: max, 100%

Amounts used

Largest site tonnage 2800 t/year or 3333 kg/day [assessed with OC and RMM as specified below]

Fregion 1, Fmainsource 1.0 (from tonnages)

ERC 2 default based Msafe: Maximum amount for safe handling (Msafe) without any further OC/RMM (no STP for wastewater):

46 kg/day corresponding to 0.46 tonnes per year (10 emission days).

Frequency and duration of use

Continuous, Release/emission: ≥ 300 days/year

Environment factors not influenced by risk management

Dilution factor river: 10

Dilution factor marine: 100

Other given operational conditions affecting environmental exposure

None

Technical conditions and measures at process level (source) to prevent release

Containment in process

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Process containment

Organisational measures to prevent/limit release from site

None

Conditions and measures related to municipal sewage treatment

Effluent rate of municipal STP: 2000 m³/days

River flow rate: 18000 m³/days

Conditions and measures related to external treatment of waste disposal

No waste generated as substance is a gas and will evaporate to air.

Conditions and measures related to external recovery of waste

None.

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2.2 Contributing scenario (2) controlling worker exposure for formulation/blending in batch processes, transfers and packaging, sampling and laboratory use in industrial settings

Product characteristic

Physical state: gas/liquefied gas
Concentration: max. 100%

Amounts used

Not applicable

Frequency & duration of exposure

Exposure frequency: daily for all PROCS
Exposure duration: >4 hours (default) for all PROCS

Human factors not influenced by risk management

None

Other given operational conditions affecting workers exposure

Ventilation: indoors without LEV for all PROCS

Technical conditions and measures at process level (source) to prevent release

Handling in industrial settings.
Containment according to definition of PROCS for liquefied gas.
See SDS section 7.

Technical conditions and measures to control dispersion from source towards the worker

None

Organisational measures to prevent/limit release, dispersion and exposure

See SDS.

Conditions and measures related to personal protection, hygiene and health evaluation

See SDS section 8.

3. Exposure estimation and reference to its source

Quantitative risk characterisation for workers (ES 1)

Toxicity Endpoint	CS #	Risk characterisation Ratio
		Inhalation
Long-term systemic effects	CS1	0.0000101
	CS2	0.0507
	CS3	0.101
	CS4	0.101
	CS5	0.254
	CS6	0.254
	CS7	0.152
	CS8	0.203
	CS9	0.0507

Quantitative risk characterisation for humans exposed via the environment (ES 1)

Route	Risk characterisation ratio
Inhalation – systemic (long term)	0.0000680
Oral – systemic (long term)	0.00000912
*Worst case selected from local and regional	

Risk characterisation for the aquatic compartment (ES 1)

Compartments	Risk characterisation ratio
Freshwater	0.00000196
Marine water	0.0000104
Sediment freshwater	0.000002
Sediment marine water	0.0000106

Risk characterisation for the aquatic compartment (ES 1)

Compartments	Risk characterisation ratio
Agricultural soil (average 30 days)	0.179
Grassland	0.179

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Assessment method: (defaults used)

Ecetoc TRA (release 5th May 2010) plus manual amendments for acute local dermal assessment and dilution in mixtures

Release factors:

Air: Release maximum 2.5% (ERC 2 default) for maximum use rate of 9300 kg/day per site or maximum release of 232 kg/day per site.

Waste water: Process containment: No processes/process steps leading to release waste water or aquatic environment.

Soil: Process containment: No processes/process steps leading to release to the soil.

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Worker exposure

Scaling information for worker assessments based on ECETOC TRA:

$$RCRs = RCRo * CFs / CFo$$

RCRo = original exposure prediction

PCRs = scaled exposure prediction

CFo = original correction factor

CFs = correction factor for scaling

Can be used for multiple determinants in series

e.g. CF1, CF2, CF3

Duration of activity [DA]	Non-solid substance* in preparation [PREP]	Correction factor	RPE efficiency [%]	RPE efficiency [-]	Correction factor
>4 hours	>25%	1	No RMM = 0%	0	1
1-4 hours	5-25%	0.6	90%	0.9	0.1
15 minutes to 1 hour	1-5%	0.2	95%	0.95	0.05
<15 minutes	<1%	0.1		fraction	(1-fraction)

Scaling for LEV:

LEV efficiency in professional settings: PROC 24 = 75%; PROC 8b – volatiles; PROC 17, PROC 18 = 90%, all other PTROCs = 80%.

