

SERVICE BULLETIN 013

DATE: November 21, 2018

SUBJECT: Working Fluid Manufacturer

MODELS AFFECTED: Series 4000 / Series 6000

This Service Bulletin is to inform service providers of newly approved suppliers of working fluid. We are aware of the increasing difficulty in procuring Honeywell Genetron R245fa. The Honeywell product was originally chosen because of its high purity and quality standards. All test and performance data was developed and is based on operation with the Honeywell Genetron product.

ElectraTherm engineering has contacted and approved two additional suppliers of R245fa.

- Asahi Glass Company (AGC)
- BOC – A member of the Linde Group

Both of these companies offer R245fa (1,1,1,3,3-Pentafluoropropane) of similar quality. Using working fluid supplied by either of the companies will no longer void the ElectraTherm warranty. However all performance and output estimates are still based on operation with Honeywell Genetron. This is because our estimates are based on real data from our test cell, and we have not done extensive performance mapping with the fluids from the other manufacturers.

The worldwide ElectraTherm fleet of machines has over 1,000,000 hours of operation using Honeywell Genetron, this is still the most tested working fluid. It is our recommendation that the Honeywell product be used whenever possible.

規格番号 U-196

制定 2004年 1月 9日

品質規格票

品名 R-245fa

項目	保証規格
外観	無色で濁りがないこと
純分 (面積%)	99.8以上
蒸発残分 (ppm)	20以下
酸分 (HClとして) (ppm)	1以下
水分 (ppm)	20以下

Safety data sheet

1,1,1,3,3-Pentafluoropropane (R 245fa)

Creation date : 17.03.2011
Revision date : 11.05.2011

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

1.1. Product identifier

Product name

1,1,1,3,3-Pentafluoropropane (R 245fa)

EC No (from EINECS): 419-170-6

CAS No: 460-73-1

Index-Nr.

Chemical formula CF₃CH₂CHF₂

REACH Registration number:

Not available.

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

Relevant identified uses

Industrial and professional. Perform risk assessment prior to use., Refrigerant.

Uses advised against

Consumer use.

1.3. Details of the supplier of the safety data sheet

Company identification

BOC, Priestley Road, Worsley, Manchester M28 2UT

E-Mail Address ReachSDS@boc.com

1.4. Emergency telephone number

Emergency phone numbers (24h): 0800 111 333

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification acc. to Regulation (EC) No 1272/2008/EC (CLP/GHS)

Press. Gas (Liquefied gas) - Contains gas under pressure; may explode if heated.

Classification acc. to Directive 67/548/EEC & 1999/45/EC

Not classified as hazardous to health.

Risk advice to man and the environment

Liquefied gas.

2.2. Label elements

- Labelling Pictograms



- Signal word

Warning

- Hazard Statements

H280 Contains gas under pressure; may explode if heated.

EIGA-As Asphyxiant in high concentrations.

- Precautionary Statements

Precautionary Statement Prevention

P281 Use personal protective equipment as required.

P260 Do not breathe gas, vapours.

Precautionary Statement Response

P308 + P313 IF exposed or concerned: Get medical advice/attention.

Precautionary Statement Storage

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

Precautionary Statement Disposal

None.

2.3. Other hazards

Contact with liquid may cause cold burns/frost bite.

SECTION 3: Composition/information on ingredients

Substance / Mixture: Substance.

3.1. Substances

1,1,1,3,3-Pentafluoropropane (R 245fa)

CAS No: 460-73-1

Index-Nr.:

EC No (from EINECS): 419-170-6

REACH Registration number:

Not available.

Contains no other components or impurities which will influence the classification of the product.

3.2. Mixtures

Not applicable.

SECTION 4: First aid measures

4.1. Description of first aid measures

First Aid General Information:

Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

First Aid Inhalation:

Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

First Aid Skin / Eye:

In case of frostbite spray with water for at least 15 minutes. Apply a sterile dressing. Obtain medical assistance. Immediately flush eyes thoroughly with water for at least 15 minutes.

First Aid Ingestion:

Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects, both acute and delayed

Inhalation can cause damage to respiratory tract and lungs. May produce irregular heart beat and nervous symptoms. In low concentrations may cause narcotic effects. Symptoms may include dizziness, headache, nausea and loss of co-ordination. In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation.

4.3. Indication of any immediate medical attention and special treatment needed

Obtain medical assistance.

SECTION 5: Fire fighting measures

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5.1. Extinguishing media

Suitable extinguishing media

All known extinguishants can be used.

5.2. Special hazards arising from the substance or mixture

Specific hazards

Exposure to fire may cause containers to rupture/explode. Can ignite spontaneously in air. Non flammable.

