

SAFETY DATA SHEET

According to REACH Regulation (EC) No 1907/2006, as amended by
UK REACH Regulations SI 2019/758



Formacel™ Z2 Foam Expansion Agent

Version	Revision Date:	SDS Number:	Date of last issue: 10.10.2024
2.5	05.03.2025	11230083-00007	Date of first issue: 08.06.2023

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name	:	Formacel™ Z2 Foam Expansion Agent
SDS-Identcode	:	130000000358
REACH Registration Number	:	UK-01-6870906490-8-0003
Substance name	:	1,1-Difluoroethane
EC-No.	:	200-866-1

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

Use of the Sub- stance/Mixture	:	Foam expansion agent
Recommended restrictions on use	:	For professional users only.

1.3 Details of the supplier of the safety data sheet

Company	:	Chemours Netherlands B.V. Baanhoekweg 22 3313 LA Dordrecht Netherlands
Telephone	:	+31-(0)-78-630-1011
Telefax	:	+31-78-6163737
E-mail address of person responsible for the SDS	:	sds-support@chemours.com

1.4 Emergency telephone number

+(44)-870-8200418 (CHEMTREC - Recommended)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008) as amended by GB-CLP Regulation, UK SI 2019/720, and UK SI 2020/1567)

Flammable gases, Category 1A	H220: Extremely flammable gas.
Gases under pressure, Liquefied gas	H280: Contains gas under pressure; may explode if heated.

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2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008) as amended by GB-CLP Regulation, UK SI 2019/720, and UK SI 2020/1567)

Hazard pictograms :  

Signal word : Danger

Hazard statements : H220 Extremely flammable gas.
H280 Contains gas under pressure; may explode if heated.

Precautionary statements : **Prevention:**
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
Response:
P377 Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381 In case of leakage, eliminate all ignition sources.
Storage:
P410 + P403 Protect from sunlight. Store in a well-ventilated place.

Additional Labelling

Contains fluorinated greenhouse gases. (HFC-152a)

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

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

Misuse or intentional inhalation abuse may cause death without warning symptoms, due to cardiac effects.

Rapid evaporation of the product may cause frostbite.

May displace oxygen and cause rapid suffocation.

SECTION 3: Composition/information on ingredients

3.1 Substances

Substance name	: 1,1-Difluoroethane
EC-No.	: 200-866-1

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Components

Chemical name	CAS-No. EC-No.	Concentration (% w/w)
1,1-Difluoroethane	75-37-6 200-866-1	>= 90 - <= 100

SECTION 4: First aid measures

4.1 Description of first aid measures

- General advice : In the case of accident or if you feel unwell, seek medical advice immediately.
When symptoms persist or in all cases of doubt seek medical advice.
- Protection of first-aiders : No special precautions are necessary for first aid responders.
- If inhaled : If inhaled, remove to fresh air.
If not breathing, give artificial respiration.
If breathing is difficult, give oxygen.
Get medical attention immediately.
- In case of skin contact : Thaw frosted parts with lukewarm water. Do not rub affected area.
Get medical attention immediately.
- In case of eye contact : Get medical attention immediately.
- If swallowed : Ingestion is not considered a potential route of exposure.

4.2 Most important symptoms and effects, both acute and delayed

- Symptoms : May cause cardiac arrhythmia.
- Other symptoms potentially related to misuse or inhalation abuse are
Cardiac sensitisation
Anaesthetic effects
Light-headedness
Dizziness
confusion
Lack of coordination
Drowsiness
Unconsciousness
- Risks : Gas reduces oxygen available for breathing.
Contact with liquid or refrigerated gas can cause cold burns and frostbite.

4.3 Indication of any immediate medical attention and special treatment needed

- Treatment : Because of possible disturbances of cardiac rhythm, cate-

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cholamine drugs, such as epinephrine, that may be used in situations of emergency life support should be used with special caution.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media : Water spray
Alcohol-resistant foam
Carbon dioxide (CO₂)
Dry chemical

Unsuitable extinguishing media : None known.

5.2 Special hazards arising from the substance or mixture

Specific hazards during fire-fighting : Vapours may form flammable mixture with air
Exposure to combustion products may be a hazard to health.
If the temperature rises there is danger of the vessels bursting due to the high vapor pressure.

