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2.2 : Non-flammable, non-toxic gases

**Warning**



## SECTION 1. Identification of the substance/mixture and of the company/undertaking

### 1.1. Product identifier

Trade name : R-407C  
 SDS no : WAG-G1149

### 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.  
 Use as refrigerant. Laboratory use. Contact supplier for more information on uses.  
 Uses advised against : Consumer use.

### 1.3. Details of the supplier of the safety data sheet

Company identification : Westfalen AG  
 Industrieweg 43  
 48155 MUENSTER Deutschland  
 Tel : 0049 2 51 6 95 0  
 Fax: 0049 2 51 6 95 1 94  
 E-Mail address (competent person) : sdb@westfalen-ag.de

### 1.4. Emergency telephone number

Emergency telephone number : Tel. (+49)551-19 24 0 (Giftinformationszentrum-Nord)

## SECTION 2. Hazards identification

### 2.1. Classification of the substance or mixture

#### Hazard Class and Category Code Regulation EC 1272/2008 (CLP)

• Physical hazards : Gases under pressure - Liquefied gas - Warning - (CLP : Press. Gas Liq.) - H280


### 2.2. Label elements

#### Labelling Regulation EC 1272/2008 (CLP)

• Hazard pictograms



• Hazard pictograms code : GHS04  
 • Signal word : Warning  
 • Hazard statements : H280 - Contains gas under pressure; may explode if heated.  
 • Precautionary statements

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## SECTION 2. Hazards identification (continued)

- Storage : P403 - Store in a well-ventilated place.

### 2.3. Other hazards

: Asphyxiant in high concentrations.

## SECTION 3. Composition/information on ingredients

### 3.1. Substance / 3.2. Mixture

#### Substance / 3.2. Mixture

Substance name	Contents	CAS No EC No Index No Registration no	Classification(DSD)	Classification(CLP)
Pentafluoroethane	: 25 %-w/w	354-33-6 206-557-8 ----- 01-2119485636-25-		Press. Gas Liq. (H280)
Difluoromethane (R32)	: 23 %-w/w	75-10-5 200-839-4 ----- 01-2119471312-47-		Flam. Gas 1 (H220) Press. Gas Liq. (H280)
Tetrafluoroethane (R134a)	: 52 %-w/w	811-97-2 212-377-0 ----- 01-2119459374-33-		Press. Gas Liq. (H280)

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

\* 1: Listed in Annex IV / V REACH, exempted from registration.

\* 2: Registration deadline not expired.

\* 3: Registration not required: Substance manufactured or imported < 1t/y.

Full text of H-phrases see section 16.

Full text of H-statements see section 16.

## SECTION 4. First aid measures

### 4.1. Description of first aid measures


- 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.
- Skin contact : For liquid spillage - flush with water for at least 15 minutes.
- Eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes.
- Ingestion : Ingestion is not considered a potential route of exposure.

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

: In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/ consciousness. Victim may not be aware of asphyxiation. Refer to section 11.

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

: None.

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## SECTION 5. Firefighting measures

### 5.1. Extinguishing media

- Suitable extinguishing media : Water spray or fog.
- Unsuitable extinguishing media : Do not use water jet to extinguish.

### 5.2. Special hazards arising from the substance or mixture

- Specific hazards : Exposure to fire may cause containers to rupture/explode.
- Hazardous combustion products : Carbon monoxide.  
Carbonyl fluoride.  
Hydrogen fluoride.

### 5.3. Advice for fire fighters

- Specific methods : Move containers away from the fire area if this can be done without risk.  
If possible, stop flow of product.  
Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas receptacles to rupture. Cool endangered receptacles with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.  
Use water spray or fog to knock down fire fumes if possible.
- Special protective equipment for fire fighters : Use self-contained breathing apparatus.  
Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.  
Standard EN 469 - Protective clothing for firefighters. Standard - EN 659: Protective gloves for firefighters.  
Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.

## SECTION 6. Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

- : Evacuate area.  
Try to stop release.  
Ensure adequate air ventilation.  
Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.  
Monitor concentration of released product.  
Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.  
Act in accordance with local emergency plan.  
Stay upwind.

### 6.2. Environmental precautions


- : Try to stop release.

### 6.3. Methods and material for containment and cleaning up

- : Ventilate area.

### 6.4. Reference to other sections

- : See also sections 8 and 13.

