

**Genetron® 404A****000000009893**

Version 2.6

Revision Date 06/04/2014

Print Date 04/16/2015

**SECTION 1. PRODUCT AND COMPANY IDENTIFICATION**

Product name : Genetron® 404A

MSDS Number : 000000009893

Product Use Description : Refrigerant

Manufacturer or supplier's details : Honeywell International Inc.  
101 Columbia Road  
Morristown, NJ 07962-1057

For more information call : 800-522-8001  
+1-973-455-6300  
(Monday-Friday, 9:00am-5:00pm)

**In case of emergency call : Medical: 1-800-498-5701 or +1-303-389-1414**  
: **Transportation (CHEMTREC): 1-800-424-9300 or +1-703-527-3887**  
:  
: (24 hours/day, 7 days/week)

**SECTION 2. HAZARDS IDENTIFICATION****Emergency Overview**

Form : Liquefied gas

Color : colourless

Odor : weak

**Classification of the substance or mixture**

Classification of the substance or mixture : Gases under pressure, Liquefied gas  
Simple Asphyxiant

**GHS Label elements, including precautionary statements**

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Symbol(s)

:



Signal word

: Warning

Hazard statements

: Contains gas under pressure; may explode if heated.  
May displace oxygen and cause rapid suffocation.

Precautionary statements

: **Storage:**  
Protect from sunlight. Store in a well-ventilated place.Hazards not otherwise  
classified: May cause cardiac arrhythmia.  
May cause frostbite.  
May cause eye and skin irritation.**Carcinogenicity**

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP, IARC, or OSHA.

**SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS**

Chemical nature

: Mixture

Chemical Name	CAS-No.	Concentration
1,1,1-Trifluoroethane	420-46-2	52.00 %
Pentafluoroethane	354-33-6	44.00 %
1,1,1,2-Tetrafluoroethane	811-97-2	4.00 %

**SECTION 4. FIRST AID MEASURES**

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- 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.
- Eye contact : Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. In case of frostbite water should be lukewarm, not hot. If symptoms persist, call a physician.
- 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.

**Notes to physician**

- Treatment : Because of the possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should be used with special caution and only in situations of emergency life support. Treatment of overexposure should be directed at the control of symptoms and the clinical conditions. Treat frost-bitten areas as needed.

**SECTION 5. FIREFIGHTING MEASURES**

- Suitable extinguishing media : The product is not flammable.  
ASHRAE 34  
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.  
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
- Specific hazards during firefighting : 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.

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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.

In case of fire hazardous decomposition products may be produced such as:

Hydrogen fluoride  
Carbon monoxide  
Carbon dioxide (CO<sub>2</sub>)  
Carbonyl halides

Special protective equipment for firefighters : In the event of fire and/or explosion do not breathe fumes.  
Wear self-contained breathing apparatus and protective suit.  
No unprotected exposed skin areas.

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

**SECTION 6. ACCIDENTAL RELEASE MEASURES**

Personal precautions : 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.  
Avoid accumulation of vapours in low areas.  
Unprotected personnel should not return until air has been tested and determined safe.  
Ensure that the oxygen content is  $\geq 19.5\%$ .

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

Methods for cleaning up : Ventilate the area.

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**SECTION 7. HANDLING AND STORAGE****Handling**

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.  
Follow all standard safety precautions for handling and use of compressed gas cylinders.  
Use authorized cylinders only.  
Protect cylinders from physical damage.  
Do not puncture or drop cylinders, expose them to open flame or excessive heat.  
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.

**Storage**

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.

**SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

Protective measures : Do not breathe vapour.  
Do not get in eyes, on skin, or on clothing.  
Ensure that eyewash stations and safety showers are close to

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- the workstation location.
- Engineering measures : General room ventilation is adequate for storage and handling. Perform filling operations only at stations with exhaust ventilation facilities.
- 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
- Hand protection : Leather gloves  
In case of contact through splashing:  
Protective gloves  
Neoprene gloves  
Polyvinyl alcohol or nitrile- butyl-rubber gloves
- Skin and body protection : Avoid skin contact with leaking liquid (danger of frostbite).  
Wear cold insulating gloves/ face shield/ eye protection.
- Respiratory protection : In case of insufficient ventilation, wear suitable respiratory equipment.  
Wear a positive-pressure supplied-air respirator.  
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.  
For rescue and maintenance work in storage tanks use self-contained breathing apparatus.
- 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.

**Exposure Guidelines**

Components	CAS-No.	Value	Control parameters	Update	Basis
1,1,1-Trifluoroethane	420-46-2	TWA : time weighted average	(1,000 ppm)		Honeywell:Limit established by Honeywell International Inc.