Hazardous combustion products

If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition:

Hydrogen fluoride. Carbon monoxide, Carbonyl fluoride.

5.3. Advice for fire-fighters

Specific methods

If possible, stop flow of product. Move container away or cool with water from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.

Special protective equipment for fire-fighters

Use self-contained breathing apparatus. Clothing for fire-fighters (including helmets, protective boots and gloves) conforming to EN 469 will provide a basic level of protection from chemical incidents. EN 469:2005: Protective clothing for fire-fighters. Performance requirements for protective clothing for fire-fighting.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Evacuate area. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Ensure adequate air ventilation. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.

6.2. Environmental precautions

Try to stop release.

6.3. Methods and material for containment and cleaning up

Ventilate area. Absorb excess liquid spillage on inorganic adsorbent material such as fine sand, brick dust etc. Place spent adsorbent in sealed packages and contact specialist waste disposal contractor.

6.4. Reference to other sections

See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Only experienced and properly instructed persons should handle gases under pressure. The substance must be handled in accordance with good industrial hygiene and safety procedures. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Do not smoke while handling product. Ensure the complete gas system has been (or is regularly) checked for leaks before use. Refer to supplier's handling instructions. Suck back of water into the container must be prevented. Do not allow backfeed into the container. Protect cylinders from physical damage; do not drag, roll, slide or drop. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Keep container valve outlets

clean and free from contaminants particularly oil and water. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to transfer gases from one cylinder/container to another. Never use direct flame or electrical heating devices to raise the pressure of a container. Do not remove or deface labels provided by the supplier for the identification of the cylinder contents.

7.2. Conditions for safe storage, including any incompatibilities

Keep container below 50°C in a well ventilated place. Observe all regulations and local requirements regarding storage of containers. Containers should be stored in the vertical position and properly secured to prevent falling over. Stored containers should be periodically checked for general conditions and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible materials. Containers should not be stored in conditions likely to encourage corrosion.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Exposure limit value

Value type	value	Note
WEEL (Workplace Environmental Exposure Limit)	300 ppm	(AIHA)

DNEL not available
PNEC not available.

8.2. Exposure controls

Appropriate engineering controls

A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered. Product to be handled in a closed system. Oxygen detectors should be used when asphyxiating gases may be released. The substance must be handled in accordance with good industrial hygiene and safety procedures. Consider work permit system e.g. for maintenance activities. Systems under pressure should be regularly checked for leakages. Provide adequate general or local ventilation. Keep concentrations well below occupational exposure limits.

Personal protective equipment

Eye and face protection

Wear a face-shield when transfilling and breaking transfer connections. Safety eyewear, goggles or face-shield to EN166 should be used to avoid exposure to liquid splashes. Wear eye protection to EN 166 when using gases.

Skin protection

Hand protection

Advice:

Chemically resistant gloves complying with EN 374 should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Material:

Viton

Min. Breakthrough time:
480 min

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Glove thickness:
0,7 mm
Guideline:
EN 374-1/2/3 Protective gloves against chemicals and micro-organisms.
Advice: Wear cold insulating gloves.
Guideline: EN 511 Protective gloves against cold.
Body protection
Protect eyes, face and skin from contact with product.
Other protection
Wear working gloves and safety shoes while handling gas cylinders.
ISO 20345 Safety footwear
Thermal hazards
If there is a risk of contact with the liquid, all protective equipment should be suitable for extremely low temperatures.
Environmental Exposure Controls
Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

General information

Appearance/Colour: Colourless gas.

Odour: No odour warning properties.

Odour threshold:

Odour threshold is subjective and inadequate to warn for over exposure.

Melting point: -103 °C

Boiling point: 15,3 °C

Flash point: Not applicable for gases and gas mixtures.

Flammability range: No reliable data available.

Vapour Pressure 20 °C: 1,227 bar

Relative density, gas: 4,6

Solubility in water: 130 mg/l

Partition coefficient: n-octanol/water: 1,35 logPow

Autoignition temperature: 412 °C

Molecular weight: 134,03 g/mol

9.2. Other information

Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity

10.1. Reactivity

Unreactive under normal conditions.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

None.

10.4. Conditions to avoid

Heat.

10.5. Incompatible materials

Oxidising agents. May react violently with alkaline-earth and alkali metals.

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced. If involved in a fire the following toxic and/or corrosive fumes may be produced by

thermal decomposition:
Hydrogen fluoride. Carbon monoxide, Carbonyl fluoride

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute oral toxicity

Not applicable.

Acute inhalation toxicity

Value: LC50

Species: Rat

Exposure time: 4 h

Value: > 200.000 ppm

Value: LC50

Species: Mouse

Exposure time: 4 h

Value in non-standard unit: > 100.000 ppm

Acute dermal toxicity

Value: LD50

Species: Rabbit

Value: > 2.000 mg/kg

Acute toxicity other routes

Ingestion is not considered a potential route of exposure.