Hazardous combustion products : Hydrogen fluoride
carbonyl fluoride
Carbon oxides

5.3 Advice for firefighters

Special protective equipment for firefighters : Wear self-contained breathing apparatus for firefighting if necessary. Use personal protective equipment.

Specific extinguishing methods : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Fight fire remotely due to the risk of explosion.
Use water spray to cool unopened containers.
Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
Remove undamaged containers from fire area if it is safe to do so.
Evacuate area.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions : Evacuate personnel to safe areas.
Only trained personnel should re-enter the area.
Remove all sources of ignition.
Avoid skin contact with leaking liquid (danger of frostbite).
Ventilate the area.
Follow safe handling advice (see section 7) and personal protective equipment recommendations (see section 8).

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6.2 Environmental precautions

Environmental precautions : Avoid release to the environment.
Prevent further leakage or spillage if safe to do so.
Retain and dispose of contaminated wash water.

6.3 Methods and material for containment and cleaning up

Methods for cleaning up : Ventilate the area.
Non-sparking tools should be used.
Suppress (knock down) gases/vapours/mists with a water spray jet.
Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable.
Sections 13 and 15 of this SDS provide information regarding certain local or national requirements.

6.4 Reference to other sections

See sections: 7, 8, 11, 12 and 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Technical measures : Use equipment rated for cylinder pressure. Use a backflow preventative device in piping. Close valve after each use and when empty.

Local/Total ventilation : If sufficient ventilation is unavailable, use with local exhaust ventilation.
If advised by assessment of the local exposure potential, use only in an area equipped with explosion-proof exhaust ventilation.

Advice on safe handling : Avoid breathing gas.
Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment
Keep container tightly closed.
Wear cold insulating gloves/ face shield/ eye protection.
Valve protection caps and valve outlet threaded plugs must remain in place unless container is secured with valve outlet piped to use point.
Prevent backflow into the gas tank.
Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.
Use a pressure reducing regulator when connecting cylinder to lower pressure (<3000 psig) piping or systems.
Close valve after each use and when empty. Do NOT change or force fit connections.

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Prevent the intrusion of water into the gas tank.
Never attempt to lift cylinder by its cap.
Do not drag, slide or roll cylinders.
Use a suitable hand truck for cylinder movement.
Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
Take precautionary measures against static discharges.
Take care to prevent spills, waste and minimize release to the environment.

Hygiene measures : If exposure to chemical is likely during typical use, provide eye flushing systems and safety showers close to the working place. When using do not eat, drink or smoke. Wash contaminated clothing before re-use.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers : Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Separate full containers from empty containers. Do not store near combustible materials. Avoid area where salt or other corrosive materials are present. Keep in properly labelled containers. Keep tightly closed. Keep in a cool, well-ventilated place. Keep away from direct sunlight. Store in accordance with the particular national regulations. Keep away from heat and sources of ignition.

Advice on common storage : Do not store with the following product types:
Self-reactive substances and mixtures
Organic peroxides
Oxidizing agents
Flammable liquids
Flammable solids
Pyrophoric liquids
Pyrophoric solids
Self-heating substances and mixtures
Substances and mixtures, which in contact with water, emit flammable gases
Explosives
Very acutely toxic substances and mixtures
Acutely toxic substances and mixtures
Substances and mixtures with chronic toxicity

Storage period : > 10 yr

Recommended storage temperature : < 52 °C

Further information on storage stability : The product has an indefinite shelf life when stored properly.

7.3 Specific end use(s)

Specific use(s) : No data available

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SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure Limits

Contains no substances with occupational exposure limit values.

Derived No Effect Level (DNEL)

Substance name	End Use	Exposure routes	Potential health effects	Value
1,1-Difluoroethane	Workers	Inhalation	Long-term systemic effects	2713 mg/m ³
	Consumers	Inhalation	Long-term systemic effects	675 mg/m ³

Predicted No Effect Concentration (PNEC)

Substance name	Environmental Compartment	Value
1,1-Difluoroethane	Fresh water	0.048 mg/l
	Marine water	0.0048 mg/l
	Intermittent use/release	0.48 mg/l
	Fresh water sediment	0.19 mg/kg dry weight (d.w.)
	Marine sediment	0.019 mg/kg dry weight (d.w.)
	Soil	0.141 mg/kg dry weight (d.w.)