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1,1,1-Trifluoroethane	420-46-2	TWA : time weighted average	3,400 mg/m <sup>3</sup> (1,000 ppm)	2007	WEEL:US. AIHA Workplace Environmental Exposure Level (WEEL) Guides
Pentafluoroethane	354-33-6	TWA : time weighted average	4,900 mg/m <sup>3</sup> (1,000 ppm)	2007	WEEL:US. AIHA Workplace Environmental Exposure Level (WEEL) Guides
Pentafluoroethane	354-33-6	TWA : time weighted average	(1,000 ppm)		Honeywell:Limit established by Honeywell International Inc.
1,1,1,2-Tetrafluoroethane	811-97-2	TWA : time weighted average	(1,000 ppm)		Honeywell:Limit established by Honeywell International Inc.
1,1,1,2-Tetrafluoroethane	811-97-2	TWA : time weighted average	4,240 mg/m <sup>3</sup> (1,000 ppm)	2007	WEEL:US. AIHA Workplace Environmental Exposure Level (WEEL) Guides

**SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES**

Physical state : Liquefied gas

Color : colourless

Odor : weak

pH : Note: neutral

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Melting point/freezing point	: Note: no data available
Boiling point/boiling range	: -47.8 °C
Flash point	: Note: not applicable
Evaporation rate	: > 1 Method: Compared to CCl4.
Lower explosion limit	: Note: None
Upper explosion limit	: Note: None
Vapor pressure	: 12,610 hPa at 21.1 °C(70.0 °F) 25,572 hPa at 54.4 °C(129.9 °F)
Vapor density	: 3.43 Note: (Air = 1.0)
Density	: 1.08 g/cm <sup>3</sup> at 21.1 °C
Water solubility	: Note: Very slightly soluble in cold water, hot water.
Partition coefficient: n-octanol/water	: log Pow: 1.06 Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a)
Ignition temperature	: < 750 °C
Decomposition temperature	: > 250 °C



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Global warming potential (GWP) : 3,784  
Ozone depletion potential (ODP) : 0

**SECTION 10. STABILITY AND REACTIVITY**

Chemical stability : Stable under normal conditions.

Possibility of hazardous reactions : Hazardous polymerisation does not occur.

Conditions to avoid : Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C.  
Decomposes under high temperature.  
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.

Incompatible materials to avoid : Potassium  
Calcium  
Powdered metals  
Finely divided aluminium  
Magnesium  
Zinc

Hazardous decomposition products : In case of fire hazardous decomposition products may be produced such as:  
Gaseous hydrogen fluoride (HF).  
Carbonyl halides  
Carbon monoxide  
Carbon dioxide (CO<sub>2</sub>)

**SECTION 11. TOXICOLOGICAL INFORMATION**

Acute inhalation toxicity  
1,1,1-Trifluoroethane : LC50: > 540000 ppm  
Exposure time: 4 h  
Species: rat

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	LC50: > 106 mg/l Exposure time: 4 h Species: rat
Pentafluoroethane	: > 769000 ppm Exposure time: 4 h Species: rat
1,1,1,2-Tetrafluoroethane	: LC50: > 500000 ppm Exposure time: 4 h Species: rat
Sensitisation 1,1,1-Trifluoroethane	: Cardiac sensitization Species: dogs Note: 1,1,1,2-tetrafluoroethane (HFC-134a): Cardiac sensitisation threshold (dog): 80000 ppm.
Pentafluoroethane	: Cardiac sensitization Species: dogs Note: No-observed-effect level 75 000 ppm Lowest observable effect level 100 000 ppm
1,1,1,2-Tetrafluoroethane	: Cardiac sensitization Species: dogs Note: No-observed-effect level 50 000 ppm Lowest observable effect level 75 000 ppm
Repeated dose toxicity 1,1,1-Trifluoroethane	: Species: rat Application Route: Inhalation Exposure time: (90 d) NOEL: 40000 ppm Subchronic toxicity
Pentafluoroethane	: Species: rat Application Route: Inhalation Exposure time: (4 Weeks)

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NOEL: 50000 ppm  
Subchronic toxicity

1,1,1,2-Tetrafluoroethane : Species: rat  
NOEL: 40000 ppm

Genotoxicity in vitro  
1,1,1-Trifluoroethane : Test Method: Ames test  
Result: negative

Pentafluoroethane : Test Method: Ames test  
Result: negative

1,1,1,2-Tetrafluoroethane : Note: In vitro tests did not show mutagenic effects

: Cell type: Human lymphocytes  
Result: negative

: Cell type: Human lymphocytes  
Result: negative

: Cell type: Chinese Hamster Ovary Cells  
Result: negative

Genotoxicity in vivo  
1,1,1-Trifluoroethane : Species: mouse  
Cell type: Bone marrow  
Application Route: Inhalation  
Result: negative

Teratogenicity  
1,1,1-Trifluoroethane : Species: rat  
Application Route: Inhalation exposure  
NOAEL, Teratog: 40,000 ppm  
NOAEL, Maternal: 40,000 ppm  
Note: Did not show teratogenic effects in animal experiments.