LEV efficiency in industrial settings: PROC 12- volatiles, PROC 24 – solids = 80%, PROC 8b – volatiles = 97%, PROC 7, PROC 8b – solids, PROC 17, PROC 18 = 95%, all other PROCs = 90%.

Environmental exposure

If conditions are different from those listed in ES Parts 2.1 & 3, downstream user (DU) should check whether they are still within the boundaries of the ES (i.e., RCR <1). The following equation may be used for scaling:

$$RCR_{Actual} = RCR_{ES} \times \frac{M_{Actual}}{M_{es}} \times \frac{T_{em,ES}}{T_{em,Actual}} \times \frac{f_{em,Actual}}{f_{em,ES}}$$

Where

RCR_{ES} is the risk characterisation ratio (unitless) (see ES Part 3)

M_{es} is the quantity of substance processed or used per year per site (tonnes/year) (See ES Part 2.1)

$T_{em,ES}$ is the duration of emission (days/year) (see ES Part 2.1)

$f_{em,ES}$ is the fraction of substance emitted from the process or use to air, water or soil (unitless) (see ES (Part 3)

Instead of $f_{em,ES}$, the actual release rates of substance emitted may be used and the following values were used in the assessment.

Compartments	Release from point source (local exposure estimation) in kg/d
Air	233
Water	0
Surface water	0
Industrial soil	0
Agricultural soil	0

M_{Actual} , $T_{em,Actual}$ and $f_{em,Actual}$ (or release rates) are the corresponding actual parameters as known to the DU, and RCR_{Actual} is the resulting scaled risk characterisation ratio.

Note: While scaling on conditions and RMMs related to the primary risk driving environmental compartments (i.e. highest RCR), be cautious not to exceed limitations set through the next limiting compartment (compare RCRs)

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1 Exposure Scenario (2) [1,1-Difluoroethane]

Propellant – Industrial use

SU 3

PC 1, 3, 4, 8, 9a, 9b, 14, 15, 20, 21, 23, 24, 25, 26, 27, 28, 29, 31, 32, 34, 35, 38, 39, 40

PROC 1, 2, 3, 4, 5, 7, 8a, 8b,

ERC 4

Formulation/blending in batch processes, transfers and packaging, sampling and laboratory use in industrial settings will describe will describe the group of contributing scenarios listed below:

Activity	Process Category (PROC)	Contributing scenario
Closed continuous process	PROC 1	CS 1
Closed continuous process - controlled exposure	PROC 2	CS 2
Closed batch process	PROC 3	CS 3
Batch/other process - opportunity for exposure	PROC 4	CS 4
Mixing and blending	PROC 5	CS 5
Industrial spraying	PROC 7	CS 6
Transfers- non dedicated equipment	PROC 8a	CS 7
Transfer- dedicated equipment	PROC 8b	CS 8

2.1 Contributing scenario (1) controlling environmental exposure for various closed and batch processes at different containment levels, blending, transfers and spraying in industrial settings.

Product characteristics

Physical state: gas/liquefied gas

Concentration: max, 100%

Amounts used

Largest site tonnage 250 t/year or 833 kg/day [assessed with OC and RMM as specified below]

Fregion 1, Fmainsource 0.185 (from tonnages)

ERC 4 default based Msafe: Maximum amount for safe handling (Msafe) without any further OC/RMM beyond STP for wastewater:

0.9 kg/day corresponding to 0.018 tonnes per year (20 emission days).

