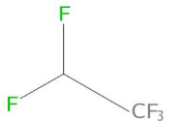
1. IDENTIFICATION OF THE SUBSTANCE/COMPOUND AND COMPANY

1.1. Product identifier Name:	Pentafluoroethane
Chemical name	IUPAC name: 1,1,1,2,2-pentafluoroethane Refrigerant-125 Freon-125 HP, refrigerator gas R 125 GHFU-125
Synonyms:	R 125, HFC 125
Chemical formula:	C2F5H
Molecular weight:	120,0214
EC number	206-557-8
REACH Pre-Registration №	Reference number 05-2114096899-20-0000
C&L bulk notification	Reference number 02-2119708817-31-0000
CAS number	354-33-6
Structural formula:	
1.2. Use of substance/ compound Identified uses	Applied as refrigerant both separate and in mixture composition; in sprinklers as fire-extinguishing means Manufacture of substance Formulation/Blending Packaging/repackaging Manufacture of charged RAC/MAC systems and other refrigeration machines Manufacture of fire extinguishers Recovery operations = Recycling / Reclamation / Destruction (waste) MAC & RAC Mobile Air Conditoning and Stationary Refrigeration & Air Conditioning systems Recovery (F-gas / ODS) / Servicing Most common technical function of substance (what it does): Heat transfer agent Laboratory chemicals Other: Fire extinguishing agent
Uses advised against	For industrial or professional use only
1.3. Details of the supplier of the safety data sheet	
Manufacturer	Joint Stock Company «HaloPolymer Perm» 614042, Russia, Perm, ul. Lasvinskaya 98 Phone № +7(342) 250-61-50 www.halopolymer.ru
Only REACH representative in EU:	JSC «HaloPolymer Perm» (Submitting legal entity URALCHEM Assist GmbH) Johannssenstrasse 10 30159, Hannover, Germany Tel: +49 511 45 99 444
1.4 Emergency telephone: Great Britain USA	+7-342-282-85-45 (24 hours) +44 (0) 203 394 9870 (24/7) 1-877 271 7077

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance 2.1.1 Regulation (EC) No 1272/2008 [CLP/GHS]	Liquefied gas, H280
2.1.2. Directive 67/548/EEC	Harmful by inhalation, R 20
2.2 Label elements 2.2.1 Labeling according to Regulation (EC) No 1272/2008 [CLP/GHS]	Hazard pictograms  GHS04 Signal word: **Warning** Hazard statements: H280 (Contains gas under pressure; may explode if heated) Precautionary statements: P 403 Store in a well-ventilated place. P 410 Protect from sunlight.
2.3 Supplemental Hazard information (EU):	Not applicable
2.4 For further information please refer to section 11 of this MSDS	

3. COPMOSITION/INFORMATION ON INGREDIENTS

3.1. Composition

Identification name	CAS number	EC number	Weight % content (or range)
pentafluorethane	354-33-6	206-557-8	99,5 % mass

The complete text of risk phrase, indicated in this section, you can find in the section 16.

4. FIRST AID MEASURE

4.1 The stated below first aid bases on supposed adherences to all regulations of the production and personal hygiene	
Inhalation:	Symptoms: short-time excitation, that changes into flaccidity, sleepiness, hypodynamia, ataxia, bradipnoe, acceleration, clonic convulsion Get an injured person outside, take off tight clothes; rest and warmth. In case of the increasing cough seek medical advice.
Eyes contact:	Symptoms: irritant action (reddening, watering) Rinse eyes in plenty of water, seek medical advice.
Skin contact:	Symptoms: frostbite By frostbite: rub skin till the sensitivity appears, by appearing blisters: put aseptic dressing, seek medical advice.

5. FIRE-FIGHTING MEASURES

5.1 The product is fire-and explosion-proof; fire-extinguishing mean.	
5.1.1. Recommended fire-extinguishing means	Apply fire-extinguishing means for main source of ignition
5.1.2. Forbidden fire-extinguishing means	Unknown
5.1.3.Exposure hazard	Do not come near reservoirs. Cool off reservoirs by means of water at the maximal long distance. Decomposition products are hazardous.
5.1.4.Hazardous decomposition products by higher temperature (> 900 ^{0}C)	By temperature > 900^{0}C the substance decomposes and generates small quantity of high-toxic compounds: anhydrous hydrogen fluoride (MPC – 0,5/0,1 mg/m^3, class of risk 2) and fluorophosgene

