1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Identification of the product

Identification of the mixture: FORANE® 507

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

Use of the Substance/Mixture :

Sector of use :	Product category :
SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites**, SU17:** General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment	**PC16:** Heat transfer fluids
SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)	**PC16:** Heat transfer fluids

1.3. Details of the supplier of the safety data sheet

Supplier
Arkema
Fluorinated Gas
420 rue d'Estienne d'Orves
92705 Colombes Cedex, France
Téléphone : +33 (0)1 49 00 80 80
Télécopie : +33 (0)1 49 00 83 96
http://www.arkema.com

E-mail address
pars-drp-fds@arkema.com

1.4. Emergency telephone number

+33 1 49 00 77 77
European emergency phone number : 112

2. HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Classification (Regulation (EC) No 1272/2008):
Gases under pressure, Liquefied gas, H280

Classification according to EU Directives 1999/45/EC :

This mixture is not classified as dangerous according to Directive 1999/45/EC.

Additional information:
For the full text of the R, H, EUH-phrases mentioned in this Section, see Section 16.

2.2. Label elements

Label elements (REGULATION (EC) No 1272/2008):

Hazard pictograms:

Signal word: **Warning**

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

Precautionary statements:

Storage:

P410 + P403 : Protect from sunlight. Store in a well-ventilated place.

Special labelling:

Contains: Pentafluoroethane; 1,1,1-Trifluoroethane. Contains fluorinated greenhouse gases covered by the Kyoto Protocol.

2.3. Other hazards

Potential health effects:

Inhalation: As with other volatile aliphatic halogenated compounds, through vapour accumulation and/or inhalation of large quantities, the product can cause : Loss of consciousness and cardiac disorders aggravated by stress and lack of oxygen, risk of mortality
Skin contact: Ejection of liquefied gas : frostbite possible

Environmental Effects:

Not readily biodegradable. Practically not bioaccumulable

Physical and chemical hazards:

Thermal decomposition giving toxic and corrosive products.
Decomposition products: See chapter 10

Other:

Results of PBT and vPvB assessment : According to REACH regulation, annex XIII, this mixture contains no substance meeting PBT and vPvB criteria.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2. Mixtures

Chemical nature of the mixture[1]:

Preparation based on :

Hazardous components (according to Regulation (EC) No. 1907/2006) :

Chemical Name[1] & REACH Registration Number[2]	EC-No.	CAS-No.	Concentration	Classification Directive 67/548/EEC	Classification Regulation (EC) No 1272/2008
Pentafluoroethane (01-2119485636-25)	206-557-8	354-33-6	50 %	WEL substance	Press. Gas Liquefied gas; H280
1,1,1-Trifluoroethane (01-2119492869-13)	206-996-5	420-46-2	50 %	F+; R12	Flam. Gas 1; H220 Press. Gas Liquefied gas; H280

[1]: See chapter 14 for Proper Shipping Name
[2] :See the text of the regulation for applicable exceptions or provisions : The transition time according to REACH Regulation, Article 23, is still not expired.
For the full text of the R, H, EUH-phrases mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1. & 4.2. Description of necessary first-aid measures & Most important symptoms/effects, acute and delayed:

Inhalation:

Move patient from contaminated area to fresh air. Oxygen or artificial respiration if needed. In case of persistent problems : Consult a physician.

Skin contact:

Frostbite : treat as thermal burns. Wash off with plenty of water.

Eye contact:

Wash immediately, abundantly and thoroughly with water. If irritation persists, consult an ophthalmologist.

Ingestion:

No hazards which require special first aid measures.

Protection of first-aiders:

If entering a saturated atmosphere, wear a self contained breathing apparatus.

4.3.Indication of immediate medical attention and special treatment needed, if necessary

Treatment: Do not administer catecholamines (because of the cardiac effect caused by the product).

5. FIREFIGHTING MEASURES

5.1.Extinguishing media

Suitable extinguishing media: Use extinguishing measures to suit surroundings.

5.2. Special hazards arising from the substance or mixture:
Thermal decomposition giving toxic and corrosive products :
Hydrogen fluoride, Carbon oxides
One of the components of this preparation gives flammable mixtures with air

5.3. Advice for firefighters:

Specific methods:
Cool containers / tanks with water spray. Ensure a system for the rapid emptying of containers. In case of fire nearby, remove exposed containers.

Special protective actions for fire-fighters:
Wear self-contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures:
Avoid contact with the skin and the eyes. Avoid inhalation of vapours. In enclosed areas : ventilate or wear a self-contained breathing apparatus (risk of anoxia). Remove all sources of ignition. Do not smoke. Evacuate non-essential staff and those not equipped with individual protection apparatus.