Frequency and duration of use

Continuous, Release/emission: ≥ 300 days/year

Environment factors not influenced by risk management

Dilution factor river: 10

Dilution factor marine: 100

Other given operational conditions affecting environmental exposure

None

Technical conditions and measures at process level (source) to prevent release

Containment in process

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

>98% flare efficiency

Organisational measures to prevent/limit release from site

None

Conditions and measures related to municipal sewage treatment

Effluent rate of municipal STP: 2000 m³/days

River flow rate: 18000 m³/days

Conditions and measures related to external treatment of waste disposal

No waste generated as substance is a gas and will evaporate to air.

Conditions and measures related to external recovery of waste

None.

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2.2 Contributing scenario (2) controlling worker exposure for various closed and batch processes at different containment levels, blending, transfers and spraying in industrial settings

Product characteristic

Physical state: gas/liquefied gas
Concentration: max. 100%

Amounts used

Not applicable

Frequency & duration of exposure

Exposure frequency: daily for all PROCs
Exposure duration: >4 hours (default) for all PROCs

Human factors not influenced by risk management

None

Other given operational conditions affecting workers exposure

Ventilation: indoors without LEV for all PROCs

Technical conditions and measures at process level (source) to prevent release

Handling in industrial settings.
Containment according to definition of PROCs for liquefied gas.
See SDS section 7.

Technical conditions and measures to control dispersion from source towards the worker

None

Organisational measures to prevent/limit release, dispersion and exposure

See SDS.

Conditions and measures related to personal protection, hygiene and health evaluation

See SDS section 8.

3. Exposure estimation and reference to its source

Quantitative risk characterisation for workers (ES 2)

Toxicity Endpoint	CS #	Risk characterisation
Long-term systemic effects		Inhalation
	CS1	0.0000101
	CS2	0.0507
	CS3	0.101
	CS4	0.101
	CS5	0.254
	CS6	0.507
	CS7	0.254
CS8	0.152	

Quantitative risk characterisation for humans exposed via the environment (ES 2)

Route	Risk characterisation ratio
Inhalation – systemic (long term)	0.000242
Oral – systemic (long term)	0.0000326
*Worst case selected from local and regional	

Risk characterisation for the aquatic compartment (ES 2)

Compartments	Risk characterisation ratio
Freshwater	0.00000196
Marine water	0.0000104
Sediment freshwater	0.000002
Sediment marine water	0.0000106

Risk characterisation for the aquatic compartment (ES 2)

Compartments	Risk characterisation ratio
Agricultural soil (average 30 days)	0.639
Grassland	0.639

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Assessment method: (defaults used)

Ecetoc TRA (release 5th May 2010) plus manual amendments for acute local dermal assessment and dilution in mixtures

Release factors:

Air: For site tonnages >390 t/ per year, release reduction to a maximum of 2% by the use of flares (≥98% efficiency) up to a maximum use rate of 2700 tonnes /year or a maximum release of 1300kg/day.

Waste water: No processes/process steps leading to release waste water or aquatic environment.

Soil: No processes/process steps leading to release to the soil.

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Worker exposure

Scaling information for worker assessments based on ECETOC TRA:

$$RCRs = RCRo * CFs / CFo$$

RCRo = original exposure prediction

PCRs = scaled exposure prediction

CFo = original correction factor

CFs = correction factor for scaling

Can be used for multiple determinants in series
e.g. CF1, CF2, CF3

Duration of activity [DA]	Non-solid substance* in preparation [PREP]	Correction factor	RPE efficiency [%]	RPE efficiency [-]	Correction factor
>4 hours	>25%	1	No RMM = 0%	0	1
1-4 hours	5-25%	0.6	90%	0.9	0.1
15 minutes to 1 hour	1-5%	0.2	95%	0.95	0.05
<15 minutes	<1%	0.1		fraction	(1-fraction)

Scaling for LEV:

LEV efficiency in professional settings: PROC 24 = 75%; PROC 8b – volatiles; PROC 17, PROC 18 = 90%, all other PROCs = 80%.

LEV efficiency in industrial settings: PROC 12- volatiles, PROC 24 – solids = 80%, PROC 8b – volatiles = 97%, PROC 7, PROC 8b – solids, PROC 17, PROC 18 = 95%, all other PROCs = 90%.