5.1.5. Special protective measures for firemen	Use insulating respirator (IR-4M) in case of inflammation Self-contained breathing apparatus
5.1.6. Other information	

6. ACCIDENTAL RELEASE MEASURES

6.1. Measures for personnel protection	Wear standard working clothes (cloths suit), rubber gloves, goggles or facing guard board; use filtering respirator with the canister (BKF) or the combined filter **(**DOT 600, mark A2B3E3P3) in case of accident
6.2. Environment safety	Facilities, where works with Refrigerant 125 are carried out, must be equipped with combined extract and input ventilation, which maintains the air condition in accordance with the requirements; rooms, where the refrigerant vapor liberation could occur, must be equipped with local ventilation suction-pumps. The regular control of Refrigerant -125 content in air of the working place must be carried out under the approved by State Sanitary Inspection plan. It is prohibited to carry out fireworks without special preparations, to turn on electric heaters, to smoke in facilities where Refrigerant is used. Complete sealing of equipments, connections and packing. Global warming potential (concerning fluortrichlormethane) - HGWP – 0,84; Global warming potential (concerning carbon dioxide) GWP – 2800 (international data -3698).
6.3. Measures by overflowing (scattering)	Complete sealing of equipments, connections and customer packages. Consumers of the product are responsible for fulfilling of federal, state, local requirements. Refrigerant is a valuable product and not to be destroyed.

7. HANDLING AND STORAGE

7.1.Transporation	Refrigerant is transported with each kind of transport according to the regulations of goods transportation, which are valid for this kind of transportation, and according to “Regulations of technology and exploitation of pressure vessels” approved by State Technical Inspection of Russian Federation. Refrigerant 125 is transported in cylinders, specialized tank containers (STC). Valves on package must be protected with cups.
7.2. Storage	Refrigerant-125 must be stored in storage rooms by temperature less than 50^0C in accordance with “Regulations of technology and exploitation of pressure vessels”, approved by State Technical Inspection of Russian Federation. The outside storage is permitted, but the package (drums, special containers) must be protected against water and direct sun effect. The storage of Refrigerant-125 with other non-explosive and non-inflammable substances is acceptable. Refrigerant 125 is filled in steel cylinders, containers, and special tank containers. Each 1dm^3 of cylinder’s (container’s) capacity must be filled no more than 0,9 kg of liquefied refrigerant. The storage of Refigerant-125 with other explosive and inflammable substances is not acceptable.
7.3. Specific usage	Unknown

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1.Exposure limit value	MPC of work.place =3000/m^3, MPC max.single=100 mg/m^3, MPC avar.daily=2-mg/m3 MPC water = not determined, MPC soil = not determined
8.2. Exposure control 8.2.1. Control of the professional effect (MPC of working place)	**Substance** | pentafluorethane **CAS No.** | **354-33-6**

	<table><tr><td></td><td colspan="2">Limit value - Eight hours</td><td colspan="2">Limit value - Short term</td></tr><tr><td>Country</td><td>ppm</td><td>mg/m³</td><td>ppm</td><td>mg/m³</td></tr><tr><td>**Sweden**</td><td>500</td><td>2500</td><td>750</td><td>3750</td></tr></table> MPC of work.place =3000/m^3, class of risk 4 limiting value endurance for countries: Great Britain LTEL: 1000 ppm Ventilation of facilities, sealing of equipments, grounding of equipments Avoiding any contacts with heated surfaces. Marking of risks with colors and danger signs (GOST 12.4.026-2001 harmonized with ISO 3461-88, ISO 4196-99, ISO 6309-87). Task and duty sharing between personnel of labor safety in the labor protection controlling system (The labor protection controlling system is worked out in accordance with GOST P 12.0.006-2002 harmonized with the standard OHSAS 18001-99 and the guide MOT ILO-OSH 2001). Labor safety learning of personnel is conducted in accordance with GOST 12.0.004-90 Facilities, where works are carried out, must be equipped with the influx-and-extract ventilator. Smoking and eating are prohibited. Working with the Refrigerant-125, workers must be supplied with special clothes, shoes, and personal protection equipments.
Protection of respiratory organs 	Respirator with the filter DOT for respirators A2B3E3P3 or with the BKF, FOS (GOST 12.4.121, GOST P 12.4.193-99, **EN 141**, GOST P 12.4.194-99, **EN 143**)
Hands' protection - the type of gloves' material - resistance term of gloves' material 	Polymeric coating gauntlets (acid-resistance), rubber gloves (acid-base resistance) GOST 20010-93, GOST 12.4.124-83, GOST 12.4.010-75, GOST 12.4.183-91, GOST 511210-97, EN407 EN388
Eyes protection (protective goggles, masks, glasses) 	Protective goggles GOST 12.4.013-97, EN166-168, 170, EN166-2001
Skin protection (aprons, shoes, clothes 	Working clothes (cloths or cotton suit) GOST 27652-88, GOST 27653-88 Working shoes (boots) GOST 5375-72, GOST 27651-93
If necessary hygiene measures	Food intake in special rooms, after the shift the hygienic shower should be taken
8.2.2.Exposure control of environment	

