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

Product name: R404A

REACH registration numbers:
- 1,1,1-Trifluoroethane: 01-2119492869-13
- Pentafluoroethane: 01-2119485636-25
- 1,1,1,2-Tetrafluoroethane: 01-2119459374-33

Company: Harp International Ltd
Gellihirion Industrial Estate
Pontypridd
Rhondda Cynon Taff
CF37 5SX
Tel: +44 (0) 1443 842255
Fax: +44 (0) 1443 841805
Email: harp@harpintl.com

Emergency phone number: +44 (0) 1270 502891 (24 hour)

Use: Refrigeration

2. Hazards identification

EC Classification:
- EC Directive 67/548/EEC: Not classified as hazardous

Label Elements:

Name on label: 1,1,1-Trifluoroethane (143a)
Pentafluoroethane (R125)
1,1,1,2-Tetrafluoroethane (R134a)

Hazard statement(s): H280: Contains gas under pressure; may explode if heated

Signal word(s): Warning

Hazard pictogram(s):

Precautionary statement(s):
Storage: P410 + P403: Protect from sunlight. Store in a well-ventilated place.
3. Composition / information on ingredients

Concentration

<table>
<thead>
<tr>
<th>Substance name</th>
<th>CAS No.</th>
<th>EC No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,1,1-Trifluoroethane (143a)</td>
<td>420-46-2</td>
<td>206-996-5</td>
<td>ca. 52%</td>
</tr>
<tr>
<td>Pentafluoroethane (R125)</td>
<td>354-33-6</td>
<td>206-557-8</td>
<td>ca. 44%</td>
</tr>
<tr>
<td>1,1,1,2-Tetrafluoroethane (R134a)</td>
<td>811-97-2</td>
<td>212-377-0</td>
<td>ca. 4%</td>
</tr>
</tbody>
</table>

Hazardous components according to Regulation (EC) 1272/2008 as amended

<table>
<thead>
<tr>
<th>Substance name</th>
<th>Hazard class</th>
<th>Hazard category</th>
<th>H Phrases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,1,1-Trifluoroethane (143a)</td>
<td>Flammable gases</td>
<td>Category 1</td>
<td>H220</td>
</tr>
<tr>
<td>Pentafluoroethane (R125)</td>
<td>Gases under pressure</td>
<td>Liquefied gas</td>
<td>H280</td>
</tr>
<tr>
<td>1,1,1,2-Tetrafluoroethane (R134a)</td>
<td>Gases under pressure</td>
<td>Liquefied gas</td>
<td>H280</td>
</tr>
</tbody>
</table>

Hazardous components according to European Directive 67/548/EEC or 1999/45/EC as amended

<table>
<thead>
<tr>
<th>Substance name</th>
<th>Classification</th>
<th>Hazard category</th>
<th>R-phrase(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,1,1-Trifluoroethane (143a)</td>
<td>F+</td>
<td>Extremely flammable</td>
<td>R12</td>
</tr>
</tbody>
</table>

4. First aid measures

Inhalation
Remove to fresh air. Oxygen or artificial respiration if needed. If symptoms persist, call a physician.

Skin contact
Allow to evaporate. Wash off with warm water. If symptoms persist, call a physician.

Eye contact
Immediately irrigate with eyewash solution or clean water, holding the eyelids apart for at least 10 minutes. Obtain immediate medical attention.

Ingestion
Unlikely route of exposure.

Most important symptoms/effects, acute and delayed

Inhalation
In case of higher concentrations: narcosis, asphyxia, may cause cardiac arrhythmia.

Skin contact
Contact with liquid or refrigerated gas can cause cold burns and frostbite. Prolonged skin contact may defat the skin and produce dermatitis.

Eye contact
Causes frostbite burns to eyes. Symptoms: Lachrymation, redness, swelling of tissue, frostbite, burn.

Ingestion
Gas. Not applicable.