6.2. Environmental precautions:
Do not release into the environment.

6.3. Methods and materials for containment and cleaning up:

Recovery:
Allow to evaporate.

Elimination: See chapter 13

6.4. Reference to other sections: None.

7. HANDLING AND STORAGE

7.1. Precautions for safe handling:

Technical measures/Precautions:
Storage and handling precautions applicable to products: pressurised liquified gas
Provide appropriate exhaust ventilation at machinery. Provide showers, eye-baths. Provide self-contained breathing apparatus nearby (for emergency intervention). Well ventilate empty vats and tanks before entering.

Safe handling advice:
Prohibit ignition sources near the point where containers are opened - Do not smoke.

Hygiene measures:
Avoid contact with the skin and the eyes. Avoid inhalation of vapours. When using do not eat, drink or smoke.
Wash hands after handling. Remove contaminated clothing and protective equipment before entering eating areas.

7.2. Conditions for safe storage, including any incompatibilities:
Keep in a cool, well-ventilated place. Store at room temperature in the original container. Keep away from open flames, hot surfaces and sources of ignition. Protect full containers from sources of heat to avoid overpressurization. Protect from light. Keep away from direct sunlight.

Packaging material:
Recommended: Ordinary steel
To be avoided: Alloys containing more than 2% of magnesium, Plastic materials

7.3. Specific end uses: None.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters:

Exposure Limit Values

Pentafluoroethane

Source	Date	Value type	Value (ppm)	Value (mg/m3)	Remarks
ARKEMA		STEL	1.000	4.900	Value recommended by the "Exposure Limit Value Committee" of ARKEMA

1,1,1-Trifluoroethane

Source	Date	Value type	Value (ppm)	Value (mg/m3)	Remarks
ARKEMA		STEL	1.000	3.400	Value recommended by the "Exposure Limit Value Committee" of ARKEMA

Derived No Effect Level (DNEL): PENTAFLUOROETHANE :

End Use	Inhalation	Ingestion	Skin contact
Workers	16444 mg/m3 (LT, SE)		
Consumers	1753 mg/m3 (LT, SE)		

LE : Local effects, **SE** : Systemic effecs, **LT** : Long term, **ST** : Short term

Derived No Effect Level (DNEL): 1,1,1-TRIFLUOROETHANE :

End Use	Inhalation	Ingestion	Skin contact
Workers	38800 mg/m3 (LT, SE)		
Consumers	10700 mg/m3 (LT, SE)		

LE : Local effects, **SE** : Systemic effecs, **LT** : Long term, **ST** : Short term

Predicted No Effect Concentration (PNEC): PENTAFLUOROETHANE :

Compartment:	Value:
Fresh water	0,1 mg/l
Water (Intermittent release)	1 mg/l
Fresh water sediment	0,6 mg/kg dw

Predicted No Effect Concentration (PNEC): 1,1,1-TRIFLUOROETHANE :

Compartment:	Value:
Fresh water	0,35 mg/l

8.2. Exposure controls:

General protective measures: Provide sufficient air exchange and/or exhaust in work rooms.

Personal protective equipment:
Respiratory protection: In case of insufficient ventilation, wear suitable respiratory equipment.
Hand protection: Leather gloves
Eye/face protection: Safety glasses with side-shields
Skin and body protection: Protective clothing (cotton)

Environmental exposure controls: See chapter 6

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance:
Physical state (20°C): gaseous

Form:	Liquefied gas
Colour:	colourless
Odour:	Ether-like (slightly)
Olfactory threshold:	No data available.
pH:	not applicable
Melting point/range :	PENTAFLUOROETHANE : -103 °C
Melting point/range :	1,1,1-TRIFLUOROETHANE : -111 °C
Boiling point/boiling range :	-47,1 °C
Flash point:	not applicable
Evaporation rate:	No data available.
Flammability (solid, gas):	
Flammability:	Non flammable product (Standard NF EN 378-1)
Vapour pressure:	1,29 MPa , at 25 °C
	2,37 MPa , at 50 °C
	3,29 hPa , at 65 °C
Vapour density:	5,52 kg/m3 At the boiling point
Density:	1.042 kg/m3 , at 25 °C
	887 kg/m3 , at 50 °C
	713 kg/m3 , at 65 °C
Water solubility :	PENTAFLUOROETHANE : 0,43 g/l at 25 °C (calculated)
	1,1,1-TRIFLUOROETHANE : 0,761 g/l at 25 °C (calculated)
Partition coefficient: n-octanol/water:	PENTAFLUOROETHANE : log Kow : = 1,48 , at 25 °C (OECD Test Guideline 107)
	1,1,1-TRIFLUOROETHANE : log Kow : = 1,73 , at 20 °C (calculated)
Autoignition temperature :	1,1,1-TRIFLUOROETHANE : 750 °C
Decomposition temperature:	No data available.
Viscosity, dynamic:	not applicable
Explosive properties:	
Explosivity:	Not relevant (due to the chemical structure)
Oxidizing properties:	Not relevant (due to the chemical structure)