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 General information:

Appearance (physical state (solid, liquid, gas) Colour: Odour: Characterisation:	gaseous (at 1013 mbar/20 degrees C) colourless slight ethereal Non-combustible gas. Only slightly soluble in water. Gas is heavier than air.

9.2.Essential information on health & environment safety	
Melting / freezing point	-103 °C at 1013 hPa
Boiling point	-48,5 °C at 1013 hPa
Relative density	4.1 at 20°C Gas density was calculated through the ideal gas-law under standard conditions to be 5.36 g/l (4.1 relative to air).
Vapour pressure	1375.8 kPa at 25 °C
Water solubility	430 mg/L at 25 °C . The solubility of HFC 125 in water at 25°C under atmospheric pressure has been estimated by the Henry's law constant experimentally derived by Arlt and co-workers.
Partition coefficient n-octanol/water (log value)	Log Kow (Paw): 1.48 at 20 °C
Dissociation constant	Dissociation of HFC 125 in water was studied. No dissociation was observed. No Ka could be determined.
9.3. Other information	Relative dielectric constant (N2=1,0) -0,955 Flame- and explosion-proof
10. STABILITY AND REACTIVITY	
10.1. Condition to avoid	If the product and flame and heated surfaces contact, the substance decomposes and generates high-toxic products.
10.2. Materials to avoided	Risk of explosion in contact with: strong bases alkali metals
10.3. Hazardous decomposition products	Fluoric carbonyl COF_2 (fluorophosgene, CAS № 353-50-4), anhydrous hydrogen fluoride HF (CAS № 7664-39-3), which are generated by thermal decomposition (t^0 >900 C^0) outside.
Special noted: - necessity and presence of stabilizers	
- possibility of dangerous esoteric reactions	Not required
- meaning of safety, if it occurs, changing of physical properties of a substance or compound	non
- hazardous decomposition products, if it occurs, after the contact with water	Products of thermal decomposing products are hazardous for environment; they pollute the sold and water.
- possibility of decomposition of instable products	non
11. TOXICOLOGICAL INFORMATION	
11.1 Toxicokinetics (absorption, metabolism, distribution and elimination)	HFC-125 is very poorly absorbed via inhalation. Compared with other hydrofluorocarbons or hydrochlorofluorocarbons, HFC-125 is less likely to be metabolised to TFA in the liver or will be metabolized at a slower rate
11.2 Acute toxicity	LCLo (4 h): > 800000 ppm, inhalation, rat (Sprague-Dawley) male/female ALC : > 709000 ppm based on: test mat., inhalation, rat (Sprague-Dawley) male The following information is taken into account for any hazard / risk assessment: LC50 > 800,000 ppm (3,927,000 mg/m3). No lethality or significant toxicity were observed up to 800,000 ppm
11.3 Irritation, corrosivity	No dedicated studies are available for the evaluation of the irritating potential of HFC 125. However, acute exposure up to 800,000 ppm HFC 125 and repeated exposure up to 50,000 ppm HFC 125 did not show signs of eye, skin or respiratory irritation.
11.3.1 Routes of exposure: Eyes and Skin contact:	HFC 125 is a gas under atmospheric conditions. The performance of eye and skin irritation studies is not technically feasible and scientifically justified. No eye irritation was observed during acute and repeated

	inhalation studies carried out by whole body exposure to HFC 125
Inhalation:	After inhalation: short-time excitation, which changes into flaccidity, sleepiness, hypodynamia, ataxia, bradipnoe, acceleration, clonic convulsion
11.5 Sensitization:	HFC 125 is a gas under atmospheric conditions. The performance of skin sensitisation studies is not technically feasible and scientifically justified. No sensitising responses were observed during acute and repeated inhalation studies carried out by whole body exposure to HFC 125
11.6 Carcinogenicity:	No data are available
11.7 Mutagenicity:	No data are available
11.8 Reproductive toxicity:	No data are available