5. Fire-fighting measures

Extinguishing media
Suitable extinguishing media
As appropriate for surrounding fire. Keep fire exposed containers cool by spraying with water.

Unsuitable extinguishing media
None.
6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel
Prevent further leakage or spillage if safe to do so
Keep away from incompatible products

Advice for emergency responders
Immediately evacuate personnel to safe areas
Keep people away from and upwind of spill/leak
Wear self-contained breathing apparatus and protective suit
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing
Suppress (knock down) gases/vapours/mists with a water spray jet
Avoid spraying the leak source
Ventilate area

Environmental precautions
Discharge into the environment must be avoided
Inform the responsible authorities in case of gas leakage or of entry into waterways, soil or drains

Methods and materials for containment and cleaning up
Allow to evaporate
Prevent product from entering drains

Reference to other sections
Refer to protective measures listed in sections 7 and 8.

7. Handling and storage

Precautions for safe handling
Use only in well-ventilated areas
Use only clean and dry utensils
Keep away from water
Preferably transfer by pump or gravity
Keep away from incompatible products

Conditions for storage, including incompatibilities

Storage
Keep only in the original container
Store in a receptacle equipped with a vent
Keep containers tightly closed in a cool, well-ventilated place
Keep in properly labelled containers
Keep in a bunded area
Keep away from heat/sparks/open flames/hot surfaces. No smoking.
Keep away from incompatible products

Packing material
Suitable material – steel cylinder

Specific use(s)
For further information, please contact supplier.
8. Exposure controls / personal protection

Control parameters

Exposure limit values

<table>
<thead>
<tr>
<th>Substance</th>
<th>Harp acceptable exposure limit</th>
<th>EH40 workplace exposure limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pentafluoroethane</td>
<td>TWA = 1000 ppm</td>
<td>Not listed</td>
</tr>
<tr>
<td>1,1,1-Trifluoroethane</td>
<td>TWA = 1000 ppm</td>
<td>Not listed</td>
</tr>
<tr>
<td>1,1,1,2-Tetrafluoroethane</td>
<td>TWA = 1000 ppm</td>
<td>TWA = 1000 ppm / 4240 mg/m³</td>
</tr>
</tbody>
</table>

Exposure controls

Appropriate engineering controls
Ensure adequate ventilation
Apply technical measures to comply with the occupational exposure limits

Respiratory protection
Self-contained breathing apparatus (EN 133)
Wear self-contained breathing apparatus in confined spaces, in cases where the oxygen level is depleted, or in case of significant emissions
Use only respiratory protection that conforms to international / national standards

Hand protection
Take note of the information given by the producer concerning permeability and break through times and of special workplace conditions (mechanical strain, duration of contact).
Protective gloves
Suitable material: Fluoroelastomer

Eye protection
Tightly fitted safety goggles

Skin and body protection
Wear suitable protective clothing
If splashes are likely to occur, wear: apron, boots, Neoprene

Hygiene measures
Eye wash bottles or eye wash stations in compliance with applicable standards
When using do not eat, drink or smoke
Gloves, overalls and boots have to be double layered (protection against cold temperature).
Handle in accordance with good industrial hygiene and safety practice

Environmental exposure controls
Dispose of rinse water in accordance with local and national regulations.

9. Physical and chemical properties

Form: Compressed liquefied gas
Colour: Colourless
Odour: Ether-like
pH: Neutral
pKa: Not applicable
Melting point/freezing point: -103°C (Pentafluoroethane)
Boiling point/boiling range: -46.7°C
Flash point: Not applicable
Evaporation rate: No data
Flammability (solid, gas): The product is not flammable
Flammability: Not applicable
Explosive properties
Not explosive

Vapour pressure
10.98 bar at 20°C
20.03 bar at 50°C

Vapour density
>3

Density
Not applicable

Bulk density
Not applicable

Solubility
430 mg/l at 25°C, water (pentafluoroethane)