9.2. Other data:

Henry constant :	PENTAFLUOROETHANE : 309E+03 Pa.m^3/mol (calculated)
	1,1,1-TRIFLUOROETHANE : 11,20E+03 Pa.m^3/mol , at 25 °C
Critical point:	Critical pressure: 3,72 MPa, Critical temperature: 71 °C

10. STABILITY AND REACTIVITY

10.1. & 10.2. Reactivity & Chemical stability:
The product is stable under normal handling and storage conditions.

10.3. Possibility of hazardous reactions: No data available.

10.4. Conditions to avoid:
Keep away from heat and sources of ignition. Avoid contact with flames and red hot metallic surfaces Protect from light.

10.5. Incompatible materials to avoid:
Strong oxidizing agents, Finely divided metals, Alkaline earth metals

10.6. Hazardous decomposition products:
At high temperature :, Thermal decomposition giving toxic and corrosive products :
Gaseous hydrogen fluoride (HF)., Carbon oxides

11. TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects:

Acute toxicity:

Inhalation: **According to its composition, can be considered as : Slightly harmful by inhalation**

PENTAFLUOROETHANE :

Effects of breathing high concentrations of vapour may include:, headache, Dizziness, Drowsiness
As with other volatile aliphatic halogenated compounds, through vapour accumulation and/or inhalation of large quantities, the product can cause :, Loss of consciousness and cardiac disorders aggravated by stress and lack of oxygen, risk of mortality

• In animals : No mortality/4 h/rat: 800000 ppm (Method: OECD Test Guideline 403)

1,1,1-TRIFLUOROETHANE :

As with other volatile aliphatic halogenated compounds, through vapour accumulation and/or inhalation of large quantities, the product can cause :, Loss of consciousness and cardiac disorders aggravated by stress and lack of oxygen, risk of mortality

• In animals : No mortality/4 h/rat: 591000 ppm (Method: OECD Test Guideline 403)

Local effects (Corrosion / Irritation / Serious eye damage):

Skin contact:

Ejection of liquefied gas : frostbite possible

Eye contact:

Transitory irritation

Respiratory or skin sensitization:

Inhalation: No data available.

Skin contact:

Not relevant (gas)

CMR effects :

Mutagenicity: **According to its composition, can be considered as : Not genotoxic**

In vitro

PENTAFLUOROETHANE :

Ames test: negative (Method: OECD Test Guideline 471)
In vitro test for chromosomal abnormalities on CHO cells: negative (Method: OECD Test Guideline 473)
In vitro chromosomal abnormality test on human lymphocytes: negative (Method: OECD Test Guideline 476)

1,1,1-TRIFLUOROETHANE :

Ames test: negative
In vitro chromosomal abnormality test on human lymphocytes: negative

In vivo

PENTAFLUOROETHANE :

Micronucleus test in vivo mouse: negative (Method: OECD Test Guideline 474)

1,1,1-TRIFLUOROETHANE :

Micronucleus test in vivo mouse: negative

Carcinogenicity: **Based on the available data, the substance is not suspected of having carcinogenic potential**

PENTAFLUOROETHANE :

No data available.

1,1,1-TRIFLUOROETHANE :

• In animals : According to available experimental data:
No effect maximum concentration300 mg/kg
(rat, 1 year, By oral route)

Reproductive toxicity:

Fertility: **Based on the available data, the substance is not suspected of having reprotoxic potential.**

Foetal development: **Absence of toxic effects for foetal development (at non toxic concentrations for the mothers)**
Experimental effects on animals:

PENTAFLUOROETHANE :
• In animals : NOAEL: 245 mg/l (Method: OECD Test Guideline 414)

Maternal concentration without effect: 245 mg/l
(Method: OECD Test Guideline 414, rat, rabbit, By inhalation)

1,1,1-TRIFLUOROETHANE :
• In animals : NOAEL: 137 mg/l Maternal concentration without effect: 137 mg/l (Method: OECD Test Guideline 414, rat, rabbit, By inhalation)

Specific target organ toxicity :

Single exposure :

Inhalation: **The substance or mixture is not classified as specific target organ toxicant, single exposure.**

