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

1.1. Product identifier

R410A

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

Use of the substance/mixture

Reserved for industrial and professional use.
Coolants for air conditioning systems and heat pumps in the low power range.

Uses advised against

Only use for the intended purpose. In case of doubt please contact our responsible department.

1.3. Details of the supplier of the safety data sheet

Company name: Arthur Friedrichs Kältemittel GmbH
Street: Bei den Kämpen 22
Place: D-21220 Seevetal
Telephone: +49 (0)41 85 / 70 01-0
Contact person: Abteilung Technik
Telefax: +49 (0)41 85 / 70 01-22
e-mail: service@afk-hh.de
Internet: www.afk-hh.de

1.4. Emergency telephone number

Poison Control Center (Mayence, GER):
+49 (0)6131-19240 (24h - de, en)

Emergency Action: In the event of a medical enquiry involving this product, please contact your doctor or local hospital accident and emergency department or the NHS enquiry service.

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Regulation (EC) No. 1272/2008

Hazard categories:
Gases under pressure: Liquefied gas

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

2.2. Label elements

Regulation (EC) No. 1272/2008

Signal word: Warning

Pictograms:

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

P260  Do not breathe Gas.
P280  Wear Protection gloves, Eye protection.
P284  Wear respiratory protection.
P308+P313  IF exposed or concerned: Get medical advice/attention.
P410+P403  Protect from sunlight. Store in a well-ventilated place.

2.3. Other hazards

Frostbite and burns through contact with liquefied product. Inhalation of high concentrations of gases can have health impairing effects due to the reduced oxygen content. Suffocating in high concentrations. Misuse or intentional inhalation can be fatal as a result of effects on the heart, without alarming symptoms. Following inhalation: disordered cardiac rhythm.

Contains the following fluorinated greenhouse gas recorded in the Kyoto Protocol (chemical name):
pentafluoroethane, difluoromethane

The components in this formulation do not meet the criteria for classification as PBT or vPvB. An environmental hazard cannot be ruled out in case of improper handling or disposal.

SECTION 3: Composition/information on ingredients

3.2. Mixtures

Hazardous components

<table>
<thead>
<tr>
<th>CAS No</th>
<th>Chemical name</th>
<th>EC No</th>
<th>Index No</th>
<th>REACH No</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>354-33-6</td>
<td>pentafluoroethane</td>
<td></td>
<td></td>
<td></td>
<td>&gt;=25 - &lt;50 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>206-557-8</td>
<td></td>
<td>01-2119485636-25</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Liquefied gas; H280</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>75-10-5</td>
<td>difluoromethane</td>
<td></td>
<td></td>
<td></td>
<td>&gt;=25 - &lt;50 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>200-839-4</td>
<td></td>
<td>01-2119471312-47</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flam. Gas 1, Liquefied gas; H220 H280</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Full text of H and EUH statements: see section 16.
SECTION 4: First aid measures

4.1. Description of first aid measures

General information
First aider: Pay attention to self-protection!

After inhalation
Move victim to fresh air. Put victim at rest and keep warm. Call a physician immediately. In case of irregular breathing or respiratory arrest, perform artificial respiration.

After contact with skin
Wash with plenty of water. Change contaminated clothing. In the event of cold damage due to contact with liquid gas, cut open and carefully remove clothing. Leave clothing stuck to the skin for the moment. Rinse the cold-damaged areas with warm (not hot) water. Do not move (no rubbing). Sterile covering, protect against further heat loss. Call a physician immediately.

After contact with eyes
Rinse immediately carefully and thoroughly with eye-bath or water. In case of frostbite due to direct contact with liquid gas escaping from the pressure container, firstly leave any contact lenses worn. Consult an ophthalmologist.

After ingestion
Not considered as a possible means of exposure.

4.2. Most important symptoms and effects, both acute and delayed
Frostbite and burns through contact with liquefied product. On inhalation of the concentrated gas: oxygen deficiency. Misuse or intentional inhalation can be fatal as a result of effects on the heart, without alarming symptoms.

Symptoms in the event of large scale exposure: unconsciousness, difficulty in breathing, agitation, headache, nausea, drowsiness, dizziness.

4.3. Indication of any immediate medical attention and special treatment needed
Treat symptomatically. To supervise the blood circulation. Do not give adrenaline or other stimulants.
SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media
Co-ordinate fire-fighting measures to the fire surroundings.

Unsuitable extinguishing media
High power water jet.

