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

1.1. Product identifier
Name of product R 410A
Art-Nr(n).: 0028

1.2. Relevant identified uses of the substance or mixture and uses advised against
Recommended intended purpose(s)
Refrigerant.

1.3. Details of the supplier of the safety data sheet
Manufacturer/distributor GHC Gerling, Holz & Co. Handels GmbH
Ruhrstraße 113, D-22761 Hamburg
Phone +49 40 853 123-0, Fax +49 40 853 123-66
E-Mail hamburg@ghc.de
Internet www.ghc.de

Advice GHC Gerling, Holz & Co. Handels GmbH
Phone +49 40 853 123-0
Fax +49 40 853 123-66
E-mail (competent person): msds@ghc.de

1.4. Emergency telephone number
Emergency advice Giftinformationszentrum (Poison Control Centre) Mainz
Phone +49 6131 19240

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture
Classification according to 67/548/EEC or 1999/45/EC
no

R-phrases no

Additional hints
The preparation is not classified as hazardous according to Directive 1999/45/EC.

Classification according to Regulation (EC) No 1272/2008 [CLP/GHS]

<table>
<thead>
<tr>
<th>Hazard classes and Hazard categories</th>
<th>Hazard Statements</th>
</tr>
</thead>
</table>
| Liquef. Gas H280                     | Contains gas under pressure; may explode if heated.

2.2. Label elements
Labelling according to Regulation (EC) No 1272/2008 [CLP/GHS]

GHS04

Signal word
Warning

Hazard statements for physical hazards
H280 Contains gas under pressure; may explode if heated.

Precautionary Statements

Storage
P403 Store in a well-ventilated place.

Hazardous ingredients for labeling
Difluoromethane (R 32), Pentafluoroethane (R 125)

Supplemental Hazard information (EU)

Health properties
Asphyxiant in high concentrations.

Environmental properties
Contains fluorinated greenhouse gases covered by the Kyoto Protocol.

Special rules for supplemental label elements for certain mixtures
Withdrawal out of the liquid phase only.

2.3. Other hazards
Adverse human health effects and symptoms
Contact with liquid may cause cold burns/frostbite.
The inhalation of gas/vapour in high concentrations may cause cardiac arrhythmia.
Misuse or intentional inhalation abuse may cause death without warning symptoms, due to cardiac effects.

Information pertaining to special dangers for human and environment
Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

Results of PBT and vPvB assessment
The substances in this mixture do not meet the PBT/vPvB criteria of REACH, annex XIII.

SECTION 3: Composition/ information on ingredients

3.1. Substances
not applicable

3.2. Mixtures
Hazardous ingredients

<table>
<thead>
<tr>
<th>CAS No</th>
<th>EC No</th>
<th>Name</th>
<th>[% weight]</th>
<th>Classification according to 67/548/EEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>354-33-6</td>
<td>206-557-8</td>
<td>Pentafluoroethane (R 125)</td>
<td>49,5 - 51,5</td>
<td>F+; R 12</td>
</tr>
<tr>
<td>75-10-5</td>
<td>200-839-4</td>
<td>Difluoromethane (R 32)</td>
<td>48,5 - 50,5</td>
<td></td>
</tr>
</tbody>
</table>
Hazardous ingredients (continued)

<table>
<thead>
<tr>
<th>CAS No</th>
<th>EC No</th>
<th>Name</th>
<th>[% weight]</th>
<th>Classification according to Regulation (EC) No 1272/2008 [CLP/GHS]</th>
</tr>
</thead>
<tbody>
<tr>
<td>354-33-6</td>
<td>206-557-8</td>
<td>Pentafluoroethane (R 125)</td>
<td>49,5 - 51,5</td>
<td>Liq. Gas, H280</td>
</tr>
<tr>
<td>75-10-5</td>
<td>200-839-4</td>
<td>Difluoromethane (R 32)</td>
<td>48,5 - 50,5</td>
<td>Flam.Gas1, H220 / Liq.Gas, H280</td>
</tr>
</tbody>
</table>

REACH

<table>
<thead>
<tr>
<th>CAS No</th>
<th>Name</th>
<th>REACH registration number</th>
</tr>
</thead>
<tbody>
<tr>
<td>354-33-6</td>
<td>Pentafluoroethane (R 125)</td>
<td>01-219485636-25</td>
</tr>
<tr>
<td>75-10-5</td>
<td>Difluoromethane (R 32)</td>
<td>01-219471312-47</td>
</tr>
</tbody>
</table>

Additional advice

The text of the R-phrases is shown in section 16.
The text of the H-phrases is shown in section 16.
Contains fluorinated greenhouse gases covered by the Kyoto Protocol.