Environmental exposure

If conditions are different from those listed in ES Parts 2.1 & 3, downstream user (DU) should check whether they are still within the boundaries of the ES (i.e., RCR <1). The following equation may be used for scaling:

$$RCR_{Actual} = RCR_{ES} \times \frac{M_{Actual}}{M_{es}} \times \frac{T_{em,ES}}{T_{em,Actual}} \times \frac{f_{em,Actual}}{f_{em,ES}}$$

Where

RCR_{ES} is the risk characterisation ratio (unitless) (see ES Part 3)

M_{es} is the quantity of substance processed or used per year per site (tonnes/year) (See ES Part 2.1)

$T_{em,ES}$ is the duration of emission (days/year) (see ES Part 2.1)

$f_{em,ES}$ is the fraction of substance emitted from the process or use to air, water or soil (unitless) (see ES (Part 3)

Instead of $f_{em,ES}$, the actual release rates of substance emitted may be used and the following values were used in the assessment.

Compartments	Release from point source (local exposure estimation) in kg/d
Air	833
wastewater	0
Surface water	0
Industrial soil	0
Agricultural soil	0

M_{Actual} , $T_{em,Actual}$ and $f_{em,Actual}$ (or release rates) are the corresponding actual parameters as known to the DU, and RCR_{Actual} is the resulting scaled risk characterisation ratio.

Note: While scaling on conditions and RMMs related to the primary risk driving environmental compartments (i.e. highest RCR), be cautious not to exceed limitations set through the next limiting compartment (compare RCRs)

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1 Exposure Scenario (4) [1,1-Difluoroethane]

Propellant (incl.one component foam) – Professional use

SU 19, 22

PC 0 (UCN D 15100 propellants) 1, 3, 4, 8, 9a, 9b,14, 15, 21, 23, 24, 25, 26, 27, 28, 29, 31, 32, 34, 35, 38, 39, 40
PROC 8a, 8b, 11

ERC 8a, 8d (ERC 8d assessment covering 8a):

Transfers (dedicated and non-dedicated equipment), spraying in professional settings will describe the group of contributing scenarios listed below:

Activity	Process Category PROC)	Contributing scenario
Transfers – non-dedicated equipment	PROC 8a	CS 1
Transfers – dedicated equipment	PROC 8b	CS 2
Spraying – non-industrial settings	PROC 11	CS 3

2.1 Contributing scenario (1) controlling environmental exposure for transfers (dedicated and non-dedicated equipment), spraying in professional settings.

Product characteristics

Physical state: gas/liquefied gas

Concentration: max, 100%

Amounts used

Annual amount supplied to professionals: max. 1350t/year – wide dispersive use, fraction top region 0.1(ERC 8d default), Fmainsource: 0.002(ERC default for wide dispersive uses)

Frequency and duration of use

Continuous release – widespread use; 365 days/year (ERC default)

Environment factors not influenced by risk management

Dilution factor river: 10

Dilution factor marine: 100

Other given operational conditions affecting environmental exposure

None

Technical conditions and measures at process level (source) to prevent release

None – 100% release to air

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

None

Organisational measures to prevent/limit release from site

None

Conditions and measures related to municipal sewage treatment

Effluent rate of municipal STP: 2000 m³/days

River flow rate: 18000 m³/days

Conditions and measures related to external treatment of waste disposal

No waste generated as substance is a gas and will evaporate to air.

Conditions and measures related to external recovery of waste

None.

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2.2 Contributing scenario (2) controlling worker exposure for transfers (dedicated and non-dedicated), spraying in professional settings.

Product characteristic

Physical state: gas/liquefied gas
Concentration: max. 100%

Amounts used

Not applicable

Frequency & duration of exposure

Exposure frequency: daily for all PROCs

Contributing scenario

Duration

CS 1	>4 hours (default)
CS 2	>4 hours (default)
CS 3	1-4 hours

Human factors not influenced by risk management

None

Other given operational conditions affecting workers exposure

Ventilation: indoors without LEV for all PROCs

Technical conditions and measures at process level (source) to prevent release

Handling in industrial settings.
Containment according to definition of PROCs for liquefied gas.
See SDS section 7.