5.2. Special hazards arising from the substance or mixture
This coolant is not flammable under normal conditions. Certain coolant/air mixtures can be flammable under increased pressure. Certain HFC mixtures and chlorine can be flammable and react with one another under certain conditions. Heating causes rise in pressure with risk of bursting.
In case of fire may be liberated: Carbon dioxide. Carbon monoxide. Halogen hydride. Pyrolysis products containing fluorine.

5.3. Advice for firefighters
In case of fire: Wear self-contained breathing apparatus. Full protective suit.

Additional information
Use water spray jet to protect personnel and to cool endangered containers. If possible, stop the escape of gas.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
Remove all sources of ignition. Provide adequate ventilation.
Clear the area. Keep away from unprotected people. Keep upwind.

6.2. Environmental precautions
Avoid environmental exposure. If possible, stop the escape of gas. Do not allow to enter into surface water or drains. Do not allow to enter into soil/subsoil. Do not allow to enter underground levels or inspection pits as vapours can generate a suffocating atmosphere.

6.3. Methods and material for containment and cleaning up
Ventilate affected area.

6.4. Reference to other sections
Personal protection equipment: see section 8
Handling and storage: see section 7
For waste disposal see section 13.
SECTION 7: Handling and storage

7.1. Precautions for safe handling

Advice on safe handling
Use only in well-ventilated areas. Vapours are heavier than air and will spread at floor level. Do not breathe gas/vapour. Avoid contact with skin, eyes and clothes. Transfer and handle product only in closed systems. Take precautionary measures against static discharges. Ground and bond container and receiving equipment. Use only antistatically equipped (spark-free) tools. Protect pressurised gas bottles against overturning. The ventilation protection equipment, valve closing nut or the valve plug (if applicable) must be mounted correctly. Open valves slowly to avoid pressure surges. Prevent backflow into the gas container. No water in the gas container, allow access to valves, flange and other parts of equipment.

Advice on protection against fire and explosion
Keep away from sources of ignition - No smoking. Take precautionary measures against static discharges. This coolant is not flammable under normal conditions. Certain coolant/air mixtures can be flammable under increased pressure. Certain HFC mixtures and chlorine can be flammable and react with one another under certain conditions.

7.2. Conditions for safe storage, including any incompatibilities

Requirements for storage rooms and vessels
Keep container tightly closed. Keep in a cool, well-ventilated place. Keep away from sources of ignition - No smoking. Avoid heating. Protect against direct sunlight.

Advice on storage compatibility
Do not store together with: self-igniting, flammable, explosive, infectious, radioactive, toxic, oxidising substances

Further information on storage conditions
Protect pressurised gas bottles against overturning. The ventilation protection equipment, valve closing nut or the valve plug (if applicable) must be mounted correctly. Storage temperature: <50°C

7.3. Specific end use(s)

Reserved for industrial and professional use. Coolants for air conditioning systems and heat pumps in the low power range.
### SECTION 8: Exposure controls/personal protection

#### 8.1. Control parameters

**DNEL/DMEL values**

<table>
<thead>
<tr>
<th>CAS No</th>
<th>Substance</th>
<th>DNEL type</th>
<th>Exposure route</th>
<th>Effect</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>354-33-6</td>
<td>pentafluoroethane</td>
<td>Worker DNEL, long-term</td>
<td>inhalation</td>
<td>systemic</td>
<td>16444 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consumer DNEL, long-term</td>
<td>inhalation</td>
<td>systemic</td>
<td>1753 mg/m³</td>
</tr>
<tr>
<td>75-10-5</td>
<td>difluoromethane</td>
<td>Worker DNEL, long-term</td>
<td>inhalation</td>
<td>systemic</td>
<td>7035 mg/m³</td>
</tr>
</tbody>
</table>

**PNEC values**

<table>
<thead>
<tr>
<th>Substance</th>
<th>Environmental compartment</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pentafluoroethane</td>
<td>Freshwater</td>
<td>0,1 mg/l</td>
</tr>
<tr>
<td></td>
<td>Freshwater (intermittent releases)</td>
<td>1 mg/l</td>
</tr>
<tr>
<td></td>
<td>Freshwater sediment</td>
<td>0,6 mg/kg</td>
</tr>
<tr>
<td>difluoromethane</td>
<td>Freshwater</td>
<td>0,142 mg/l</td>
</tr>
<tr>
<td></td>
<td>Freshwater (intermittent releases)</td>
<td>1,42 mg/l</td>
</tr>
<tr>
<td></td>
<td>Freshwater sediment</td>
<td>0,534 mg/kg</td>
</tr>
</tbody>
</table>

#### 8.2. Exposure controls

**Appropriate engineering controls**

Provide adequate ventilation as well as local exhaustion at critical locations. If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn. Transfer and handle product only in closed systems.