SECTION 4: First aid measures

4.1. Description of first aid measures

General information
Remove contaminated soaked clothing immediately.
In the event of persistent symptoms receive medical treatment.
Adhere to personal protective measures when giving first aid.

In case of inhalation
Remove the casualty into fresh air and keep him immobile.
Seek medical treatment immediately.
In case of respiratory standstill give artificial respiration by respiratory bag (Ambu bag) or respirator. Send for a doctor.

In case of skin contact
In case of contact with skin wash off with warm water.
In case of frostbite rinse with plenty of water. Don’t remove clothing.
In case of frostbite spray with lukewarm (not hot) water for at least 15 minutes. Apply a sterile dressing. Obtain medical assistance.

In case of eye contact
Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Call for a doctor immediately.

In case of ingestion
Ingestion is not considered a potential route of exposure.

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

Physician's information / possible symptoms
The following symptoms may occur in case of strong exposition:
Cardiac arrhythmia (disordered cardiac rhythm).
Shortness of breath
Anaesthetic state
Headache
Nausea
Dizziness
Contact with liquid may cause cold burns/frostbite.

Physician's information / possible dangers
Long-term inhaling of separation products may cause pulmonary oedema.
4.3. Indication of any immediate medical attention and special treatment needed

Treatment (Advice to doctor)

- Treat symptoms.
- Do not give any preparations of the adrenalin-ephedrine group.

SECTION 5: Firefighting measures

5.1. Extinguishing media

- Suitable extinguishing media
  
  Product does not burn, fire-extinguishing activities according to surrounding.

- Unsuitable extinguishing media
  
  Full water jet

5.2. Special hazards arising from the substance or mixture

- In case of fire formation of dangerous gases possible.
- Formation of explosive gas mixtures in air.
- Carbon monoxide (CO)
- Hydrogen fluoride (HF)
- Carbonyl fluoride.

5.3. Advice for firefighters

- Special protective equipment for fire-fighters
  
  Use breathing apparatus with independent air supply (isolated).
  
  Wear full protective clothing.

- Additional information
  
  Cool endangered containers with water spray jet.
  
  Exposure to fire may cause containers to rupture / explode.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel
  
  See chapter 8.
  
  Evacuate area.

- For emergency responders
  
  Remove persons to safety.
  
  Personal protection by wearing close-fitting protective clothing and breathing apparatus.
  
  Keep people away and stay on the upwind side.

6.2. Environmental precautions

- If possible, stop flow of product.
- Do not discharge into the drains/surface waters/groundwater.
- Prevent spread over a wide area (e.g. by containment or oil barriers).
- Do not discharge into the subsoil/soil.

6.3. Methods and material for containment and cleaning up

- Ensure adequate air ventilation.
  
  Allow to vaporise.

6.4. Reference to other sections

- Safe handling: see section 7
- Disposal: see section 13
- Personal protection equipment: see section 8
SECTION 7: Handling and storage

7.1. Precautions for safe handling

Advice on safe handling
Use only in thoroughly ventilated areas.
Transfer and handle only in enclosed systems.
Containers’ temperature may not be increased above 50 °C.
Do not heat with open flames.
The working pressure in the receptacle must not exceed the saturation vapour pressure of the pure product resulting at a temperature of 50 °C.
Provide good room ventilation even at ground level (vapours are heavier than air).
Prevent cylinders from falling over.
Avoid release to the environment.
Ensure valve protection device is correctly fitted.
Ensure valve outlet cap nut or plug (where provided) is correctly fitted.
Open valve slowly to avoid pressure shock.
Do not allow backfeed into the container.
Suck back of water into the container must be prevented.
No water to valves, flanges and other fittings.
Purging of pipes and valves with inert gases - to avoid: water, solvents.

