

# SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006, as amended



## Genetron® 404A (R-404A)

000000009893

Version 4.1

Revision Date 20.12.2024

Supersedes 3

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

#### 1.1. Product identifier

Product name : Genetron® 404A (R-404A)  
SDS-number : 000000009893  
Type of product : Mixture  
Remarks : SDS according to Art. 31 of Regulation (EC) 1907/2006.

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

Use of the Substance/Mixture : Refrigerant  
Uses advised against : none

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

Company : Honeywell Advanced Limited      Honeywell International, Inc.  
One Spencer Dock, North Wall      115 Tabor Road  
Quay      Morris Plains, NJ 07950-2546  
Dublin 1      USA  
Ireland  
Telephone : +353 1 447 9350  
For further information, please contact: : SafetyDataSheet@Honeywell.com

#### 1.4. Emergency telephone number

Emergency telephone number : +1-703-527-3887 (ChemTrec-Transport)  
+1-303-389-1414 (Medical)  
: Poison Control Center:  
United Kingdom: (+44) 844 892 0111

### SECTION 2: Hazards identification

#### 2.1. Classification of the substance or mixture

REGULATION (EC) No 1272/2008

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Gases under pressure Liquefied gas  
H280 Contains gas under pressure; may explode if heated.

### 2.2. Label elements

#### REGULATION (EC) No 1272/2008

Hazard pictograms



Signal word : Warning

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

Precautionary statements : P260 Do not breathe gas.  
P410 + P403 Protect from sunlight. Store in a well-ventilated place.

Special labelling of certain products : Contains fluorinated greenhouse gases.

### 2.3. Other hazards

Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Rapid evaporation of the liquid may cause frostbite. This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher. The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

## SECTION 3: Composition/information on ingredients

### 3.1. Substances

Not applicable

### 3.2. Mixtures

Chemical name	CAS-No. Index-No.	Classification 1272/2008	Concentration	Remarks
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	REACH Registration Number EC-No.			
1,1,1-Trifluoroethane	420-46-2 206-996-5	Flam. Gas 1A; H220 Press. Gas ; H280	52 %	
Pentafluoroethane	354-33-6 206-557-8	Press. Gas ; H280	44 %	
Norflurane	811-97-2 212-377-0	Press. Gas ; H280	4 %	

Remaining components of this product are non-hazardous and/or are present at concentrations below reportable limits.

Occupational Exposure Limit(s), if available, are listed in Section 8.  
For the full text of the H-Statements mentioned in this Section, see Section 16.

## SECTION 4: First aid measures

### 4.1 Description of first aid measures

#### *General advice:*

First aider needs to protect himself. Move out of dangerous area. Take off all contaminated clothing immediately.

#### *Inhalation:*

Move to fresh air. If breathing is irregular or stopped, administer artificial respiration. Use oxygen as required, provided a qualified operator is present. Call a physician. Do not give drugs from adrenaline-ephedrine group.

#### *Skin contact:*

After contact with skin, wash immediately with plenty of water. If there is evidence of frostbite, bathe (do not rub) with lukewarm (not hot) water. If water is not available, cover with a clean, soft cloth or similar covering. If symptoms persist, call a physician.

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### *Eye contact:*

Remove contact lenses. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

### *Ingestion:*

Unlikely route of exposure. As this product is a gas, refer to the inhalation section. Do not induce vomiting without medical advice. Call a physician immediately.

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

No data available

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

Do not give adrenaline or similar drugs.

See Section 11 for more detailed information on health effects and symptoms.

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### SECTION 5: Firefighting measures

#### 5.1. Extinguishing media

*Suitable extinguishing media:*

The product is not flammable.

ASHRAE 34

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

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

Contents under pressure.

This product is not flammable at ambient temperatures and atmospheric pressure.

However, this material can ignite when mixed with air under pressure and exposed to strong ignition sources.

Container may rupture on heating.

Cool closed containers exposed to fire with water spray.

Do not allow run-off from fire fighting to enter drains or water courses.

Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.

Fire may cause evolution of:

Hydrogen fluoride

Carbon oxides

Halogenated compounds

Carbonyl halides

Gaseous hydrogen chloride (HCl).

#### 5.3. Advice for firefighters

Wear full protective clothing and self-contained breathing apparatus.