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## SECTION 7. Handling and storage

### 7.1. Precautions for safe handling

#### Safe use of the product

- : Protect eyes, face and skin from liquid splashes.
- Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt.
- Avoid release of product into atmosphere.
- Do not breathe gas.
- 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.
- Do not smoke while handling product.
- Ensure the complete gas system was (or is regularly) checked for leaks before use.
- Consider pressure relief device(s) in gas installations.

#### Safe handling of the gas receptacle

- : Refer to supplier's container handling instructions.
- 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.
- Containers should be stored in the vertical position and properly secured to prevent them from falling over.

### 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 not be stored in conditions likely to encourage corrosion.
- Containers should be stored in the vertical position and properly secured to prevent them from falling over.
- Stored containers should be periodically checked for general condition 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.

### 7.3. Specific end use(s)

: None.


## SECTION 8. Exposure controls/personal protection

### 8.1. Control parameters

#### Occupational Exposure Limits

#### Tetrafluoroethane (R134a)

- : WEL - LTEL - UK [mg/m<sup>3</sup>] : 4240
- : WEL - LTEL - UK [ppm] : 1000
- : AGW (8h) - Germany [mg/m<sup>3</sup>] TRGS 900 : 4200
- : AGW (8h) - Germany [ppm] TRGS 900 : 1000


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## SECTION 8. Exposure controls/personal protection (continued)

	: Exceeding factor AGW - Germany TRGS 900 : 8
	: KZGW/VLE-CH [mg/m <sup>3</sup> ] : 4200
<b>DNEL: Derived no effect level (Workers)</b>	
<b>Pentafluoroethane</b>	: Inhalation-long term (systemic) [mg/m <sup>3</sup> ] : 16444
<b>Difluoromethane (R32)</b>	: Inhalation-long term (systemic) [mg/m <sup>3</sup> ] : 7035
<b>Tetrafluoroethane (R134a)</b>	: Inhalation-long term (systemic) [mg/m <sup>3</sup> ] : 14000
<b>DMEL: Derived minimum effect level (Workers)</b>	
	: No data available.
<b>PNEC: Predicted no effect concentration</b>	
<b>Pentafluoroethane</b>	: Aqua (freshwater) [mg/l] : 0.1
	: Aquatic, intermittent releases [mg/l] : 1
	: Sediment, freshwater [mg/kg dw] : 0.6
<b>Difluoromethane (R32)</b>	: Aqua (freshwater) [mg/l] : 0.142
	: Aquatic, intermittent releases [mg/l] : 1.42
	: Sediment, freshwater [mg/kg dw] : 0.534
<b>Tetrafluoroethane (R134a)</b>	: Aqua (freshwater) [mg/l] : 0.1
	: Aqua (marine water) [mg/l] : 0.01
	: Aquatic, intermittent releases [mg/l] : 1
	: Sediment, freshwater [mg/kg dw] : 0.75
	: Micro-organisms or PNEC sewage treatment plant (STP) [mg/l] : 73

### 8.2. Exposure controls

<b>8.2.1. Appropriate engineering controls</b>	: Oxygen detectors should be used when asphyxiating gases may be released. Provide adequate general and local exhaust ventilation. Ensure exposure is below occupational exposure limits (where available). Systems under pressure should be regularly checked for leakages. Consider work permit system e.g. for maintenance activities.
<b>8.2.2. Individual protection measures, e.g. personal protective equipment</b>	: 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: PPE compliant to the recommended EN/ISO standards should be selected.
• <b>Eye/face protection</b>	: Wear safety glasses with side shields. Wear goggles and a face shield when transfilling or breaking transfer connections. Standard EN 166 - Personal eye-protection.
• <b>Skin protection</b>	
- <b>Hand protection</b>	: Wear working gloves when handling gas containers. Standard EN 388 - Protective gloves against mechanical risk.
- <b>Other</b>	: Wear safety shoes while handling containers. Standard EN ISO 20345 - Personal protective equipment - Safety footwear.
• <b>Respiratory protection</b>	: Self contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmospheres. Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.
• <b>Thermal hazards</b>	: Wear cold insulating gloves when transfilling or breaking transfer connections. Standard EN 511 - Cold insulating gloves.
<b>8.2.3. Environmental exposure controls</b>	: Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

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## SECTION 9. Physical and chemical properties