Solubility/qualitative
No data available

Partition coefficient: n-octanol/water
log Pow: 1.48, 20°C (pentafluoroethane)

Auto-ignition temperature
728°C

Decomposition temperature
>700°C

Viscosity
Not applicable

Oxidizing properties
Non oxidizer

10. Stability and reactivity

Reactivity
Risk of violent reaction

Chemical stability
Stable under recommended storage conditions

Possibility of hazardous reactions
Strong oxidizers, alkali metals and alkaline earth metals may cause fires or explosions.
Vapours are heavier than air and may spread along floors

Conditions to avoid
Heat

Materials to avoid
Light and/or alkaline metals, powdered metals, alkaline earth metals, oxidising agents

Hazardous decomposition products
Gaseous hydrogen fluoride (HF), Fluorophosgene
The release of other hazardous decomposition products is possible

11. Toxicological information

Acute toxicity
Acute oral toxicity
Not applicable

Acute inhalation toxicity
LC50, 4 h, >2,030,000 mg/m3 (1,1,1-Trifluoroethane)
LC0, 4 h, rat, >80000 ppb (Pentafluoroethane)

Acute dermal toxicity
Not relevant

Skin corrosion
Not applicable

Serious eye damage/eye irritation
Not applicable

Respiratory or skin sensitization
Not applicable

Mutagenicity
In vitro tests did not show mutagenic effects (Pentafluoroethane)
In vivo tests did not show mutagenic effects (Pentafluoroethane)

Carcinogenicity
No data available

Toxicity for reproduction
No toxicity to reproduction (Pentafluoroethane)

Repeated dose toxicity
Inhalation, after a single exposure, dog, 10% w/w, risk of cardiac sensitization at high dose (Pentafluoroethane)
Inhalation, repeated exposure, rat, >=50000ppm, NOAEL (Pentafluoroethane)

Other information
No data available
12. Ecological information

Toxicity

<table>
<thead>
<tr>
<th>Species</th>
<th>LC50</th>
<th>96 h</th>
<th>&gt;200 mg/l</th>
<th>1,1,1,3,3-pentafluorobutane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fishes</td>
<td>Brachydanius rerio</td>
<td>96 h</td>
<td>Ca. 200 mg/l</td>
<td>1,1,1,3,3-pentafluorobutane</td>
</tr>
<tr>
<td>Fishes</td>
<td>Various species</td>
<td>96 h</td>
<td>109 mg/l</td>
<td>1,1,1-Trifluoroethane</td>
</tr>
<tr>
<td>Crustaceans</td>
<td>Daphnia magna</td>
<td>48 h</td>
<td>&gt;200 mg/l</td>
<td>1,1,1,3,3-pentafluorobutane</td>
</tr>
<tr>
<td>Crustaceans</td>
<td>Various species</td>
<td>48 h</td>
<td>200 mg/l</td>
<td>1,1,1-Trifluoroethane</td>
</tr>
<tr>
<td>Crustaceans</td>
<td>Daphnia magna</td>
<td>48 h</td>
<td>300 mg/l</td>
<td>1,1,1-Trifluoroethane</td>
</tr>
<tr>
<td>Algae</td>
<td>Selenastrum capricornutum</td>
<td>72 h</td>
<td>13.2 mg/l</td>
<td>1,1,1-trifluoroethane</td>
</tr>
<tr>
<td>Algae</td>
<td>Various species</td>
<td>72 h</td>
<td>&gt;114 mg/l</td>
<td>1,1,1-trifluoroethane</td>
</tr>
<tr>
<td>Terrestrial plants</td>
<td>NOEC growth</td>
<td>&gt;=6 g/m&lt;sup&gt;3&lt;/sup&gt;</td>
<td>1,1,1,3,3-pentafluorobutane</td>
<td></td>
</tr>
</tbody>
</table>