General protective measures
Do not inhale gases/vapours/aerosols.

Hygiene measures
At work do not eat, drink and smoke.

Advice on protection against fire and explosion
The product is not flammable in air under ambient conditions of temperature and pressure. When pressurised with air, oxygen or other oxidants, it may become flammable.
Pay attention to general rules of internal fire prevention.

7.2. Conditions for safe storage, including any incompatibilities

Requirements for storage rooms and vessels
Keep in closed original container.
Ventilate store-rooms thoroughly.
Use transportable pressure equipment.
Suitable materials: Normalised steel and carbon steel, tempered steel, aluminium alloys, stainless steel.
Valve: Suitable materials: Brass, copper alloys, carbon steels, aluminium alloys, stainless steel.

Advice on storage compatibility
Do not store with spontaneously flammable materials.
Do not store together with combustible liquids or combustible solids.
Do not store together with animal feedstuffs.
Do not store together with explosives.
Do not store together with infectious substances.
Do not store together with radioactive material.
Do not store together with toxic liquids or toxic solids.
Do not store together with food.
Do not store together with oxidizing liquids or oxidizing solids.

Further information on storage conditions
Store closed container at cool and aired place.
Store only in original container at temperature of 50°C maximum (=122°F).
Prevent cylinders from falling over.
Protect of heat.
7.3. Specific end use(s)
Recommendation(s) for intended use
See section 1.2
Use in accordance with regulation (EU) No 517/2014 on fluorinated greenhouse gases.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters
Additional advice
Difluoromethane (R 32) (EC-No: 200-839-4; CAS-No: 75-10-5): DNEL (workers, inhalation, long-term, systemic effects): 7035 mg/m³ (3259 ppm).
Difluoromethane (R 32) (EC-No: 200-839-4; CAS-No: 75-10-5): DNEL (consumers, inhalation, long-term, systemic effects): 750 mg/m³.
Pentafluoroethane (R 125) (EC-No: 206-557-8; CAS-No: 354-33-6): DNEL (workers, inhalation, long-term, systemic effects): 16444 mg/m³.

8.2. Exposure controls
Respiratory protection
Breathing apparatus in the event of high concentrations.
Keep self contained breathing apparatus readily available for emergency use.
Respiratory protection complying with EN 137.
In case of rescue and maintenance activities in storage containers use environment-independent breathing apparatus because of risk of suffocation by edging out of air oxygen

Hand protection
Leather gloves
Protective gloves complying with EN 374.

Eye protection
safety goggles, in case of increased risk add protective face shield
Safety goggles with side protection complying with EN 166.

Other protection measures
Safety shoes with steel toe.
Body covering work clothing, or chemical resistant suit at increased risk.

Limitation and surveillance of the environment
Difluoromethane (R 32) (EC-No: 200-839-4; CAS-No: 75-10-5): PNEC (freshwater): 0,142 mg/l.
Difluoromethane (R 32) (EC-No: 200-839-4; CAS-No: 75-10-5): PNEC (water): 1,42 mg/l (intermittent emission).
Difluoromethane (R 32) (EC-No: 200-839-4; CAS-No: 75-10-5): PNEC (freshwater sediment): 0,534 mg/kg sediment
Pentafluoroethane (R 125) (EC-No: 206-557-8; CAS-No: 354-33-6): PNEC (freshwater): 0,1 mg/l.
Pentafluoroethane (R 125) (EC-No: 206-557-8; CAS-No: 354-33-6): PNEC (freshwater sediment): 0,6 mg/kg sediment
See chapter 7.

Appropriate engineering controls
Transfer and handle only in enclosed systems.
### SECTION 9: Physical and chemical properties