8.2 Exposure controls

Engineering measures

Minimize workplace exposure concentrations.

If sufficient ventilation is unavailable, use with local exhaust ventilation.

If advised by assessment of the local exposure potential, use only in an area equipped with explosion-proof exhaust ventilation.

Personal protective equipment

Eye/face protection : Wear the following personal protective equipment:
Chemical resistant goggles must be worn.
Face-shield
Equipment should conform to BS EN 166

Hand protection
Material : Low temperature resistant gloves

Remarks : Choose gloves to protect hands against chemicals depending on the concentration and quantity of the hazardous substance and specific to place of work. For special applications, we recommend clarifying the resistance to chemicals of the aforementioned protective gloves with the glove manufacturer. Wash hands before breaks and at the end of workday. Breakthrough time is not determined for the product. Change

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gloves often!

Skin and body protection : Wear the following personal protective equipment:
If assessment demonstrates that there is a risk of explosive atmospheres or flash fires, use flame retardant antistatic protective clothing.

Respiratory protection : Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown.

Protective measures : Wear cold insulating gloves/ face shield/ eye protection.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	: Liquefied gas
Colour	: clear, colourless
Odour	: slight, ether-like
Odour Threshold	: No data available
pH	: No data available
Melting point/freezing point	: -117 °C
Initial boiling point and boiling range	: -24.7 °C (1,013 hPa)
Flash point	: Not applicable
Evaporation rate	: Not applicable
Flammability (solid, gas)	: Flammable
Upper explosion limit / Upper flammability limit	: Upper flammability limit 16.9 %(V) Method: ASTM E681
Lower explosion limit / Lower flammability limit	: Lower flammability limit 3.9 %(V) Method: ASTM E681
Vapour pressure	: 5,146.24 hPa (25 °C)
Relative vapour density	: 2.4 (Air = 1.0)
Density	: 0.90 g/cm ³ (25 °C)

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(as liquid)

0.0027 g/cm³ (25 °C)

Solubility(ies)

Water solubility : 0.2 g/l (25 °C)

Partition coefficient: n-octanol/water : log Pow: 1.13 (25 °C)

Auto-ignition temperature : 440 °C

Decomposition temperature : No data available

Viscosity

Viscosity, kinematic : Not applicable

Explosive properties : Not explosive

Oxidizing properties : The substance or mixture is not classified as oxidizing.

9.2 Other information

Particle size : Not applicable

Self-ignition : The substance or mixture is not classified as pyrophoric.

SECTION 10: Stability and reactivity

10.1 Reactivity

Not classified as a reactivity hazard.

10.2 Chemical stability

Stable if used as directed. Follow precautionary advice and avoid incompatible materials and conditions.

10.3 Possibility of hazardous reactions

Hazardous reactions : Vapours may form flammable mixture with air
Can react with strong oxidizing agents.
Extremely flammable gas.

10.4 Conditions to avoid

Conditions to avoid : Heat, flames and sparks.

10.5 Incompatible materials

Materials to avoid : Oxidizing agents

10.6 Hazardous decomposition products

No hazardous decomposition products are known.

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SECTION 11: Toxicological information

11.1 Information on toxicological effects

Information on likely routes of exposure : Inhalation
Skin contact
Eye contact

Acute toxicity

Not classified based on available information.

Components:

1,1-Difluoroethane:

Acute oral toxicity : Assessment: The substance or mixture has no acute oral toxicity

Acute inhalation toxicity : LC50 (Rat): > 437500 ppm
Exposure time: 4 h
Test atmosphere: gas

No observed adverse effect concentration (Dog): 50000 ppm
Test atmosphere: gas
Method: Cardiac sensitisation study

Lowest observed adverse effect concentration (Dog): 150000 ppm
Test atmosphere: gas
Method: Cardiac sensitisation study

Cardiac sensitisation threshold limit (Dog): 405,000 mg/m³
Test atmosphere: gas
Method: Cardiac sensitisation study

Acute dermal toxicity : Assessment: The substance or mixture has no acute dermal toxicity

Skin corrosion/irritation

Not classified based on available information.

Components:

1,1-Difluoroethane:

Result : No skin irritation

Serious eye damage/eye irritation

Not classified based on available information.

Components:

1,1-Difluoroethane:

Result : No eye irritation

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Respiratory or skin sensitisation

Skin sensitisation

Not classified based on available information.