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

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### SECTION 6: Accidental release measures

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

Immediately evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Wear personal protective equipment. Unprotected persons must be kept away. Remove all sources of ignition. Avoid skin contact with leaking liquid (danger of frostbite). Ventilate the area. After release, disperses into the air. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Ensure that the oxygen content is  $\geq 19.5\%$ .

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### 6.2. Environmental precautions

Prevent further leakage or spillage if safe to do so. The product evaporates readily.

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

Ventilate the area.

### 6.4. Reference to other sections

For personal protection see section 8.

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## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

#### *Advice on safe handling:*

Handle with care. Avoid inhalation of vapour or mist. Do not get in eyes, on skin, or on clothing. Wear personal protective equipment. Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C. Use authorized cylinders only. Protect cylinders from physical damage. Do not pierce or burn, even after use. Do not spray on a naked flame or any incandescent material. Do not remove screw cap until immediately ready for use. Always replace cap after use.

#### *Advice on protection against fire and explosion:*

The product is not flammable. Can form a combustible mixture with air at pressures above atmospheric pressure.

#### *Hygiene measures:*

Handle in accordance with good industrial hygiene and safety practice. Ensure adequate ventilation, especially in confined areas. Do not get in eyes, on skin, or on clothing. Remove and wash contaminated clothing before re-use. Keep working clothes separately.

### 7.2. Conditions for safe storage, including any incompatibilities

#### *Requirements for storage areas and containers:*

Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50 °C. Do not pierce or burn, even after use. Keep containers tightly closed in a dry, cool and well-ventilated place. Storage rooms must be properly ventilated. Ensure adequate ventilation, especially in confined areas. Protect cylinders from physical damage.

### 7.3. Specific end use(s)

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### Specific use information:

Restricted to professional users.

For industrial use only.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

#### Occupational exposure limits:

Components	Basis / Value type	Value / Form of exposure	Exceeding Factor	Remarks
1,1,1-Trifluoroethane	HONEYWELL TWA	1.000 ppm		We are not aware of any national exposure limit.
Pentafluoroethane	HONEYWELL TWA	1.000 ppm		We are not aware of any national exposure limit.
Norflurane	HONEYWELL TWA	1.000 ppm		
Norflurane	EH40 WEL TWA	4.240 mg/m3 1.000 ppm		

HONEYWELL - Limit established by Honeywell International Inc.

TWA - Time weighted average

#### DNEL/ PNEC-Values

Component	End-use/impact	Exposure duration	Value	Exposure routes	Remarks
1,1,1-Trifluoroethane	Workers / Long-term systemic effects		438,61 mg/m3	Inhalation	
1,1,1-Trifluoroethane	Consumers / Long-term systemic effects		219,3 mg/m3	Inhalation	
Pentafluoroethane	Workers / Long-term systemic effects		16444 mg/m3	Inhalation	

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Pentafluoroethane	Consumers / Long-term systemic effects		1753 mg/m <sup>3</sup>	Inhalation	
Norflurane	Workers / Long-term systemic effects		13936 mg/m <sup>3</sup>	Inhalation	
Norflurane	Consumers / Long-term systemic effects		2476 mg/m <sup>3</sup>	Inhalation	

Component	Environmental compartment / Value	Remarks
1,1,1-Trifluoroethane	Fresh water: 0,35 mg/l	Assessment factor: 1000
Pentafluoroethane	Fresh water: 0,1 mg/l	Assessment factor: 1000
Pentafluoroethane	Fresh water sediment: 0,6 mg/kg dw	
Norflurane	Fresh water: 0,1 mg/l	Assessment factor: 1000
Norflurane	Marine water: 0,01 mg/l	Assessment factor: 10000
Norflurane	Fresh water sediment: 0,75 mg/kg	Assessment factor: 100
Norflurane	Sewage treatment plant: 73 mg/l	Assessment factor: 10

## 8.2. Exposure controls

### Occupational exposure controls

The Personal Protective Equipment must be in accordance with EN standards:respirator EN 136, 140, 149; safety glasses EN 166; protective suit: EN 340, 463, 468, 943-1, 943-2; gloves EN 374, 511; safety shoes EN-ISO 20345.

### Engineering measures

General room ventilation is adequate for storage and handling.