Technical conditions and measures to control dispersion from source towards the worker

None

Organisational measures to prevent/limit release, dispersion and exposure

See SDS.

Conditions and measures related to personal protection, hygiene and health evaluation

See SDS section 8.

3. Exposure estimation and reference to its source

Quantitative risk characterisation for workers (ES 4)

Toxicity Endpoint	CS #	Risk characterisation Ratio
Long-term systemic effects		Inhalation
	CS1	0.507
	CS2	0.254
	CS3	0.609

Quantitative risk characterisation for humans exposed via the environment (ES 4)

Route	Risk characterisation ratio
Oral – systemic (long term)	0.000000000547
*Worst case selected from local and regional	

Risk characterisation for the aquatic compartment (ES 4)

Compartments	Risk characterisation ratio
Freshwater	0.00000196
Marine water	0.0000104
Sediment freshwater	0.000002
Sediment marine water	0.0000106

Risk characterisation for the terrestrial compartment (ES 3)

Compartments	Risk characterisation ratio
Agricultural soil (average 30 days)	0.000000547
Grassland	0.000000547

Assessment method: (defaults used)

Ecetoc TRA (release 5th May 2010) plus manual amendments for acute local dermal assessment and dilution in mixture.

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Release factors:

Waste water: No release top waste water as 100% goes to air.

Soil: No direct release to soil as 100% goes to air.

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Worker exposure

Scaling information for worker assessments based on ECETOC TRA:

$$RCRs = RCR_o * CFs / CFo$$

RCRo = original exposure prediction

PCRs = scaled exposure prediction

Can be used for multiple determinants in

CFo = original correction factor

e.g. CF1, CF2, CF3

CFs = correction factor for scaling

Duration of activity [DA]	Non-solid substance* in preparation [PREP]	Correction factor	RPE efficiency [%]	RPE efficiency [-]	Correction factor
>4 hours	>25%	1	No RMM = 0%	0	1
1-4 hours	5-25%	0.6	90%	0.9	0.1
15 minutes to 1 hour	1-5%	0.2	95%	0.95	0.05
<15 minutes	<1%	0.1		fraction	(1-fraction)

Scaling for LEV:

LEV efficiency in professional settings: PROC 24 = 75%; PROC 8b – volatiles; PROC 17, PROC 18 = 90%, all other PROCs = 80%.

LEV efficiency in industrial settings: PROC 12- volatiles, PROC 24 – solids = 80%, PROC 8b – volatiles = 97%, PROC 7, PROC 8b – solids, PROC 17, PROC 18 = 95%, all other PROCs = 90%.

Environmental exposure

If conditions are different from those listed in ES Parts 2.1 & 3, downstream user (DU) should check whether they are still within the boundaries of the ES (i.e., RCR < 1). The following equation may be used for scaling:

$$RCR_{Actual} = RCR_{ES} \times \frac{M_{Actual}}{M_{es}} \times \frac{T_{em,ES}}{T_{em,Actual}} \times \frac{f_{em,Actual}}{f_{em,ES}}$$

Where

RCR_{ES} is the risk characterisation ratio (unitless) (see ES Part 3)

M_{es} is the quantity of substance processed or used per year per site (tonnes/year) (See ES Part 2.1)

$T_{em,ES}$ is the duration of emission (days/year) (see ES Part 2.1)

$f_{em,ES}$ is the fraction of substance emitted from the process or use to air, water or soil (unitless) (see ES (Part 3)

Instead of $f_{em,ES}$, the actual release rates of substance emitted may be used and the following values were used in the assessment.

Compartments	Release from point source (local exposure estimation) in kg/d
Air	0
Water	0
Surface water	0
Industrial soil	0
Agricultural soil	0

M_{Actual} , $T_{em,Actual}$ and $f_{em,Actual}$ (or release rates) are the corresponding actual parameters as known to the DU, and RCR_{Actual} is the resulting scaled risk characterisation ratio.