Respiratory sensitisation

Not classified based on available information.

Components:

1,1-Difluoroethane:

Exposure routes : Skin contact
Result : negative

Exposure routes : Inhalation
Species : Rat
Result : negative

Germ cell mutagenicity

Not classified based on available information.

Components:

1,1-Difluoroethane:

Genotoxicity in vitro : Test Type: Bacterial reverse mutation assay (AMES)
Method: OECD Test Guideline 471
Result: negative

Test Type: Chromosome aberration test in vitro
Method: OECD Test Guideline 473
Result: positive

Genotoxicity in vivo : Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)
Species: Rat
Application Route: inhalation (gas)
Method: OECD Test Guideline 474
Result: negative

Germ cell mutagenicity- Assessment : Weight of evidence does not support classification as a germ cell mutagen.

Carcinogenicity

Not classified based on available information.

Components:

1,1-Difluoroethane:

Species : Rat
Application Route : inhalation (gas)
Exposure time : 104 weeks
Method : OECD Test Guideline 453

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Result : negative

Carcinogenicity - Assessment : Weight of evidence does not support classification as a carcinogen

Reproductive toxicity

Not classified based on available information.

Components:

1,1-Difluoroethane:

Effects on fertility : Test Type: Rodent dominant lethal test (germ cell) (in vivo)
Species: Mouse
Application Route: inhalation (gas)
Method: OECD Test Guideline 478
Result: negative
Remarks: Based on data from similar materials

Test Type: Combined Chronic Toxicity/Carcinogenicity Studies
Species: Rat
Application Route: inhalation (gas)
Method: OECD Test Guideline 453
Result: negative

Effects on foetal development : Test Type: Prenatal development toxicity study (teratogenicity)
Species: Rat
Application Route: inhalation (vapour)
Method: OECD Test Guideline 414
Result: negative

Test Type: Prenatal development toxicity study (teratogenicity)
Species: Rabbit
Application Route: inhalation (gas)
Method: OECD Test Guideline 414
Result: negative
Remarks: Based on data from similar materials

Reproductive toxicity - Assessment : Weight of evidence does not support classification for reproductive toxicity

STOT - single exposure

Not classified based on available information.

Components:

1,1-Difluoroethane:

Exposure routes : inhalation (gas)
Assessment : No significant health effects observed in animals at concentrations of 20000 ppmV/4h or less

Exposure routes : Skin contact

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Assessment : No significant health effects observed in animals at concentrations of 2000 mg/kg bw or less

Exposure routes : Ingestion
Assessment : No significant health effects observed in animals at concentrations of 2000 mg/kg bw or less

STOT - repeated exposure

Not classified based on available information.

Components:

1,1-Difluoroethane:

Exposure routes : inhalation (gas)
Assessment : No significant health effects observed in animals at concentrations of 250 ppmV/6h/d or less.

Exposure routes : Skin contact
Assessment : No significant health effects observed in animals at concentrations of 200 mg/kg bw or less.

Exposure routes : Ingestion
Assessment : No significant health effects observed in animals at concentrations of 100 mg/kg bw or less.

Repeated dose toxicity

Components:

1,1-Difluoroethane:

Species : Rat, male and female
NOAEL : 25000 ppm
LOAEL : >25000 ppm
Application Route : inhalation (gas)
Exposure time : 104 Weeks
Method : OECD Test Guideline 453

Aspiration toxicity

Not classified based on available information.

Components:

1,1-Difluoroethane:

No aspiration toxicity classification

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SECTION 12: Ecological information

12.1 Toxicity

Components:

1,1-Difluoroethane:

Toxicity to fish	:	LC50 (Fish): 295.783 mg/l Exposure time: 96 h Method: ECOSAR (Ecological Structure Activity Relationships)
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia (water flea)): 146.695 mg/l Exposure time: 48 h Method: ECOSAR (Ecological Structure Activity Relationships)
Toxicity to algae/aquatic plants	:	EC50 (algae): 47.755 mg/l Method: ECOSAR (Ecological Structure Activity Relationships)

Ecotoxicology Assessment

Acute aquatic toxicity	:	This product has no known ecotoxicological effects.
Chronic aquatic toxicity	:	This product has no known ecotoxicological effects.