Species: rabbit  
Application Route: Inhalation exposure  
NOAEL, Teratog: 40,000 ppm

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- NOAEL,Maternal: 40,000 ppm  
Note: Did not show teratogenic effects in animal experiments.
- Pentafluoroethane : Species: rabbit  
Application Route: Inhalation exposure  
NOAEL, Teratog: 50,000 ppm  
NOAEL, Maternal: 50,000 ppm  
Note: Did not show teratogenic effects in animal experiments.
- Species: rat  
Application Route: Inhalation exposure  
NOAEL, Teratog: 50,000 ppm  
NOAEL, Maternal: 50,000 ppm  
Note: Did not show teratogenic effects in animal experiments.
- Further information : Note: Acute Health Hazard Ethane, pentafluoro- (HFC-125): Cardiac sensitisation threshold (dog): 75000 ppm. 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. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Irritating to eyes and skin. Rapid evaporation of the liquid may cause frostbite. Avoid skin contact with leaking liquid (danger of frostbite). May cause cardiac arrhythmia. Chronic Health Hazard 1,1,1-trifluoroethane (HFC-143a): Not mutagenic in AMES Test.

**SECTION 12. ECOLOGICAL INFORMATION**

- Biodegradability  
Pentafluoroethane : Result: Not readily biodegradable.  
Value: 5 %  
Method: OECD 301 D

**Further information on ecology**

- Additional ecological information : This product is subject to U.S. Environmental Protection Agency Clean Air Act Regulations at 40 CFR Part 82. This product contains greenhouse gases which may contribute to global warming. Do NOT vent to the atmosphere. To comply with provisions of the U.S. Clean Air Act, any

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residual must be recovered.

**SECTION 13. DISPOSAL CONSIDERATIONS**

- Disposal methods : Observe all Federal, State, and Local Environmental regulations.
- Note : This product is subject to U.S. Environmental Protection Agency Clean Air Act Regulations Section 608 in 40 CFR Part 82 regarding refrigerant recycling.

**SECTION 14. TRANSPORT INFORMATION**

- DOT** UN/ID No. : UN 3337  
 Proper shipping name : REFRIGERANT GAS R 404A  
 Class : 2.2  
 Packing group :  
 Hazard Labels : 2.2
- IATA** UN/ID No. : UN 3337  
 Description of the goods : REFRIGERANT GAS R 404A  
 Class : 2.2  
 Hazard Labels : 2.2  
 Packing instruction (cargo aircraft) : 200  
 Packing instruction (passenger aircraft) : 200
- IMDG** UN/ID No. : UN 3337  
 Description of the goods : REFRIGERANT GAS R 404A  
 Class : 2.2  
 Hazard Labels : 2.2  
 EmS Number : F-C, S-V  
 Marine pollutant : no

**SECTION 15. REGULATORY INFORMATION****Inventories**

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US. Toxic Substances Control Act : On TSCA Inventory

Australia. Industrial Chemical (Notification and Assessment) Act : On the inventory, or in compliance with the inventory

Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL) : 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. Toxic Chemical Control Law (TCCL) List : On the inventory, or in compliance with the inventory

Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act : On the inventory, or in compliance with the inventory

China. Inventory of Existing Chemical Substances : On the inventory, or in compliance with the inventory

NZIOC - New Zealand : On the inventory, or in compliance with the inventory

**National regulatory information**

**SARA 302 Components** : SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components** : SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

**SARA 311/312 Hazards** : Acute Health Hazard  
Sudden Release of Pressure Hazard

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**California Prop. 65** : This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

**New Jersey RTK** : 1,1,1-Trifluoroethane 420-46-2

**WHMIS Classification** : A: Compressed Gas  
This product has been classified according to the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR.

**Global warming potential** : 3,784

**Ozone depletion potential (ODP)** : 0

**SECTION 16. OTHER INFORMATION**

	<b>HMIS III</b>	<b>NFPA</b>
Health hazard	: 1	2
Flammability	: 1	1
Physical Hazard	: 0	
Instability	:	0

Hazard rating and rating systems (e.g. HMIS® III, NFPA): This information is intended solely for the use of individuals trained in the particular system.

**Further information**

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

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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 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.

Changes since the last version are highlighted in the margin. This version replaces all previous versions.

Previous Issue Date: 08/16/2012

Prepared by Honeywell Performance Materials and Technologies Product Stewardship Group