Safety Data Sheet according to Regulation (EC) No. 1907/2006 (REACH)

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R 407C
0024

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

1.1. Product identifier

Name of product

R 407C
Art-Nr(n).: 0024

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

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

Hazard classes and Hazard categories	Hazard Statements	Classification procedure
Liquef. Gas	**H280**	

Hazard statements for physical hazards
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
1,1,1,2-Tetrafluoroethane (R 134a), 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.
Receptacle under pressure.

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

CAS No	EC No	Name	[% weight]	Classification according to 67/548/EEC
811-97-2	212-377-0	1,1,1,2-Tetrafluoroethane (R 134a)	50 - 54	
354-33-6	206-557-8	Pentafluoroethane (R 125)	23 - 27	
75-10-5	200-839-4	Difluoromethane (R 32)	21 - 25	F+; R 12

CAS No	EC No	Name	[% weight]	Classification according to Regulation (EC) No 1272/2008 [CLP/GHS]
811-97-2	212-377-0	1,1,1,2-Tetrafluoroethane (R 134a)	50 - 54	Liq. Gas, H280
354-33-6	206-557-8	Pentafluoroethane (R 125)	23 - 27	Liq. Gas, H280
75-10-5	200-839-4	Difluoromethane (R 32)	21 - 25	Flam.Gas1, H220 / Liq.Gas, H280

REACH

CAS No	Name	REACH registration number
811-97-2	1,1,1,2-Tetrafluoroethane (R 134a)	01-2119459374-33
354-33-6	Pentafluoroethane (R 125)	01-2119485636-25
75-10-5	Difluoromethane (R 32)	01-2119471312-47

! **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
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 artifical 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 minuts. 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:
Unconsciousness
Cardiac arrhythmia (disordered cardiac rhythm).
Headache
Nausea
Confusion
Dizziness

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)
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).
Suppress gases/vapours/mists with water spray jet
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 ℃.
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 ℃.
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.
Only use containers that are approved specifically for the substance/product.
Suitable materials: Normalised steel and carbon steel, tempered steel, aluminium alloys, stainless steel.

Advice on storage compatibility

Do not store with combustible materials.
Do not store with spontaneously flammable materials.
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℃ maximum (=122℉).
Prevent cylinders from falling over.
Protect of heat.

Information on storage stability

At appropriate storage unlimited stability.

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.
Pentafluoroethane (R 125) (EC-No: 206-557-8; CAS-No: 354-33-6): DNEL (consumers, inhalation, long-term, systemic effects): 1753 mg/m³.
1,1,1,2-Tetrafluoroethane (R 134a) (EC-No: 212-377-0; CAS-No: 811-97-2): DNEL (workers, inhalation, long-term, systemic effects): 13936 mg/m³
1,1,1,2-Tetrafluoroethane (R 134a) (EC-No: 212-377-0; CAS-No: 811-97-2): DNEL (consumers, inhalation, long-term, systemic effects): 2476 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
1,1,1,2-Tetrafluoroethane (R 134a) (EC-No: 212-377-0; CAS-No: 811-97-2): PNEC (freshwater): 0,1 mg/l
1,1,1,2-Tetrafluoroethane (R 134a) (EC-No: 212-377-0; CAS-No: 811-97-2): PNEC (marine water): 0,01 mg/l
1,1,1,2-Tetrafluoroethane (R 134a) (EC-No: 212-377-0; CAS-No: 811-97-2): PNEC (water): 1 mg/l (temporary use / release)
1,1,1,2-Tetrafluoroethane (R 134a) (EC-No: 212-377-0; CAS-No: 811-97-2): PNEC (freshwater sediment): 0,75 mg/kg
1,1,1,2-Tetrafluoroethane (R 134a) (EC-No: 212-377-0; CAS-No: 811-97-2): PNEC (water): 73 mg/l (sewage treatment plant).
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 (water): 1 mg/l (intermittent emission).
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

Appearance
Gaseous / liquefied under pressure.

Colour
colourless

Odour
ethereal

Odour threshold
not determined

Important health, safety and environmental information

	Value	Temperature	at	Method	Remark
pH value	not applicable				
boiling point	-43,6 ℃		1013 hPa		
melting point	not determined				
Flash point	no				
Vapourisation rate	not determined				
Flammable (solid)	not applicable				
Flammability (gas)					The mixture does not meet the criteria for classification as a flammable gas.
Ignition temperature	685 ℃				
Self ignition temperature	not determined				
Lower explosion limit	no				
Upper explosion limit	no				
Vapour pressure	10350 hPa	20 ℃			
Relative density	1,136 g/cm3	25 ℃			liquid phase
Bulk density	not applicable				
Vapour density	3,582	25 ℃	101,3 kPa		

	Value	Temperature	at	Method	Remark
Solubility in water	not determined				
Solubility/other	not determined				
Partition coefficient n-octanol/water (log P O/W)	not determined				
Decomposition temperature	not determined				
Viscosity dynamic	0,1516 mPa*s	25 °C			liquid phase

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
May react violently with oxidants.
When pressurised with air, oxygen or other oxidants, the mixture may become flammable.

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.
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

	Value/Validation	Species	Method	Remark
LD50 acute oral	not applicable			
LD50 acute dermal	not applicable			
LC50 acute inhalation	ca. 520000 ppm (4 h)	rat		R-32
Irritability skin	low irritant effect - not necessary to label	rabbit		R-134a
Irritability eye	low irritant - no labeling duty	rabbit eye		R-134a
Skin sensitization	non-sensitizing	Laboratory animals		
Sensitization respiratory system	non-sensitizing			

Subacute Toxicity - Carcinogenicity

	Value	Species	Method	Validation
Subchronic Toxicity				No effects of toxicological significance.
Mutagenicity				No experimental information on genotoxicity in vivo available.
Reproduction-Toxicity				No reproductive toxicity.
Carcinogenicity				No indications of carcinogenic effects are available from long-term trials.

Experiences made from practice
Gases have a suffocating effect.

! **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

	Value	Species	Method	Validation
Fish	LC50 450 mg/l (96 h)	rainbow trout		R-134a
Daphnia	EC50 980 mg/l (48 h)	Daphnia magna		R-134a
Bacteria	EC10 > 730 mg/l (6 h)	Pseudomonas putida		R-134a

12.2. Persistence and degradability

Physico-chemical degradability	not determined		
Biological degradability	3 % (28 d) R-134a	OECD 301 D	not readily degradable
Degradability	not determined		

12.3. Bioaccumulative potential

Bioaccumulation improbable (R-134a).

12.4. Mobility in soil

not determined

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: 1774
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

	ADR/RID	IMDG	IATA-DGR
14.1. UN number	3340	3340	3340
14.2. UN proper shipping name	REFRIGERANT GAS R407C	REFRIGERANT GAS R 407C	Refrigerant gas R 407C
14.3. Transport hazard class(es)	2.2	2.2	2.2
14.4. Packing group	-	-	-
14.5. Environmental hazards	No	No	No

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 (EU) 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 % 20 ℃ 10350 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: 15.0

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.