12.2 Persistence and degradability

Components:

1,1-Difluoroethane:

Biodegradability	:	Result: Not readily biodegradable.
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12.3 Bioaccumulative potential

Components:

1,1-Difluoroethane:

Bioaccumulation	:	Remarks: Bioaccumulation is unlikely.
Partition coefficient: n-octanol/water	:	log Pow: 1.13 (25 °C)

12.4 Mobility in soil

Components:

1,1-Difluoroethane:

Distribution among environmental compartments	:	Koc: 4.47
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12.5 Results of PBT and vPvB assessment

Product:

Assessment : This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects

Product:

Endocrine disrupting potential : This substance/mixture does not contain components considered to have endocrine disrupting properties for environment according to UK REACH Article 57(f).

Regulation (EU) No 2024/573 on fluorinated greenhouse gases

Product:

100-year global warming potential: 124

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product	: Dispose of in accordance with local regulations. According to the European Waste Catalogue, Waste Codes are not product specific, but application specific. Waste codes should be assigned by the user, preferably in discussion with the waste disposal authorities.
Contaminated packaging	: Empty containers should be taken to an approved waste handling site for recycling or disposal. Empty pressure vessels should be returned to the supplier. If not otherwise specified: Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number

ADN	: UN 1030
ADR	: UN 1030
RID	: UN 1030
IMDG	: UN 1030
IATA (Cargo)	: UN 1030
IATA (Passenger)	: UN 1030 Not permitted for transport

14.2 UN proper shipping name

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ADN	:	1,1-DIFLUOROETHANE
ADR	:	1,1-DIFLUOROETHANE
RID	:	1,1-DIFLUOROETHANE
IMDG	:	1,1-DIFLUOROETHANE
IATA (Cargo)	:	1,1-Difluoroethane
IATA (Passenger)	:	1,1-DIFLUOROETHANE Not permitted for transport

14.3 Transport hazard class(es)

	Class	Subsidiary risks
ADN	: 2	2.1
ADR	: 2	2.1
RID	: 2	2.1, (13)
IMDG	: 2.1	
IATA (Cargo)	: 2.1	
IATA (Passenger)	: Not permitted for transport	

14.4 Packing group

ADN	
Packing group	: Not assigned by regulation
Classification Code	: 2F
Hazard Identification Number	: 23
Labels	: 2.1
ADR	
Packing group	: Not assigned by regulation
Classification Code	: 2F
Hazard Identification Number	: 23
Labels	: 2.1
Tunnel restriction code	: (B/D)
RID	
Packing group	: Not assigned by regulation
Classification Code	: 2F
Hazard Identification Number	: 23
Labels	: 2.1 ((13))
IMDG	
Packing group	: Not assigned by regulation
Labels	: 2.1
EmS Code	: F-D, S-U
IATA (Cargo)	
Packing instruction (cargo aircraft)	: 200
Packing group	: Not assigned by regulation
Labels	: Flammable Gas
IATA (Passenger)	: Not permitted for transport

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14.5 Environmental hazards

ADN

Environmentally hazardous : no

ADR

Environmentally hazardous : no

RID

Environmentally hazardous : no

IMDG

Marine pollutant : no

14.6 Special precautions for user

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

14.7 Transport in bulk according to Annex II of Marpol and the IBC Code

Remarks : Not applicable for product as supplied.

SECTION 15: Regulatory information

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

Relevant EU provisions transposed through retained EU law

UK REACH List of restrictions (Annex 17)	: Conditions of restriction for the following entries should be considered: Number on list 40
	Substance(s) or mixture(s) are listed here according to their appearance in the regulation, irrespective of their use/purpose or the conditions of the restriction. Please refer to the conditions in corresponding Regulation to determine whether an entry is applicable to the placing on the market or not.
UK REACH Candidate list of substances of very high concern (SVHC) for Authorisation	: Not applicable
The Persistent Organic Pollutants Regulations (retained Regulation (EU) 2019/1021 as amended for Great Britain)	: Not applicable
Regulation (EU) No 2024/590 on substances that deplete the ozone layer	: Not applicable
UK REACH List of substances subject to authorisation (Annex XIV)	: Not applicable

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GB Export and import of hazardous chemicals - Prior Informed Consent (PIC) Regulation : Not applicable

Control of Major Accident Hazards Regulations 2015 (COMAH)

	Quantity 1	Quantity 2
18	Liquefied flammable gases (including LPG) and natural gas 50 t	200 t

Other regulations:

Take note of The Management of Health and Safety at Work Regulations 1999 (requirements relating to protection of young people at work contained in Regulation 19) and of Directive 94/33/EC on the protection of young people at work.