**Protective and hygiene measures**

Change contaminated clothing. Wash hands before breaks and after work. When using do not eat or drink. When using do not smoke.

**Eye/face protection**

Use framed glasses with side shields. Wear additional facial protection if facial contact with this substance is possible through splashing, spraying or material in the air.

**Hand protection**

Use leather gloves to protect against injuries in handling compressed gas cylinders and against frostbite from rapidly expanding gas.

**Skin protection**

Safety boots with steel toecap. Work clothing covering the entire body.
Respiratory protection

Only required in exceptional situations, e.g. in case of inadvertent release of substances, for maintenance work in storage containers or in case of fire: Protective respiration apparatus not using surrounding air (breathing apparatus) (DIN EN 133).
### 9.1. Information on basic physical and chemical properties

- **Physical state:** gaseous, pressure liquefied
- **Colour:** colourless
- **Odour:** like: Ether

#### Test method

- **pH-Value:** neutral

#### Changes in the physical state

- **Melting point:** No data available
- **Initial boiling point and boiling range:** -48.5 °C
- **Sublimation point:** No data available
- **Softening point:** No data available
- **Flash point:** not applicable

#### Flammability

- **Solid:** not applicable
- **Gas:** No data available

#### Explosive properties

- **No data available**

- **Lower explosion limits:** not applicable
- **Upper explosion limits:** not applicable
- **Ignition temperature:** No data available

#### Auto-ignition temperature

- **Solid:** not applicable
- **Gas:** No data available

#### Decomposition temperature

- **No data available**

#### Oxidizing properties

- **No data available**

#### Vapour pressure

- **(at 21,1 °C):** 14844 hPa
- **(at 54,4 °C):** 33798 hPa

#### Density

- **(at 21,1 °C):** 1.08 g/cm³
- **Bulk density:** not applicable

#### Water solubility

- **1.5 g/L**
Solubility in other solvents
No data available

Partition coefficient: No data available
Viscosity / dynamic: No data available
Vapour density: 3
Evaporation rate: >1

9.2. Other information
No further information available.

SECTION 10: Stability and reactivity

10.1. Reactivity
No dangerous reactivity under regular conditions.

10.2. Chemical stability
The product is stable under regular conditions.

10.3. Possibility of hazardous reactions

10.4. Conditions to avoid
Avoid having contact with excessive heat, open flames, sparks or sources of ignition.
This coolant is not flammable under normal conditions. Certain coolant/air mixtures can be flammable under increased pressure. Certain HFC mixtures and chlorine can be flammable and react with one another under certain conditions.

10.5. Incompatible materials

10.6. Hazardous decomposition products
SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity

Based on available data, the classification criteria are not met.

<table>
<thead>
<tr>
<th>CAS No</th>
<th>Chemical name</th>
<th>Exposure route</th>
<th>Dose</th>
<th>Species</th>
<th>Source</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>354-33-6 pentafluoroethane</td>
<td>inhalative (4 h) gas LC50</td>
<td>&gt;800000 ppm</td>
<td>Rat</td>
<td>OECD 403</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75-10-5 difluoromethane</td>
<td>inhalative (4 h) gas LC50</td>
<td>&gt;520000 ppm</td>
<td>Rat</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Irritation and corrosivity

Based on available data, the classification criteria are not met.

Sensitising effects

Based on available data, the classification criteria are not met.

Carcinogenic/mutagenic/toxic effects for reproduction

Based on available data, the classification criteria are not met.

STOT-single exposure

Based on available data, the classification criteria are not met.

STOT-repeated exposure

Based on available data, the classification criteria are not met.

Aspiration hazard

Based on available data, the classification criteria are not met.