Note: While scaling on conditions and RMMs related to the primary risk driving environmental compartments (i.e. highest RCR), be cautious not to exceed limitations set through the next limiting compartment (compare RCRs)

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1 Exposure Scenario (5) [1,1-Difluoroethane]

Propellant/one component foam – Consumer use

SU 21

PC 0 – UCN D 15100 propellants, 1, 3, 4, 8, 9a, 9b,14, 15, 21, 23, 24, 25, 26, 27, 28, 29, 31, 32, 34, 35, 38, 39, 40, ERC 8d, 8a (ERC 8a covered by ERC 8d)

2.1 Contributing scenario (1) controlling environmental exposure for consumer use of propellant in various applications.

Product characteristics

Physical state: Liquid in a pressurised container, released as a gas when used properly

Concentration: maximum 50% (w/w) in product

Amounts used

Annual amount supplied to consumers: max. 1650 t/year – wide dispersive use, fraction to region 0.1(ERC default for wide dispersive use), Fmainsource: 0.002 (ERC default for wide dispersive use)

Frequency and duration of use

Wide dispersive use; 365 days/year (ERC default)

Environment factors not influenced by risk management

Dilution factor freshwater: 10 (TRA/EUSES default)

Dilution factor marine water: 100 (TRA/EUSES default)

Other given operational conditions affecting environmental exposure

None

Conditions and measures related to municipal sewage treatment plant

Effluent rate of municipal STP: 2000 m³/days [TRA/EUSES default]

River flow rate: 18000 m³/days [TRA/EUSES default]

Conditions and measures related to external treatment of waste disposal

None

Conditions and measures related to external recovery of waste

No waste generated as substance is a gas and will evaporate to air.

2.2 Contributing scenario (2) controlling consumer exposure for consumer use of propellant in various applications

Product characteristic

Physical state: Liquid in a pressurized container, released as a gas when used properly.

Concentration: maximum 50% (w/w) in product

Amounts used

The following representative PCs were assessed using different modelling approaches (incl. different assumptions) to cover the PCs listed in the ES title: PC 3 (aerosol spray), PC 8 (disinfectant spray), PC 9a (aerosol spray can), PC 31 (polishes and wax blends), PC 35 (washing and cleaning products), PC 39 (personal care products).

PC 3 (air care products – aerosol) - TRAM	10g/event
PC 3 (air care products – aerosol) – A.I.S.E.	8.4g/event
PC 8 (disinfectant spray) – ConsExpo	22.9g/event
PC 9a (paint spray can) – TRAM	300g/unit
PC 9a (paint spray can) – ConsExpo	297g/unit
PC 31 (polishes and wax blends) – A.I.S.E.	60g/event
PC 31 (polishes and wax blends) – ConsExpo	36g/event
PC35 (washing and cleaning products – cleaners, trigger sprays) – TRA	35g/event
PC35 (washing and cleaning products – cleaners, trigger sprays) – ConsExpo	135g/event/ - Leather cleaner 19.2g/event – All purpose cleaner
PC 39 (personal care products) - ConsExpo	6.8g/event

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Frequency and duration of use/exposure

PC 3 (Air care products – aerosol) TRA	0.25 hours duration	4 events/day
PC 3 (Air care products – aerosol) A.I.S.E.	0.25 hours duration	1 event/day
PC 8 (disinfectant spray)	0.51 minutes spray duration	
PC 9a (paint spray can) – TRA	0.33 hours exposure duration	1 event/day
PC 9a (paint spray can) – ConsExpo	15 minutes spray duration	
PC 31 (polishes and wax blends) – A.I.S.E.	1 hour exposure duration	0.43 event/day
PC 31 (polishes and wax blends) – ConsExpo	1.2 minutes spray duration	
PC 35 (Washing and cleaning products – cleaners, trigger sprays) - TRA	4 hours exposure duration	1 event/day
PC 35 (Washing and cleaning products – cleaners, trigger sprays) – A.I.S.E.	0.167 hour exposure duration	1 event/day
PC 35 (Washing and cleaning products – cleaners, trigger sprays) - ConsExpo	3 minutes spray duration – leather cleaning 0.41 minutes spray duration – All purpose cleaner	1 event/year – Leather cleaner 1 event/day – All purpose cleaner
PC 39 (Personal care products) - ConsExpo	0.24 minutes spray duration	1.2 event/day

Human factors not influenced by risk management

60 kg body weight assumed for all assessments.