Repeated exposure: **The substance or mixture is not classified as specific target organ toxicant, repeated exposure.**

PENTAFLUOROETHANE :
• In animals : Studies of prolonged inhalation in animals have not shown sub-chronic toxic effects

Inhalation: NOAEL= 50000 ppm (Method: OECD Test Guideline 408, rat, 3 Months)

1,1,1-TRIFLUOROETHANE :
Studies of prolonged inhalation in animals have not shown sub-chronic toxic effects
• In animals : Inhalation: No specific toxic effects
NOAEL= 40000 ppm (Method: OECD Test Guideline 408, rat, 3 Months)

Aspiration hazard: Not relevant

12. ECOLOGICAL INFORMATION

12.1. Toxicity

Fish: **According to its composition, can be considered as : Slightly harmful to fish**

PENTAFLUOROETHANE :
Through anology with a comparable product :
LC50, 96 h (Oncorhynchus mykiss) : > 100 mg/l

1,1,1-TRIFLUOROETHANE :
LC50, 96 h (Oncorhynchus mykiss) : > 40 mg/l
LC50 (Freshwater fish) : = 109 mg/l (Method: calculated)

Aquatic invertebrates: **According to its composition, can be considered as : Slightly harmful to daphnia**

PENTAFLUOROETHANE :
Through anology with a comparable product :
LC50, 48 h (Daphnia magna (Water flea)) : > 100 mg/l

1,1,1-TRIFLUOROETHANE :
LC50, 48 h (Daphnia magna (Water flea)) : = 300 mg/l (Method: OECD Test Guideline 202)
EC(I)50, 48 h (Daphnia) : = 115 mg/l (Method: calculated)

Aquatic plants: **According to its composition, can be considered as : Slightly harmful to algae**

PENTAFLUOROETHANE :
Through anology with a comparable product :
EC50, 72 h (Pseudokirchneriella subcapitata) : > 114 mg/l

1,1,1-TRIFLUOROETHANE :
Through anology with a comparable product :
EC50, 96 h (Algae) : = 71 mg/l (Method: calculated)
NOEC, 96 h (Selenastrum capricornutum) : > 44 mg/l

Microorganisms:

1,1,1-TRIFLUOROETHANE :
Through anology with a comparable product :
EC0, 6 h (Pseudomonas putida) : > 730 mg/l

12.2. Persistence and degradability :

Biodegradation (In water): **According to its composition, can be considered as Not readily biodegradable.**

PENTAFLUOROETHANE :

Not readily biodegradable.
5 % after 28 d (Method: OECD Test Guideline 301 D)

1,1,1-TRIFLUOROETHANE :

Not readily biodegradable.
Through anology with a comparable product : 3 % after 28 d

Photodegradation (In air):

PENTAFLUOROETHANE :

Degradation by radicals OH: Overall half-life time: 29 y

1,1,1-TRIFLUOROETHANE :

Degradation by radicals OH: Overall half-life time: 1.108 d

12.3. Bioaccumulative potential :

Bioaccumulation: **According to its composition, can be considered as : Practically not bioaccumulable**

PENTAFLUOROETHANE :

Partition coefficient: n-octanol/water: log Kow : = 1,48 , at 25 °C (Method: OECD Test Guideline 107)

1,1,1-TRIFLUOROETHANE :

Partition coefficient: n-octanol/water: log Kow : = 1,73 , at 20 °C (Method: calculated)

12.4. Mobility in soil - Distribution among environmental compartments:

Substance : PENTAFLUOROETHANE :
Air: 100 %

1,1,1-TRIFLUOROETHANE :
Air: 100 %
(Method: Calculation according Mackay, Level I)

Henry constant:
PENTAFLUOROETHANE :

309E+03 $Pa.m^3/mol$, , (Method: calculated)

1,1,1-TRIFLUOROETHANE :

11,20E+03 $Pa.m^3/mol$, 25 °C,

Absorption / desorption:
PENTAFLUOROETHANE :

In aqueous environment: rapid evaporation
(Method: estimation) Volatilization 1/2 life time: 3,2 h
In soils and sediments: Slight adsorption , log Koc: 1,3 - 1,7

1,1,1-TRIFLUOROETHANE :

In soils and sediments: Slight adsorption

12.5. Results of PBT and vPvB assessment :

According to REACH regulation, annex XIII, this mixture contains no substance meeting PBT and vPvB criteria.