Persistence and degradability

Abiotic degradation


Water, Result: non-significant hydrolysis

Biodegradation

Aerobic, tested according to closed bottle test, degradation, 5% after 28 d. Result: not readily biodegradable (Pentafluoroethane)

Bioaccumulative potential

Bioaccumulative potential: log Pow 1.48. Result: does not bioaccumulate (Pentafluoroethane)

Mobility

Soil/sediments, adsorption, log KOC: from 1.3 – 2.3. Conditions: calculated value

Air, Henry’s law constant (H), from 65 – 185 kPa.m<sup>3</sup>/mol, 20°C. Conditions: calculated value, considerable volatility

Other adverse effects

Ozone depletion potential = 0
Result = no effect on stratospheric ozone
Ozone depletion potential; ODP; (R11 = 1) (Pentafluoroethane)
Global Warming Potential = 0.94
Halocarbon global warming potential; HGWP; (R11 = 1)

13. Disposal considerations

Waste disposal methods

In accordance with local and national regulations
Refer to manufacturer/supplier for information on recovery/recycling

Contaminated packaging

To avoid treatments, as far as possible, use dedicated containers

14. Transport information

International transport regulations

IATA-DGR

UN number: UN 3337
Class: 2.2
ICAO-Labels: 2.2 - Non-flammable, non-toxic gas
Proper shipping name: REFRIGERANT GAS R404A
SAFETY DATA SHEET

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IMDG
UN number               UN 3337
Class                    2.2
IMDG-Labels          2.2 - Non-flammable, non-toxic gas
HI/UN No.              3337
EnS                      F-C, S-V
Proper shipping name     REFRIGERANT GAS R404A

ADR
UN number               UN 3337
Class                    2
ADR/RID Labels          2.2 - Non-flammable, non-toxic gas
HI/UN No.              20 / 3337
Proper shipping name     REFRIGERANT GAS R404A

RID
UN number               UN 3337
Class                    2
ADR/RID Labels          2.2 - Non-flammable, non-toxic gas
HI/UN No.              20 / 3337
Proper shipping name     REFRIGERANT GAS R404A

ADN
UN number               UN 3337
Class                    2
ADR/RID Labels          2.2 – Non-flammable, non-toxic gas
Proper shipping name     REFRIGERANT GAS R404A

15. Regulatory information
Applicable Laws or Regulations
- EH40/2005 Workplace Exposure Limits, as amended through 1, 10, 2007 (WEL’s) published by the Health and Safety Executive (HSE). Issued under the Control of Substances Hazardous to Health Regulations, as amended

Notification status

<table>
<thead>
<tr>
<th>Inventory information</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australian Inventory of Chemical Substances (AICS)</td>
<td>In compliance with inventory</td>
</tr>
<tr>
<td>Canadian Domestic Substances List (DSL)</td>
<td>In compliance with inventory</td>
</tr>
<tr>
<td>Inventory of Existing Chemical Substances (China) (IECS)</td>
<td>In compliance with inventory</td>
</tr>
<tr>
<td>Japanese Existing and New Chemical Substances (MITI List) (ENCS)</td>
<td>In compliance with inventory</td>
</tr>
<tr>
<td>New Zealand Inventory of Chemicals (NZIOC)</td>
<td>In compliance with inventory</td>
</tr>
<tr>
<td>Toxic Substance Control Act List (TSCA)</td>
<td>In compliance with inventory</td>
</tr>
<tr>
<td>EU List of Existing Chemical Substances (EINECS)</td>
<td>In compliance with inventory</td>
</tr>
<tr>
<td>Korean Existing Chemicals Inventory (KECI (KR))</td>
<td>In compliance with inventory</td>
</tr>
<tr>
<td>Philippine Inventory of Chemicals and Chemical Substances (PICCS)</td>
<td>In compliance with inventory</td>
</tr>
</tbody>
</table>
16. Other information

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

Full text of R-phrases referred to under sections 2 and 3
R12 Extremely flammable

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

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