Other given operational conditions affecting consumer exposure

The only potential route of exposure is via inhalation since product is released as a gas into the air. The product is used indoors and outdoors – indoor scenario is more conservative and covers outdoor scenario. Room volumes and ventilation rates of the scenarios assessed are:

PC 3 (Air care products – aerosol) TRA	-	20m ³ room volume
PC 3 (Air care products – aerosol) A.I.S.E.	2/hours ventilation rate	2.5m ³ room volume
PC 8 (disinfectant spray)	2.5/hours ventilation rate	15m ³ room volume
PC 9a (paint spray can) – TRA	-	20m ³ room volume
PC 9a (paint spray can) – ConsExpo	1.5/hours ventilation rate	34m ³ room volume
PC 31 (polishes and wax blends) – A.I.S.E.	-	58m ³ room volume
PC 31 (polishes and wax blends) – ConsExpo	1.5/hours ventilation rate	34m ³ room volume
PC 35 (Washing and cleaning products – cleaners, trigger sprays) - TRA	-	20m ³ room volume
PC 35 (Washing and cleaning products – cleaners, trigger sprays) – A.I.S.E.	-	15m ³ room volume
PC 35 (Washing and cleaning products – cleaners, trigger sprays) - ConsExpo	0.5 – Leather 2.5 – All purpose cleaner	58m ³ room volume – Leather cleaner 15m ³ room volume – All purpose cleaner
PC 39 (Personal care products) - ConsExpo	2/hours ventilation rate	10m ³ room volume

Conditions and measures related to information and behavioural advice to consumers

Safety and application notes on product label and/or package insert

- 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 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.

Conditions and measures related to personal protection and hygiene

None.

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3. Exposure estimation and reference to its source

Quantitative risk characterisation for workers (ES 5)

Toxicity Endpoint	CS #	Risk Characterisation Ratio
Long term – systemic effects - inhalation		
TRA – PC 3 – air care products	Aerosol sprays	0.025
TRA – PC 9a – coatings and paints	Aerosol spray can	0.25
TRA – PC 35 – washing and cleaning products	Cleaners, trigger sprays	0.35
AISE C 17 (PC 3)	Aerosol i) aqueous	0.013
AISE C 20 (PC 31)	Spray	0.036
AISE C 7 (PC 35)	Spray	0.0027
ConsExpo – spray paint can (PC 9a)	Spray	0.22
ConsExpo – disinfectant, spray (PC 8)	Spray	0.00025
ConsExpo – Personal care products (PC 39)	Hair spray	0.001
ConsExpo – furniture cleaning (PC 35)	Leather spray	0.0033
ConsExpo – all purpose cleaner (PC 35)	Spray	0.0000039
ConsExpo – shoe polish (PC 31)	Spray	0.04
	Worst case	0.35

Quantitative risk characterisation for humans exposed via the environment (ES 5)

Route	Risk characterisation ratio
Inhalation – systemic (long term)	0.000000252
Oral – systemic (long term)	0.000000000547
*Worst case selected from local and regional	

Risk characterisation for the aquatic compartment (ES 5)

Compartments	Risk characterisation ratio
Freshwater	0.00000196
Marine water	0.0000104
Sediment freshwater	0.000002
Sediment marine water	0.0000106

Risk characterisation for the aquatic compartment (ES 5)

Compartments	Risk characterisation ratio
Agricultural soil (average 30 days)	0.000000547
Grassland	0.000000547

Assessment method:

Extoc TRA (release May 2010), A.I.S.E. REACT Model and ConsExpo

Release factors:

Wastewater; no release to wastewater as 100% goes to air.

Soil: no direct release to soil as 100% goes to air

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

If conditions differ significantly from those listed in Section 2, downstream user (DU) should check whether they are still within the boundaries of the ES. This evaluation may be based on the expert judgement or on the risk assessment tools that are recommended by ECHA.