Skin irritation

No data available.

Eye irritation

No data available.

Sensitization

No data available.

Repeated dose toxicity

Species: Rat

NOAEL ppm: 500 ppm

Assessment mutagenicity

No data available.

Assessment carcinogenicity

No data available.

Assessment toxicity to reproduction

No data available.

Assessment teratogenicity

No data available.

Other relevant toxicity information

Inhalation can cause damage to respiratory tract and lungs.,
Causes damage to the cardiovascular system.

Experiences with human exposure

Irregular cardiac activity.

SECTION 12: Ecological information

12.1. Toxicity

When discharged in large quantities may contribute to the greenhouse effect.

Acute and prolonged toxicity fish

Species: Rainbow trout (Oncorhynchus mykiss)

Exposure time: 96 h

Value type: LC50

Value in standard unit mg/l: > 81,8 mg/l

Acute and prolonged toxicity fish

Species: Rainbow trout (Oncorhynchus mykiss)

Exposure time: 96 h

Value type: NOEC

Value in standard unit mg/l: > 10 mg/l

Acute toxicity aquatic invertebrates

Species: Daphnia magna

Exposure time: 48 h

Value type: EC50

Value in standard unit mg/l: 97,9 mg/l

Acute toxicity aquatic invertebrates

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Species: Daphnia magna
Exposure time: 48 h
Value type: NOEC
Value in standard unit mg/l: > 97,9 mg/l

12.2. Persistence and degradability

No data available.

12.3. Bioaccumulative potential

Bioaccumulation
Accumulation in aquatic organisms is unlikely.

12.4. Mobility in soil

No data available.

12.5. Results of PBT and vPvB assessment

No data available.

12.6. Other adverse effects
Global Warming Potential GWP
Contains fluorinated greenhouse gases covered by the Kyoto protocol.
950

SECTION 13: Disposal considerations

13.1. Waste treatment methods
Avoid discharge to atmosphere. Do not discharge into any place where its accumulation could be dangerous. Contact supplier if guidance is required. Gases in pressure containers excluding those, which are mentioned under 16 05 04.
EWC Nr. 16 05 05

SECTION 14: Transport information

ADR/RID

14.1. UN number
3163

14.2. UN proper shipping name
Liquefied gas, n.o.s. (1,1,1,3,3 –Pentafluoropropane R245fa)

14.3. Transport hazard class(es)
Class: 2
Classification Code: 2A
Labels: 2.2
Hazard number: 20
Tunnel restriction code: (C/E)
Emergency Action Code: 2TE

14.4. Packing group (Packing Instruction)
P200

14.5. Environmental hazards
None.

14.6. Special precautions for user
None.

IMDG

14.1. UN number
3163

14.2. UN proper shipping name
Liquefied gas, n.o.s. (1,1,1,3,3 –Pentafluoropropane R245fa)

14.3. Transport hazard class(es)
Class: 2.2
Labels: 2.2
EmS: F-C,S-V

14.4. Packing group (Packing Instruction)
P200

14.5. Environmental hazards
None.

14.6. Special precautions for user
None.

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
Not applicable.

IATA

14.1. UN number
3163

14.2. UN proper shipping name
Liquefied gas, n.o.s. (1,1,1,3,3 –Pentafluoropropane R245fa)

14.3. Transport hazard class(es)
Class: 2.2
Labels: 2.2

14.4. Packing group (Packing Instruction)
P200

14.5. Environmental hazards
None.

14.6. Special precautions for user
None.

Other transport information
Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers ensure that they are firmly secured. Ensure that the cylinder valve is closed and not leaking. Ensure that the valve outlet cap nut or plug (where provided) is correctly fitted. Ensure that the valve protection device (where provided) is correctly fitted. Ensure adequate ventilation. Ensure compliance with applicable regulations.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture
Seveso Directive 96/82/EC: Not covered.

Other regulations
Regulation on Fluorinated greenhouse gases 842/2006/EC: Listed.

15.2. Chemical safety assessment
A CSA does not need to be carried out for this product.

SECTION 16: Other information

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Ensure all national/local regulations are observed. The hazard of asphyxiation is often overlooked and must be stressed during operator training. Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.

Advice

Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted. Details given in this document are believed to be correct at the time of going to press.

Further information

Note:

When using this document care should be taken, as the decimal sign and its position complies with rules for the structure and drafting of international standards, and is a comma on the line. As an example 2,000 is two (to three decimal places) and not two thousand, whilst 1.000 is one thousand and not one (to three decimal places).

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