Further information

Can cause frostbite. Suffocating in high concentrations. Inhalation causes narcotic effects/intoxication.
### SECTION 12: Ecological information

#### 12.1. Toxicity

<table>
<thead>
<tr>
<th>CAS No</th>
<th>Chemical name</th>
<th>Aquatic toxicity</th>
<th>Dose</th>
<th>[h]</th>
<th>[d]</th>
<th>Species</th>
<th>Source</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>354-33-6</td>
<td>pentafluoroethane</td>
<td>Acute fish toxicity</td>
<td>LC50</td>
<td>450 mg/l</td>
<td>96 h</td>
<td>Oncorhynchus mykiss (Rainbow trout)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute algae toxicity</td>
<td>ErC50</td>
<td>142 mg/l</td>
<td>96 h</td>
<td>algae</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute crustacea toxicity</td>
<td>EC50</td>
<td>980 mg/l</td>
<td>48 h</td>
<td>Daphnia magna (Big water flea)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75-10-5</td>
<td>difluoromethane</td>
<td>Acute fish toxicity</td>
<td>LC50</td>
<td>1507 mg/l</td>
<td>96 h</td>
<td>fish</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute algae toxicity</td>
<td>ErC50</td>
<td>142 mg/l</td>
<td>96 h</td>
<td>algae</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute crustacea toxicity</td>
<td>EC50</td>
<td>652 mg/l</td>
<td>48 h</td>
<td>Daphnia magna (Big water flea)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fish toxicity</td>
<td>NOEC</td>
<td>65,8</td>
<td>30 d</td>
<td>fish</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 12.2. Persistence and degradability

No data available.

#### 12.3. Bioaccumulative potential

No data available.

#### 12.4. Mobility in soil

No data available.

#### 12.5. Results of PBT and vPvB assessment

The components in this mixture do not meet the criteria for classification as PBT or vPvB.

#### 12.6. Other adverse effects

Global Warming potential (GWP): 1975

The product does not decompose ozone.

### Further information

An environmental hazard cannot be ruled out in case of improper handling or disposal. Avoid release to the environment.

### SECTION 13: Disposal considerations

#### 13.1. Waste treatment methods

**Advice on disposal**

Dispose of waste according to applicable legislation.

**Waste disposal number of waste from residues-unused products**

140601 WASTE ORGANIC SOLVENTS, REFRIGERANTS AND PROPELLANTS (EXCEPT 07 AND 08); waste organic solvents, refrigerants and foam/aerosol propellants; chlorofluorocarbons, HCFC, HFC; hazardous waste
Contaminated packaging

Transportable pressure equipment (empty, residual pressure): return to the supplier/manufacturer.
SECTION 14: Transport information

Land transport (ADR/RID)

14.1. UN number: UN 3163
14.2. UN proper shipping name: LIQUEFIED GAS, N.O.S. (pentafluoroethane, difluoromethane)
14.3. Transport hazard class(es): 2
14.4. Packing group: -
Hazard label: 2.2

Classification code: 2A
Special Provisions: 274 662
Limited quantity: 120 mL
Excepted quantity: E1
Transport category: 3
Hazard No: 20
Tunnel restriction code: C/E

Inland waterways transport (ADN)

14.1. UN number: UN 3163
14.2. UN proper shipping name: LIQUEFIED GAS, N.O.S. (pentafluoroethane, difluoromethane)
14.3. Transport hazard class(es): 2
14.4. Packing group: -
Hazard label: 2.2

Classification code: 2A
Special Provisions: 274 662
Limited quantity: 120 mL
Excepted quantity: E1
Marine transport (IMDG)

14.1. UN number: UN 3163
14.2. UN proper shipping name: LIQUEFIED GAS, N.O.S. (pentafluoroethane, difluoromethane)
14.3. Transport hazard class(es): 2.2
14.4. Packing group: -
Hazard label: 2.2

Special Provisions:
- Limited quantity: 120 mL
- Excepted quantity: E1
- EmS: F-C, S-V

Air transport (ICAO-TI/IATA-DGR)

14.1. UN number: UN 3163
14.2. UN proper shipping name: LIQUEFIED GAS, N.O.S. (pentafluoroethane, difluoromethane)
14.3. Transport hazard class(es): 2.2
14.4. Packing group: -
Hazard label: 2.2

- Limited quantity Passenger: -
- Passenger LQ: -
- Excepted quantity: E1
- IATA-packing instructions - Passenger: 200
- IATA-max. quantity - Passenger: 75 kg
- IATA-packing instructions - Cargo: 200
- IATA-max. quantity - Cargo: 150 kg

14.5. Environmental hazards
ENVIRONMENTALLY HAZARDOUS: no

14.6. Special precautions for user
Follow the information given in the safety datasheet.
Prior to transport: Secure container. Ensure cylinder valve is closed and not leaking. The valve outlet cap nut or plug (where provided) is correctly fitted. The valve protection device (where provided) is correctly fitted. Provide adequate ventilation.