12.6. Other adverse effects:

Global warming potential (GWP): 1,1,1-TRIFLUOROETHANE: , Global warming potential with respect to CO2 (time horizon 100 years) , Value: 3.800

PENTAFLUOROETHANE , Global warming potential with respect to CO2 (time horizon 100 years) , Value: 3.400

Ozone depletion potential: PENTAFLUOROETHANE , Ozone depletion potential; ODP; (R-11 = 1) , Value: 0

1,1,1-TRIFLUOROETHANE: , Not an atmospheric ozone precursor : POCP , Value: 0

1,1,1-TRIFLUOROETHANE: , Ozone depletion potential; ODP; (R-11 = 1) , Value: 0

13. DISPOSAL CONSIDERATIONS

13.1. Waste treatment:

Disposal of product: Recycle or incinerate at an approved waste disposal site. In accordance with local and national regulations.

14. TRANSPORT INFORMATION

Regulation	UN number	Proper shipping name	Class	Label	PG	Environmentally hazardous	Other information
ADR	3163	LIQUEFIED GAS, N.O.S.(PENTAFLUOROETHANE, 1.1.1-TRIFLUOROETHANE, 50/50%)	2	2.2		no	
RID	3163	LIQUEFIED GAS, N.O.S. (PENTAFLUOROETHANE, 1.1.1-TRIFLUOROETHANE, 50/50%)	2	2.2		no	
IATA Cargo	3163	Liquefied gas, n.o.s. (Pentafluoroethane, 1.1.1-TRIFLUOROETHANE)	2.2	2.2		no	
IATA Passenger	3163	Liquefied gas, n.o.s. (Pentafluoroethane, 1.1.1-TRIFLUOROETHANE)	2.2	2.2		no	
IMDG	3163	LIQUEFIED GAS, N.O.S. (PENTAFLUOROETHANE, 1.1.1-TRIFLUOROETHANE)	2.2	2.2		no	EmS Number: F-C, S-V

15. REGULATORY INFORMATION

Safety data sheets: according to Regulation (EC) No. 1907/2006

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

Listed in:

EU. Regulation No. 842/2006 on certain fluorinated greenhouse gases, Annex 1. OJ (L 161) 1: Pentafluoroethane: 1,1,1-Trifluoroethane

15.2. Chemical Safety Assessment:

As the substance doesn't meet the criteria for health and environment classification and is neither PBT nor vPvB, according to REACH regulation, article 14(3), development of specific exposure scenarios are not required.

INVENTORIES:

EINECS:	Conforms to
TSCA:	Conforms to
AICS:	Conforms to
DSL:	All components of this product are on the Canadian DSL list.
ENCS (JP):	Conforms to
KECI (KR):	Conforms to
PICCS (PH):	Conforms to
IECSC (CN):	Conforms to
NZIOC:	Conforms to

16. OTHER INFORMATION

Full text of R, H, EUH-phrases referred to under sections 2 and 3

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

Bibliography Encyclopédie des gaz (Air Liquide - Ed. 1976 - ELSEVIER AMSTERDAM

Update:

Safety datasheet sections which have been updated:		Type:
1	1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING	Revisions
2	2. HAZARDS IDENTIFICATION	Revisions
3	3. COMPOSITION/INFORMATION ON INGREDIENTS	Additions
8	8. EXPOSURE CONTROLS/PERSONAL PROTECTION	Additions
9	9. PHYSICAL AND CHEMICAL PROPERTIES	Additions, Revisions
11	11. TOXICOLOGICAL INFORMATION	Additions, Revisions
12	12. ECOLOGICAL INFORMATION	Additions, Revisions

Thesaurus:
NOAEL : No Observed Adverse Effect Level (NOAEL)
LOAEL : Lowest Observed Adverse Effect Level (LOAEL)
bw : Body weight
food : oral feed
dw : Dry weight
vPvB : very Persistent and very Bioaccumulative
PBT : Persistent, Bioaccumulative and Toxic

This information applies to the PRODUCT AS SUCH and conforming to specifications of ARKEMA. In case of formulations or mixtures, it is necessary to ascertain that a new danger will not appear. The information contained is based on our knowledge of the product, at the date of publishing and it is given quite sincerely. Users are advised of possible additional hazards when the product is used in applications for which it was not intended. This sheet shall only be used and reproduced for prevention and security purposes. The references to legislative, regulatory and codes of practice documents cannot be considered as exhaustive. It is the responsibility of the person receiving the product to refer to the totality of the official documents concerning the use, the possession and the handling of the product. It is also the responsibility of the handlers of the product to pass on to any subsequent persons who will come into contact with the product (usage, storage, cleaning of containers, other processes) the totality of the information contained within this safety data sheet and necessary for safety at work, the protection of health and the protection of environment.

NB: In this document the numerical separator of the thousands is the "." (point), the decimal separator is "," (comma).