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Perform filling operations only at stations with exhaust ventilation facilities.

### Personal protective equipment

#### *Respiratory protection:*

In case of insufficient ventilation wear suitable respiratory equipment.

Self-contained breathing apparatus (EN 133)

#### *Hand protection:*

Protective gloves against cold

(EN 511)

Gloves must be inspected prior to use.

Replace when worn.

#### *Eye protection:*

Wear as appropriate:

Safety glasses with side-shields

If splashes are likely to occur, wear:

Goggles or face shield, giving complete protection to eyes

#### *Skin and body protection:*

Protective footwear

### Environmental exposure controls

Handle in accordance with local environmental regulations and good industrial practices.

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## SECTION 9: Physical and chemical properties

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

- |                                     |   |                               |
|-------------------------------------|---|-------------------------------|
| (a) Physical state                  | : | gaseous                       |
| (b) Colour                          | : | colourless                    |
| (c) Odour                           | : | weak                          |
| (e) Boiling point/boiling range     | : | -47,8 °C                      |
| (g) Lower and upper explosion limit | : | Lower explosion limit<br>None |

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- |  |   |  |
|--|---|--|
|  | : | Upper explosion limit<br>None  |
| (h) Flash point                                | : | Not applicable   |
| (i) Auto-ignition<br>temperature               | : | No data available  |
| (j) Decomposition<br>temperature               | : | 250 °C   |
| (k) pH   | : | neutral  |
| (l) Viscosity, kinematic                       | : | No data available  |
| (m) Solubility(ies)                            | : | Water solubility:<br>Very slightly soluble in cold water, hot water. |
| (n) Partition coefficient: n-<br>octanol/water | : | log Pow 1,06<br>Medium: 1,1,1,2-tetrafluoroethane (HFC-134a)         |
| (o) Vapour pressure                            | : | 12.610 hPa<br>at 21,1 °C<br><br>25.572 hPa<br>at 54,4 °C             |
| (p) Density and / or relative<br>density       | : | 1,08 g/cm3<br>at 21,1 °C   |
| (q) Relative vapour density                    | : | 3,43<br>(Air = 1.0)  |
| (r) Particle characteristics                   | : | No data available  |

### 9.2 Other Information

- |                  |   |                                  |
|------------------|---|----------------------------------|
| Evaporation rate | : | > 1<br>Method: Compared to CCl4. |
|------------------|---|----------------------------------|

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Viscosity, dynamic : No data available

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### SECTION 10: Stability and reactivity

#### 10.1. Reactivity

Stable under normal conditions.

#### 10.2. Chemical stability

No data available

#### 10.3. Possibility of hazardous reactions

Hazardous polymerisation does not occur.

#### 10.4. Conditions to avoid

Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C.

Some risk may be expected of corrosive and toxic decomposition products.

Can form a combustible mixture with air at pressures above atmospheric pressure.

Do not mix with oxygen or air above atmospheric pressure.

#### 10.5. Incompatible materials

Oxidizing agents

Finely divided metal powders such as aluminum, magnesium, or zinc.

#### 10.6. Hazardous decomposition products

Halogenated compounds

Hydrogen fluoride

Carbonyl halides

Carbon oxides

Gaseous hydrogen chloride (HCl).

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### SECTION 11: Toxicological information

#### 11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

##### (a) Acute toxicity

*Acute oral toxicity:*

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Not applicable

*Acute dermal toxicity:*

No data available

*Acute inhalation toxicity:*

LC50

Species: Rat

Value: > 500000 ppm

Exposure time: 4 h

Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a)

*Acute toxicity (other routes of administration):*

No data available

**(b) Skin corrosion/irritation:**

No data available

**(c) Serious eye damage/eye irritation:**

No data available

**(d) Respiratory or skin sensitisation:**

No data available

**(h) STOT-single exposure:**

No data available

**(i) STOT - repeated exposure:**

No data available

**(j) Aspiration hazard:**

No data available

### 11.2. Information on other hazards

*Endocrine disrupting properties*

No data available

*Other information:*

1,1,1-trifluoroethane (HFC-143a): Not mutagenic in AMES Test.

Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.

Ethane, pentafluoro- (HFC-125): Cardiac sensitisation threshold (dog): 75000 ppm.