12. ECOLOGICAL INFORMATION

12.1.Ecotoxicity	The substance is not transformed at the environment LC50>70%
12.2 Assessment of PBT/vPvB Properties	HFC 125 can be regarded as neither PBT nor vPvB according to the screening criteria defined in the REACH Guidance on Information Requirements & Chemical Safety Assessment (Chapter R.11) and on the criteria defined in REACH Annex XIII. Persistence: HFC 125 is not readily biodegradable, but it is expected to rapidly volatilise from aquatic and soil compartments. Bioaccumulation: Freons are inert enough and not involved into chemical reactions in the low troposphere stratum. HFC 125 satisfies the screening criterion to be considered as non bioaccumulable (Log Kow <4.5). Toxicity: The assessment of aquatic toxicity for HFC 125 is based on data from structural analogues. Overall it is possible to conclude that no EC50 or LC50 below 0.1 mg/l is to be expected for HFC 125. No secondary poisoning of birds and wild mammals is to be expected.
12.3 Other harmful effects (ozone strata destruction, photochemical ozone potential, effect on the endocrine system and/or on the global warming)	Ozone safety substance, ozone destruction potential (ODP) = 0. Global warming potential (concerning fluortrichlormethane) - HGWP – 0,84; Global warming potential (concerning carbon dioxide) GWP – 2800 (international data -3698).

13. DISPOSAL CONSIDERATIONS

	Cylinders are reusable containers.Cylinders of repeated use are subject to return to the supplier. Faulty tanks usage is prohibited. They shall be sent for repair or scrapped. Every 10 years the cylinders shall be checked. Nonreturnable tare (wooden boxes) is collected into containers and directed to burial locations approved by local authorities or for combustion in industrial waste incinerators. HFC 125 is a valuable product and not to be destroyed.

14. TRANSPORT INFORMATION

All special safety precautions, needed for user must be indicated: IMDG (sea), ADR (Dir 94/55/EC dd 21.11.1994 – road), RID (Dir96/49/EC dd 23.07.1996 – railway), ICAO/IATA (air). Among others, the following items must	3220

be included: -UN number -class -ship's name -see pollutions -other necessary information	 3220 2.2 Non Test pressure of package's body with thermal isolation is 4,1 MPa, without thermal isolation is 4,9 MPa. Maximal delivery ratio kg/dm^3 – 0,9 
15. REGULATORY INFORMATION	
15.1 Chemical description:	PENTAFLUOROETHANE
Montreal Protocol on Substance that deplete the Ozone Layer approved by the government of U.S.S.R. in November 1988 The Kyoto Protocol to the United Nations Framework Convention on Climate Change (ratified by the Federal law RF from 04.11.2004 № 128-F3: the Administrative Regulations on the Classification of Substances hazardous to Waters (Germany, 17.05.99)	Pentafluoroethane does not belong to the substance that deplete the ozone layer Regulated as a greenhouse gas
The Legislation of Russian Federation:	The Regulations of RF "About the Protection of Consumer", "About Environment Protection", " About the Sanitation and Epidemiological Control", "About the Technical Regulation"
16. OTHER INFORMATION	
R(isk) phrase(S) (data of the company): recommendation concerning reduction of usage (i.e. recommendations to consumers based on the law)	R 20 – Harmful when breathed in, S 23 – Do not breath sprayed gas (fume, vapors) The personnel familiarized with the physical and chemical, toxic properties of the product, briefed and examined in safety methods of works with the product in pressure vessel working regulations only is permitted to work with the product. Greenhouse gas, coefficient GWP = 3200
LITERATURE	1. Data of the company 2. Information card Register of potential dangerous chemical substance (RPOHV). Pentafluoroethane. Certificate of state registration VT № 001922 dd 28.02.2001, M., RVPOHV, 2001 3. Regulations concerning the International Transport of Dangerous Goods by Rail (RID). M.,1998 4. Emergency cards of hazardous goods, transported by Russian, CIS and Latvian, Lithuanian, Estonian Republics railway. M., "Transport" 2000. 5. Maximum permissible concentration (MPC) of harmful substances in the air of working place G.2.2.5.1313-03. M., Minzdav of Russia, 2003 6. Maximum permissible concentration (MPC) of harmful substances in the air of city. GN 2.1.6.1338-03.M.,2003 7. Legislation on Dangerous Substance Classification and Labelling in the European Communities, Brussel-Luxemburg, 1987 8. Recommendation on the Transport of Dangerous Goods, United Nation, New York, 1993 9. RPB № 05807960.24.16617 dd 23.11.2006 10. Federal register of potential dangerous chemical and biological