15.2 Chemical safety assessment

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

SECTION 16: Other information

Other information : Formacel™ and any associated logos are trademarks or copyrights of The Chemours Company FC, LLC.
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Items where changes have been made to the previous version are highlighted in the body of this document by two vertical lines.

Full text of other abbreviations

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - Agreement concerning the International Carriage of Dangerous Goods by Road; AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test popula-

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tion; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; SVHC - Substance of very high concern; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Further information

Sources of key data used to compile the Safety Data Sheet : Internal technical data, data from raw material SDSs, OECD eChem Portal search results and European Chemicals Agency, <http://echa.europa.eu/>

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be considered a warranty or quality specification of any type. The information provided relates only to the specific material identified at the top of this SDS and may not be valid when the SDS material is used in combination with any other materials or in any process, unless specified in the text. Material users should review the information and recommendations in the specific context of their intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user's end product, if applicable.

GB / EN

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Annex: Exposure Scenarios

Table of Contents

Number	Title
ES1	Industrial use; Polymer preparations and compounds (PC32); Formulation & (re)packing of substances and mixtures.
ES2	professional use; Propellant.; Cosmetics, personal care products (PC39).
ES3	Consumer use; Aerosol propellants.

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ES 1: Industrial use; Polymer preparations and compounds (PC32); Formulation & (re)packing of substances and mixtures.

1.1. Title section

Exposure Scenario name	: Industrial, Formulation & (re)packing of substances and mixtures
Structured Short Title	: Industrial use; Polymer preparations and compounds (PC32); Formulation & (re)packing of substances and mixtures.

Environment		
CS 1	Formulation & (re)packing of substances and mixtures	ERC2
Worker		
CS 2	Closed systems	PROC3
CS 3	Batch process, Mixing operations	PROC5
CS 4	Material transfers	PROC8b
CS 5	Material transfers, Small scale, Dedicated facility	PROC9
CS 6	Laboratory activities	PROC15

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: Formulation into mixture (ERC2)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Gaseous Liquefied gas
Amount used (or contained in articles), frequency and duration of use/exposure	
Annual amount per site	: 99 tonnes/year
Daily amount per site	: 0.33 tonnes/day
Fraction of EU tonnage used in region	: 1
Fraction of Regional tonnage used locally	: 1
Emission days	: 300

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Conditions and measures related to sewage treatment plant	
STP type	: No sewage treatment plant
STP effluent	: 2,000 m3/d
Conditions and measures related to treatment of waste (including article waste)	
Waste treatment	: No waste generated as substance is a gas.
Other conditions affecting environmental exposure	
Receiving surface water flow	: 18,000 m3/d

1.2.2. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Gaseous Liquefied gas
Amount used (or contained in articles), frequency and duration of use/exposure	
Use frequency	: 8 h/day
Technical and organisational conditions and measures	
Use in closed process	
Local exhaust ventilation Inhalation - minimum efficiency of 80 %	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Ensure operatives are trained to minimise exposures.	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).	
Ensure that the valves of the cylinders are tightly closed and not leaking.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear suitable gloves tested to EN374. Dermal - minimum efficiency of 80 %	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	

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Indoor or outdoor use	: Outdoor use
Temperature	: Assumes process temperature up to 52 °C
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
Avoid skin contact with leaking liquid (danger of frostbite). Wear protective gloves/ protective clothing/ eye protection/ face protection.	

1.2.3. Control of worker exposure: Mixing or blending in batch processes (PROC5)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Gaseous Liquefied gas
Amount used (or contained in articles), frequency and duration of use/exposure	
Use frequency	: 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Ensure operatives are trained to minimise exposures.	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear suitable gloves tested to EN374. Dermal - minimum efficiency of 80 %	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Outdoor use
Temperature	: Assumes process temperature up to 52 °C
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
Avoid skin contact with leaking liquid (danger of frostbite). Wear protective gloves/ protective clothing/ eye protection/ face protection.	