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1,1,1-trifluoroethane (HFC-143a): Cardiac sensitisation threshold (dog): >250000 ppm.  
1,1,1,2-tetrafluoroethane (HFC-134a): Cardiac sensitisation threshold (dog): 80000 ppm.  
Inhalation: May cause cardiac arrhythmia.  
Rapid evaporation of the liquid may cause frostbite.  
Avoid skin contact with leaking liquid (danger of frostbite).

### SECTION 12: Ecological information

#### 12.1. Toxicity

*Toxicity to fish:*

No data available

*Toxicity to aquatic plants:*

No data available

*Toxicity to aquatic invertebrates:*

No data available

#### 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

No data available

#### 12.6. Endocrine disrupting properties

No data available

#### 12.7. Other adverse effects

Accumulation in aquatic organisms is unlikely.

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### SECTION 13: Disposal considerations

#### 13.1. Waste treatment methods

*Product:*

Dispose according to legal requirements.

*Packaging:*

Legal requirements are to be considered in regard of reuse or disposal of used packaging materials

*Further information:*

Provisions relating to waste:

EC Directive 2006/12/EC; 2008/98/EEC

Regulation No. 1013/2006

For personal protection see section 8.

### SECTION 14: Transport information

#### 14.1 UN number or ID number

ADR/RID:3337

IMDG:3337

IATA:3337

#### 14.2 UN proper shipping name

ADR/RID:REFRIGERANT GAS R 404A

IMDG:REFRIGERANT GAS R 404A

IATA:Refrigerant gas R 404A

#### 14.3 Transport hazard class(es)

ADR/RID:2.2

IMDG: 2.2

IATA: 2.2

#### 14.4 Packaging group

No data available

#### 14.5 Environmental hazards

ADR/RID:no

Marine pollutant: no

#### 14.6 Special precautions for user

IMDG Code segregation group according chapter 3.1.4.4 : NONE,

#### 14.7 Maritime transport in bulk according to IMO instruments

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No data available

### SECTION 15: Regulatory information

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

Basis	Value	Remarks
Substances of very high concern (SVHC)		This product does not contain substances of very high concern according to Regulation (EC) No Article 57 above the respective regulatory 1907/2006 (REACH), concentration limit of $\geq 0.1\%$ (w/w).

Global warming potential :  
3.922

#### Other inventory information

USA. List of Active Substances on the Toxic Substances Control Act (TSCA) Chemical Substances Inventory, as amended  
On TSCA Inventory

Australia. Inventory of Industrial Chemicals (AIIC), as amended  
On the inventory, or in compliance with the inventory

Canada. Domestic Substances List (DSL), as amended  
All components of this product are on the Canadian DSL

Japan. Kashin-Hou Law List  
On the inventory, or in compliance with the inventory

Korea. Existing Chemicals Inventory (KECI)  
On the inventory, or in compliance with the inventory

Philippines. Inventory of Chemicals and Chemical Substances (PICCS)  
On the inventory, or in compliance with the inventory

China. Inventory of Existing Chemical Substances (IECSC)  
On the inventory, or in compliance with the inventory

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NZIOC - New Zealand

On the inventory, or in compliance with the inventory

Taiwan Chemical Substance Inventory (TCSI)

On the inventory, or in compliance with the inventory

### 15.2 Chemical safety assessment

A Chemical Safety Assessment has not been carried out.

## SECTION 16: Other information

### Text of H-statements referred to under heading 3

1,1,1-Trifluoroethane	:	H220	Extremely flammable gas.
		H280	Contains gas under pressure; may explode if heated.
Pentafluoroethane	:	H280	Contains gas under pressure; may explode if heated.
Norflurane	:	H280	Contains gas under pressure; may explode if heated.

### Further information

All directives and regulations refer to amended versions.

Vertical lines in the left hand margin indicate a relevant amendment from the previous version.

Abbreviations:

EC European Community

CAS Chemical Abstracts Service

DNEL Derived no effect level

PNEC Predicted no effect level

vPvB Very persistent and very bioaccumulative substance

PBT Persistent, bioaccumulative und toxic substance

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific



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material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text. Final determination of suitability of any material is the sole responsibility of the user.

This information should not constitute a guarantee for any specific product properties.

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