14.7. Transport in bulk according to Annex II of Marpol and the IBC Code
not applicable
SECTION 15: Regulatory information

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

EU regulatory information

Additional information

Regulation (EC) No. 648/2004 (Detergents regulation): not applicable
Regulation (EC) No. 1005/2009 on substances that lead to the depletion of the ozone layer: not applicable
Regulation (EC) No 850/2004 on persistent organic pollutants: not applicable
Regulation (EC) No 689/2008 of the European Parliament and of the Council concerning the export and import of dangerous chemicals: This mix contains no chemicals that are subject to the export notification procedures (annex 1).
This mixture contains the following substances of very high concern (SVHC) which are included in the Candidate List according to Article 59 of REACH: none
This mixture contains the following substances of very high concern (SVHC) which are subject to authorisation according to Annex XIV of REACH: none

National regulatory information

Employment restrictions: Observe restrictions to employment for juvenils according to the 'juvenile work protection guideline' (94/33/EC). Observe employment restrictions under the Maternity Protection Directive (92/85/EEC) for expectant or nursing mothers. Observe employment restrictions for women of child-bearing age.

Water contaminating class (D): 1 - slightly water contaminating

Additional information

TRGS 510 "Lagerung von Gefahrstoffen in ortsbeweglichen Behältern"
BGR 500 "Betreiben von Arbeitsmitteln" - Kapitel 2.33 "Anlagen für den Umgang mit Gasen"
BGV D34 "Verwendung von Flüssiggas"

15.2. Chemical safety assessment

For the following substances of this mixture a chemical safety assessment has been carried out:
pentafluoroethane
difluoromethane
SECTION 16: Other information

Changes
This data sheet contains changes from the previous version in section(s): 1,2,5,7,8,12,14,15,16.
Version 1.00 - 14.08.2013 - Creation
Version 1.01 - 12.03.2014 - Adaption and completion due to actual informations of the supplier.
Version 1.02 - 17.11.2016 - General update
Version 1.03 - 15.05.2017 - changes in section 2

Abbreviations and acronyms
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
CAS: Chemical Abstracts Service
DIN: Norm of the Deutsche Institut für Normung (German Institute for Standardization)
EC: Effective Concentration
EG: European Community (Europäische Gemeinschaft)
EN: European Norm
IATA: International Air Transport Association
IBC Code: International Code for the Construction and Equipment of ships carrying Dangerous Chemicals in Bulk
ICAO: International Civil Aviation Organization
IMDG: International Maritime Code for Dangerous Goods
ISO: Norm of the International Standards Organization
CLP: Classification, Labeling, Packaging
IUCLID: International Uniform Chemical Information Database
LC: Lethal concentration
LD: Lethal dose
log Kow: Octanol/water partition coefficient
MARPOL: Maritime Pollution Convention = Convention for the Prevention of Maritime Pollution from Ships
OECD: Organisation for Economic Co-operation and Development
PBT: Persistent, bio-cumulative, toxic
RID: Regulation Concerning the International Transport of Dangerous Goods by Rail
TRGS: Technische Regeln für Gefahrstoffe
UN: United Nations
VOC: Volatile Organic Compounds
vPvB: very persistent and very bio-cumulative
VvWvS: Administrative Regulation for Water Pollutants
WGK: German Water Hazard Class
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
DNEL: Derived No Effect Level
PNEC: Predicted No Effect Concentration
TLV: Threshold Limiting Value
STOT: Specific Target Organ Toxicity
### Classification for mixtures and used evaluation method according to Regulation (EC) No. 1272/2008 [CLP]

<table>
<thead>
<tr>
<th>Classification</th>
<th>Classification procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquefied gas; H280</td>
<td>On basis of test data</td>
</tr>
</tbody>
</table>

**Relevant H and EUH statements (number and full text)**

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

**Further Information**

The information given in this safety data sheet is to describe the product's safety regulations. It is not for guaranteeing certain characteristics and is based on today's knowledge. The safety data sheet was generated upon information of pre-suppliers by:

REACHECK Solutions GmbH, Frohsinnstraße 28, 63739 Aschaffenburg, Germany  
Phone: +49 (0)6021 - 1 50 86-0, Fax: +49 (0)6021 - 1 50 86-77, E-Mail: eu-sds@reacheck.eu,  
www.reacheck.eu

*(The data for the hazardous ingredients were taken respectively from the last version of the sub-contractor's safety data sheet.)*