1.2.4. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

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Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Gaseous Liquefied gas
Amount used (or contained in articles), frequency and duration of use/exposure	
Use frequency	: 8 h/day
Technical and organisational conditions and measures	
Local exhaust ventilation Inhalation - minimum efficiency of 80 %	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Ensure operatives are trained to minimise exposures.	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear suitable gloves tested to EN374. Dermal - minimum efficiency of 80 %	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Outdoor use
Temperature	: Assumes process temperature up to 52 °C
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
Avoid skin contact with leaking liquid (danger of frostbite). Wear protective gloves/ protective clothing/ eye protection/ face protection.	

1.2.5. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Gaseous Liquefied gas
Amount used (or contained in articles), frequency and duration of use/exposure	

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Use frequency	: 8 h/day
Technical and organisational conditions and measures	
Local exhaust ventilation Inhalation - minimum efficiency of 80 %	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Ensure operatives are trained to minimise exposures.	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear suitable gloves tested to EN374. Dermal - minimum efficiency of 80 %	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Outdoor use
Temperature	: Assumes process temperature up to 52 °C
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
Avoid skin contact with leaking liquid (danger of frostbite). Wear protective gloves/ protective clothing/ eye protection/ face protection.	

1.2.6. Control of worker exposure: Use as laboratory reagent (PROC15)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Gaseous Liquefied gas
Amount used (or contained in articles), frequency and duration of use/exposure	
Use frequency	: 8 h/day
Technical and organisational conditions and measures	
Local exhaust ventilation Inhalation - minimum efficiency of 80 %	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Ensure operatives are trained to minimise exposures.	

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Provide a basic standard of general ventilation (1 to 3 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Indoor use
Temperature	: Assumes process temperature up to 52 °C
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
Avoid skin contact with leaking liquid (danger of frostbite). Wear protective gloves/ protective clothing/ eye protection/ face protection.	

1.3. Exposure estimation and reference to its source

1.3.1. Environmental release and exposure: Formulation into mixture (ERC2)

Release route	Release rate	Release estimation method
Water	0 kg/day	
Air	8.25 kg/day	
Soil	0 kg/day	

Protection Target	Exposure estimate	RCR
Freshwater	< 0.000002 mg/L (EUSES v2.1)	< 0.01
Freshwater sediment	< 0.000005 mg/kg dry weight (EUSES v2.1)	< 0.01
Marine water	< 0.000002 mg/L (EUSES v2.1)	< 0.01
Marine sediment	< 0.000005 mg/kg dry weight (EUSES v2.1)	< 0.01
Agricultural soil	0.000892 mg/kg dry weight (EUSES v2.1)	< 0.01
Man via environment - Inhalation	0.00391 mg/m ³ (EUSES v2.1)	< 0.01

1.3.2. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Exposure route	Health effect	Exposure indica-	Exposure esti-	RCR
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		tor	mate	
inhalative	systemic	long-term	16.21 mg/m ³ (measured data)	< 0.01

1.3.3. Worker exposure: Mixing or blending in batch processes (PROC5)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	16.21 mg/m ³ (measured data)	< 0.01

1.3.4. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	16.21 mg/m ³ (measured data)	< 0.01

1.3.5. Worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	16.21 mg/m ³ (measured data)	< 0.01

1.3.6. Worker exposure: Use as laboratory reagent (PROC15)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	138 mg/m ³ (ECETOC TRA worker v3)	0.051

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

For further information, please contact sds-support@chemours.com.

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ES 2: professional use; Propellant.; Cosmetics, personal care products (PC39).

2.1. Title section

Exposure Scenario name	: Professional, Aerosol propellants
Structured Short Title	: professional use; Propellant.; Cosmetics, personal care products (PC39).

Environment		
CS 1	Propellant	ERC8d
Worker		
CS 2	Professional, Spraying	PROC7

2.2. Conditions of use affecting exposure

2.2.1. Control of environmental exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Gaseous Liquefied gas
Amount used (or contained in articles), frequency and duration of use/exposure	
Annual amount for wide disperse uses	: 50 tonnes/year
Daily amount for wide dispersive uses	: < 0.000028 tonnes/day
Fraction of EU tonnage used in region	: 0.1
Fraction of Regional tonnage used locally	: 0.002
Emission days	: 365
Conditions and measures related to sewage treatment plant	
STP type	: Municipal Sewage Treatment Plant
Additional information on STP	: Biological elimination

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Conditions and measures related to treatment of waste (including article waste)

Waste treatment : No waste from process

2.2.2. Control of worker exposure: Industrial spraying (PROC7)

Product (article) characteristics

Covers concentrations up to 50 %

Physical form of product : Gaseous
Liquefied gas

Amount used (or contained in articles), frequency and duration of use/exposure

Use frequency : 4 h/day

Technical and organisational conditions and measures

Ensure operatives are trained to minimise exposures.