#### 9.1. Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>Temperature at</th>
<th>Method</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gaseous / liquefied under pressure.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Odour</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>colourless</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Odour threshold</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>not determined</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Important health, safety and environmental information</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH value</td>
<td>not applicable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>boiling point</td>
<td>-52,6 °C</td>
<td>1013 hPa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>melting point</td>
<td>not determined</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flash point</td>
<td>not applicable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vapourisation rate</td>
<td>not determined</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flammable (solid)</td>
<td>not applicable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flammability (gas)</td>
<td>no</td>
<td></td>
<td>EN 378-1</td>
<td></td>
</tr>
<tr>
<td>Ignition temperature</td>
<td>no</td>
<td></td>
<td>EN 378-1</td>
<td></td>
</tr>
<tr>
<td>Self ignition temperature</td>
<td>not applicable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower explosion limit</td>
<td>no</td>
<td></td>
<td>EN 378-1</td>
<td></td>
</tr>
<tr>
<td>Upper explosion limit</td>
<td>no</td>
<td></td>
<td>EN 378-1</td>
<td></td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>16530 hPa</td>
<td>25 °C</td>
<td></td>
<td>information concerns to liquid phase</td>
</tr>
<tr>
<td>Relative density</td>
<td>1,062 g/cm³</td>
<td>25 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bulk density</td>
<td>not applicable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vapour density</td>
<td>ca. 2,5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solubility in water</td>
<td>not determined</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solubility/other</td>
<td>not determined</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>Temperature</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partition coefficient n-octanol/water (log P O/W)</td>
<td>1,48</td>
<td>20 °C</td>
<td>R-125</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td></td>
<td></td>
<td>not determined</td>
</tr>
<tr>
<td>Viscosity dynamic</td>
<td>0,15 mPa*s</td>
<td>25 °C</td>
<td>information concerns to liquid phase</td>
</tr>
</tbody>
</table>

**Oxidising properties**
- no

**Explosive properties**
- no

**9.2. Other information**
Vapours are heavier than air.

---

**SECTION 10: Stability and reactivity**

**10.1. Reactivity**
See section "Possibility of hazardous reactions".

**10.2. Chemical stability**
Stable under normal conditions.

**10.3. Possibility of hazardous reactions**
When pressurised with air, oxygen or other oxidants, the substance may become flammable. Reactions with oxidizing agents.

**10.4. Conditions to avoid**
Heat sources / heat - risk of bursting.
Avoid contact with open flames, glowing metal surfaces, etc..

**10.5. Incompatible materials**
**Substances to avoid**
- Metals in powder form.
- Metallic salts in powder form.
- Fine metal particles.
- Strong oxidizing agents.
- Alkali metals.
- Earth alkali metals.

**10.6. Hazardous decomposition products**
- Carbon monoxide
- Fluorophosgene on contact open flame or glowing objects
- Hydrogen fluoride
Thermal decomposition
Remark not applicable

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity/Irritability/Sensitization

<table>
<thead>
<tr>
<th>Value/Validation</th>
<th>Species</th>
<th>Method</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD50 acute oral</td>
<td>not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD50 acute dermal</td>
<td>not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC50 acute inhalation</td>
<td>&gt; 520000 ppm (4 h)</td>
<td>rat</td>
<td>OECD 403</td>
</tr>
</tbody>
</table>

Irritability skin no
Irritability eye no
Skin sensitization non-sensitizing
Sensitization respiratory system not determined

Subacute Toxicity - Carcinogenicity

<table>
<thead>
<tr>
<th>Value</th>
<th>Species</th>
<th>Method</th>
<th>Validation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subchronic Toxicity</td>
<td>NOAEL 50000 ppm (90 d) Inhalation</td>
<td>Rat</td>
<td>OECD 408</td>
</tr>
</tbody>
</table>

Mutagenicity
No experimental information on genotoxicity in vitro and in vivo available.

Reproduction-Toxicity
No indications of toxic effects were observed in reproduction studies in animals.

Carcinogenicity
The existing data do not justify a classification as a carcinogen.

Specific target organ toxicity (single exposure)
No data available

Specific target organ toxicity (repeated exposure)
No data available

Aspiration hazard not applicable
Experiences made from practice
May cause frostbite.
Gases have a suffocating effect.
Inhalation causes narcotic effect/intoxication.

Additional information
The product has not been tested. The information is derived from the properties of the individual components.