	substances, 1993-2000, ed.by Kurlyandskogo 11.A.Y.Korolchenko. Fire- and explosive safety of substances and materials, fire-extinguishing means. Reference book in 2 parts. Ass.”Pognauka”, 2000.-757 p. 12. Recommendation on the Transport of Dangerous Goods, (the 8th rev.edit.), OON, New York and Geneva, 1994 13.Thr European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) T II. Appendix B with corrections, entered until 01.01.1997 14. Toxicological Evaluation of 1,1,1,2,2-Pentafluoroethane (HFC-125)

The information contained herein is based on the present state of our knowledge and does not therefore guarantee certain properties. Recipients of our product must take responsibility for observing existing laws and regulations.

ANNEX

Exposure Scenario

Information item	**Proposed ES1**
Product Identification	
Product name as it appears on SDS	pentafluoroethane
Short title exposure scenario	

Internal name	pentafluoroethane
Sector(s) of Use (SU)	SU 3 Industrial Manufacturing (all) SU 17 General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment SU 22 Public domain (administration, education, entertainment, services, craftsmen)
Process Category(ies) (PROC)	PROC 3 Use in closed batch process (synthesis or formulation), Industrial setting;
Product OR Article category	
Product Category(ies). (PC)	PC_16_n PC 16 Heat Transfer Fluids
Article Category(ies). (AC)	AC_Not_Applicable
Environmental Release Category(ies) (ERC)	ERC7 Industrial use of substances in closed systems
Processes and activities	
Life Cycle Stage	Use
Optional: Provide additional information on processes and activities if needed	Liquefied gas Incombustible
Max. process temperature.	450
Human health - Workers	
Type of use	Industrial
Physical form under conditions of use	Gas
Dustiness category for solid substances.	
Max. duration of inhalatory exposure.	15 minutes to 1 hour
Outdoor or indoor operation and application of Local Exhaust Ventilation (LEV)	Indoor with LEV
Use of respiratory protection equipment (RPE).	>95%
Use of dermal protective clothes and gloves.	Yes
Dilution factor of the product.	1
Consumer exposure	
Product Sub-category(ies)	
Article Sub-category(ies)	
Is the Product a spray?	No
Maximum fraction of the product in the consumer product used per consumer per event	1

Max. dermal contact area with skin	2 inside hands / one hand / palm of hands
Max. oral contact area with mouth	1 some fingertips
Maximum amount used per consumer per event	Not applicable
Optional : provide risk management measures if needed	Avoid spraying directly into eyes or nose
Environmental exposure	
Maximum amount of product used per year. If the amount used is variable, use the higher value as the maximum tonnage to be coverd.	100
Use of sewage/waste water treatment plant (STP) for selected ERC	Not applicable
Max. number of emission days per year	300
Industry sector for spERC	
Industry sector spERC - will overwrite ERC in risk assessment	
Treatment of waste air	Scrubber
Treatment of waste solids	3rd party disposal
Treatment of waste liquids (not for waste water - see 6.2.4)	Other
	It is not required
Treatment of waste water	
Pre-treatment	None
Sewage/waste water treatment plant (STP) description:	
- give flow rates and describe capacity of STP	
- elimination rate in STP	
- dry weather river flow rate	
- describe sludge solids disposal	
Waste Management Measures	
Information on measures to control risk during production and use stages of substance, preparation or article	Use appropriate containment to avoid environmental contamination
Information on measures to control risk at the end of service life of substance, preparation or article	This material and its container must be disposed of in a safe way
Exposure prediction	

Do you have relevant measurement data available (worker exposure, environmental release, consumer safety) for the applicable PROC's, ERC's and PC's/AC's.	Yes
If yes, please attach this information. Please indicate the conditions under which the measurements have been taken.	PDK (CIS) 3000 mg/m3
Boundaries set by Exposure Scenario	
Please provide additional information that you deem relevant for this use, Operational Conditions and Risk Management Measures	Hold the container strongly closed. The premise where works are spent, should be supplied by a forced-air and exhaust ventilation. At work with хладоном do not smoke and do not accept food, use personal protection frames.

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