Provide a basic standard of general ventilation (1 to 3 air changes per hour).

Other conditions affecting workers exposure

Indoor or outdoor use : Outdoor use

Temperature : Assumes process temperature up to 52 °C

2.3. Exposure estimation and reference to its source

2.3.1. Environmental release and exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)

Release route	Release rate	Release estimation method
Water	0 kg/day	
Air	13.69 kg/day	
Soil	0 kg/day	

Protection Target	Exposure estimate	RCR
Freshwater	< 0.0000011 mg/L (EUSES v2.1)	< 0.01
Freshwater sediment	< 0.0000043 mg/kg dry weight (EUSES v2.1)	< 0.01

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Marine water	< 0.0000011 mg/L (EUSES v2.1)	< 0.01
Marine sediment	< 0.0000045 mg/kg dry weight (EUSES v2.1)	< 0.01
Agricultural soil	< 0.0000009 mg/kg dry weight (EUSES v2.1)	< 0.01
Man via environment - Inhalation	< 0.0000002 mg/m ³ (EUSES v2.1)	< 0.01

2.3.2. Worker exposure: Industrial spraying (PROC7)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	300 mg/m ³ (ConsExpo)	0.111

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

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ES 3: Consumer use; Aerosol propellants.

3.1. Title section

Exposure Scenario name	: Consumer, Aerosol propellants
Structured Short Title	: Consumer use; Aerosol propellants.

Environment		
CS 1	Aerosol propellants	ERC8d
Consumer		
CS 2	Cosmetics, personal care products, Hair Spray	PC39

3.2. Conditions of use affecting exposure

3.2.1. Control of environmental exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Gaseous Liquefied gas
Amount used (or contained in articles), frequency and duration of use/exposure	
Annual amount for wide disperse uses	: 50 tonnes/year
Daily amount for wide dispersive uses	: < 0.000028 tonnes/day
Fraction of EU tonnage used in region	: 0.1
Fraction of Regional tonnage used locally	: 0.002
Emission days	: 365
Conditions and measures related to treatment of waste (including article waste)	
Waste treatment	: No waste from process

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3.2.2. Control of consumer exposure: Cosmetics, personal care products (PC39)

Product (article) characteristics	
Covers concentrations up to 50 %	
Physical form of product	: Gaseous Liquefied gas Aerosol
Vapour pressure	: < 0 Pa
Amount used (or contained in articles), frequency and duration of use/exposure	
For each use event, covers use amounts up to	: 6 g/event
Duration	: Spray duration 0.24 min
Duration	: Exposure duration 5 min
Use frequency	: Number of applications 1.2 events per day
Other conditions affecting consumers exposure	
Room size	: 10 m ³
Ventilation rate	: 2

3.3. Exposure estimation and reference to its source

3.3.1. Environmental release and exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)

Release route	Release rate	Release estimation method
Water	0 kg/day	
Air	13.69 kg/day	
Soil	0 kg/day	

Protection Target	Exposure estimate	RCR
Freshwater	< 0.0000011 mg/L (EUSES v2.1)	< 0.01
Freshwater sediment	< 0.0000043 mg/kg dry weight (EUSES v2.1)	< 0.01
Marine water	< 0.0000011 mg/L (EUSES v2.1)	< 0.01
Marine sediment	< 0.0000045 mg/kg dry weight	< 0.01

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	(EUSES v2.1)	
Agricultural soil	< 0.0000009 mg/kg dry weight (EUSES v2.1)	< 0.01
Man via environment - Inhalation	0.00208 mg/m ³ (EUSES v2.1)	< 0.01

3.3.2. Consumer exposure: Cosmetics, personal care products (PC39)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	270 mg/m ³ (ConsExpo)	0.4

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

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