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

<b>Appearance</b>	
<b>Physical state at 20°C / 101.3kPa</b>	: Gas.
<b>Colour</b>	: Mixture contains one or more component(s) which have the following colour(s): Colourless.
<b>Odour</b>	: There may be no odour warning properties, odour is subjective and inadequate to warn of overexposure. Mixture contains one or more component(s) which have the following odour(s): Ethereal.
<b>Odour threshold</b>	: Odour threshold is subjective and inadequate to warn of overexposure.
<b>pH value</b>	: Not applicable for gas-mixtures.
<b>Molar mass [g/mol]</b>	: Not applicable for gas-mixtures.
<b>Melting point [°C]</b>	: Not applicable for gas-mixtures.
<b>Boiling point [°C]</b>	: Not applicable for gas-mixtures.
<b>Flash point [°C]</b>	: Not applicable for gas-mixtures.
<b>Evaporation rate (ether=1)</b>	: Not applicable for gas-mixtures.
<b>Flammability range [vol% in air]</b>	: Non flammable.
<b>Vapour pressure [20°C]</b>	: Not applicable.
<b>Relative density, gas (air=1)</b>	: Heavier than air.
<b>Solubility in water [mg/l]</b>	: Solubility in water of component(s) of the mixture : • Tetrafluoroethane (R134a) : 1930 • Pentafluoroethane : 900 • Difluoromethane (R32) : 280000
<b>Partition coefficient n-octanol/water [log Kow]</b>	: Not applicable for gas-mixtures.
<b>Viscosity at 20°C [mPa.s]</b>	: Not applicable.
<b>Explosive Properties</b>	: Not applicable.
<b>Oxidising Properties</b>	: Not applicable.

### 9.2. Other information

<b>Other data</b>	: Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.
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## SECTION 10. Stability and reactivity

### 10.1. Reactivity

: No reactivity hazard other than the effects described in sub-sections below.

### 10.2. Chemical stability

: Stable under normal conditions.

### 10.3. Possibility of hazardous reactions

: None.

### 10.4. Conditions to avoid


: Avoid moisture in installation systems.

### 10.5. Incompatible materials

: For additional information on compatibility refer to ISO 11114.

### 10.6. Hazardous decomposition products

: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

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## SECTION 10. Stability and reactivity (continued)

## SECTION 11. Toxicological information

### 11.1. Information on toxicological effects

<b>Acute toxicity</b>	: Classification criteria are not met. Toxicological effects not expected from this product if occupational exposure limit values are not exceeded.
<b>Rat inhalation LC50 [ppm/4h]</b>	: • Pentafluoroethane : 1610
<b>Skin corrosion/irritation</b>	: No known effects from this product.
<b>Serious eye damage/irritation</b>	: No known effects from this product.
<b>Respiratory or skin sensitisation</b>	: No known effects from this product.
<b>Carcinogenicity</b>	: No known effects from this product.
<b>Germ cell mutagenicity</b>	: No known effects from this product.
<b>Toxic for reproduction : Fertility</b>	: No known effects from this product.
<b>Toxic for reproduction : unborn child</b>	: No known effects from this product.
<b>STOT-single exposure</b>	: No known effects from this product.
<b>STOT-repeated exposure</b>	: No known effects from this product.
<b>Aspiration hazard</b>	: Not applicable for gases and gas mixtures.

## SECTION 12. Ecological information

### 12.1. Toxicity

<b>Assessment</b>	: Classification criteria are not met.
<b>EC50 48h - Daphnia magna [mg/l]</b>	: • Tetrafluoroethane (R134a) : 930 • Pentafluoroethane : > 100 • Difluoromethane (R32) : 142
<b>EC50 72h - Algae [mg/l]</b>	: • Tetrafluoroethane (R134a) : No data available. • Pentafluoroethane : 142 • Difluoromethane (R32) : 652
<b>LC50 96 h - fish [mg/l]</b>	: • Tetrafluoroethane (R134a) : 450 • Pentafluoroethane : 109 • Difluoromethane (R32) : 1507

### 12.2. Persistence and degradability

**Assessment** : No data available.

### 12.3. Bioaccumulative potential

**Assessment** : No data available.

### 12.4. Mobility in soil


**Assessment** : No data available.

### 12.5. Results of PBT and vPvB assessment

**Assessment** : Not classified as PBT or vPvB.

### 12.6. Other adverse effects

<b>Effect on the ozone layer</b>	: None.
<b>Effect on global warming</b>	: Contains fluorinated greenhouse gases covered by the Kyoto protocol. Calculated GWP of mixture : 1869. For quantities refer to cylinder label.