SECTION 12: Ecological information

12.1. Toxicity

Ecotoxicological effects

<table>
<thead>
<tr>
<th>Species</th>
<th>Value</th>
<th>Method</th>
<th>Validation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish</td>
<td>LC50 1507 mg/l (96 h)</td>
<td>freshwater fish</td>
<td>Calculated R-32</td>
</tr>
<tr>
<td>Daphnia</td>
<td>EC50 652 mg/l (48 h)</td>
<td>Daphnia magna</td>
<td>Calculated R-32</td>
</tr>
<tr>
<td>Algae</td>
<td>EC50 &gt; 114 mg/l (72 h)</td>
<td>Pseudokirchneriella subcapitata</td>
<td>R-125. The product has not been tested. The information was derived from products of similar structure or composition.</td>
</tr>
</tbody>
</table>

Bacteria not determined

12.2. Persistence and degradability

Biological degradability

<table>
<thead>
<tr>
<th>Value</th>
<th>Method</th>
<th>Validation</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 % (28 d)</td>
<td>OECD 301 D</td>
<td>not readily degradable</td>
</tr>
</tbody>
</table>

12.3. Bioaccumulative potential
Does not bioaccumulate.

12.4. Mobility in soil
Adsorption in the soil is not likely.

12.5. Results of PBT and vPvB assessment
The substances in this mixture do not meet the PBT/vPvB criteria of REACH, annex XIII.

12.6. Other adverse effects

GWP: 2088
ODP: 0

General regulation
Use in accordance with regulation (EU) No 517/2014 on fluorinated greenhouse gases. Avoid release to the environment.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste code No. | Name of waste
----------------|------------------
14 06 01*      | chlorofluorocarbons, HCFC, HFC

Wastes marked with an asterisk are considered to be hazardous waste pursuant to Directive 2008/98/EC on hazardous waste.

Recommendations for the product
Dispose of as hazardous waste.
Return to manufacturer.
Recommendations for packaging
Transportable pressure equipment (empty, residual pressure): Return to supplier / manufacturer.

General information
Operators of stationary equipment shall be responsible for putting in place arrangements for the proper recovery.

SECTION 14: Transport information

<table>
<thead>
<tr>
<th>ADR/RID</th>
<th>IMDG</th>
<th>IATA-DGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.1. UN number</td>
<td>1078</td>
<td>1078</td>
</tr>
<tr>
<td>14.2. UN proper shipping name</td>
<td>REFRIGERANT GAS, N.O.S. (50 % Pentafluoroethane, 50 % Difluormethane)</td>
<td>REFRIGERANT GAS, N.O.S. (50 % Pentafluoroethane, 50 % Difluoromethane)</td>
</tr>
<tr>
<td>14.3. Transport hazard class(es)</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>14.4. Packing group</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>14.5. Environmental hazards</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

14.6. Special precautions for user
The protective measures listed in Sections 6, 7 and 8 of the Safety Data Sheet have to be considered.

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
not applicable
No transport as bulk according IBC - Code.

Land and inland navigation transport ADR/RID
Hazard label(s) 2.2
tunnel restriction code C/E
Classification code 2A

? SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture
Other regulations (EU)
Regulation (UE) No 517/2014 on fluorinated greenhouse gases.
Regulation (EC) No 303/2008 establishing minimum requirements and the conditions for mutual recognition for the certification of companies and personnel as regards stationary refrigeration, air conditioning and heat pump equipment containing certain fluor.
Regulation (EC) No 1494/2007 establishing, pursuant to Regulation (EC) No 842/2006, the form of labels and additional labelling requirements as regards products and equipment containing certain fluorinated greenhouse gases.

VOC standard
VOC content >=99,5 % 25 °C 16530 hPa

15.2. Chemical Safety Assessment
The protective measures listed in Sections 6, 7 and 8 of the Safety Data Sheet have to be considered.
An exposure scenario is not required.
Chemical safety assessments for substances in this mixture were carried out.
SECTION 16: Other information

Recommended uses and restrictions
Use in accordance with regulation (EU) No 517/2014 on fluorinated greenhouse gases.
National and local regulations concerning chemicals shall be observed.

Further information
The information contained herein is based on the state of our knowledge. It characterizes the product with regard to the appropriate safety precautions. It does not represent a guarantee of the properties of the product.

Indication of changes: "!" = Data changed compared with the previous version. Previous version: 10.0

Wording of the R/H-phrases specified in chapter 3 (not the classification of the mixture!)

R 12 Extremely flammable.
H220 Extremely flammable gas.
H280 Contains gas under pressure; may explode if heated.