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## SECTION 13. Disposal considerations

### 13.1. Waste treatment methods

: Ensure that the emission levels from local regulations or operating permits are not exceeded. Do not discharge into any place where its accumulation could be dangerous. Refer to the ELGA code of practice Doc.30 "Disposal of Gases", downloadable at <http://www.elga.org> for more guidance on suitable disposal methods. Contact supplier if guidance is required.

List of hazardous waste codes (from Commission Decision 2001/118/EC)

: 16 05 05: Gases in pressure containers other than those mentioned in 16 05 04.

### 13.2. Additional information

: None.

## SECTION 14. Transport information

### 14.1. UN number

UN number : 3340  
 Labelling ADR, IMDG, IATA



: 2.2 : Non-flammable, non-toxic gases

### 14.2. UN proper shipping name

Transport by road/rail (ADR/RID) : REFRIGERANT GAS R 407C  
 Transport by air (ICAO-TI / IATA-DGR) : REFRIGERANT GAS R 407C  
 Transport by sea (IMDG) : REFRIGERANT GAS R 407C

### 14.3. Transport hazard class(es)

Transport by road/rail (ADR/RID)  
 Class : 2  
 Classification code : 2 A  
 H.I. nr : 20  
 Tunnel Restriction : C/E Tank carriage: Passage forbidden through tunnels of category C, D and E; Other carriage: Passage forbidden through tunnels of category E

Transport by air (ICAO-TI / IATA-DGR)  
 Class / Division (Subsidiary risk(s)) : 2.2  
 Transport by sea (IMDG)  
 Class / Division (Subsidiary risk(s)) : 2.2  
 Emergency Schedule (EmS) - Fire : F-C  
 Emergency Schedule (EmS) - Spillage : S-V


### 14.4. Packing group

Transport by road/rail (ADR/RID) : Not applicable.  
 Transport by air (ICAO-TI / IATA-DGR) : Not applicable.  
 Transport by sea (IMDG) : Not applicable.

### 14.5. Environmental hazards

Transport by road/rail (ADR/RID) : None.  
 Transport by air (ICAO-TI / IATA-DGR) : None.  
 Transport by sea (IMDG) : None.



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## SECTION 14. Transport information (continued)

### 14.6 Special precautions for user

<b>Packing Instruction(s)</b>	
<b>Transport by road/rail (ADR/RID)</b>	: P200
<b>Transport by air (ICAO-TI / IATA-DGR)</b>	
<b>Passenger and Cargo Aircraft</b>	: Allowed.
<b>Packing instruction - Passenger and Cargo Aircraft</b>	: 200
<b>Cargo Aircraft only</b>	: Allowed.
<b>Packing instruction - Cargo Aircraft only</b>	: 200
<b>Transport by sea (IMDG)</b>	: P200
<b>Special precautions for user</b>	: 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 there is adequate ventilation. - Ensure that containers are firmly secured. - Ensure cylinder valve is closed and not leaking. - Ensure valve outlet cap nut or plug (where provided) is correctly fitted. - Ensure valve protection device (where provided) is correctly fitted.

### 14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

<b>Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code</b>	: Not applicable.
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## SECTION 15. Regulatory information

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

#### EU legislation

<b>Seveso directive 96/82/EC</b>	: Not covered.
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#### National legislation

<b>National legislation</b>	: Ensure all national/local regulations are observed.
<b>Water hazard class (WGK)</b>	: WGK Germany: 1 - Low hazard to waters.

### 15.2. Chemical safety assessment

: A CSA does not need to be carried out for this product.


## SECTION 16. Other information

<b>Indication of changes</b>	: Revised safety data sheet in accordance with commission regulation (EU) No 453/2010. According to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830
<b>Training advice</b>	: Receptacle under pressure.
<b>Further information</b>	: Classification in accordance with calculation methods of regulation (EC) 1272/2008 CLP This Safety Data Sheet has been established in accordance with the applicable European Union legislation.
<b>List of full text of R-phrases in section 3.</b>	: R12 : Extremely flammable.
<b>List of full text of H-statements in section 3.</b>	: H220 - Extremely flammable gas. H280 - Contains gas under pressure; may explode if heated.

### Westfalen AG

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**SECTION 16. Other information (continued)**

**DISCLAIMER OF LIABILITY**

: Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.  
Details given in this document are believed to be correct at the time of going to press. 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.

**End of document**