

Genetron® MP66 (R-401B)**000000011266**

Version 2.4

Revision Date 09/13/2012

Print Date 08/28/2013

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Genetron® MP66 (R-401B)

MSDS Number : 000000011266

Product Use Description : Refrigerant

Company : 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 (PROSAR): 1-800-498-5701 or +1-651-523-0309**
: **Transportation (CHEMTREC): 1-800-424-9300 or +1-703-527-3887**
:
: (24 hours/day, 7 days/week)

SECTION 2. HAZARDS IDENTIFICATION**Emergency Overview**

Form : compressed liquefied gas

Color : colourless

Odor : slight ether-like

Hazard Summary : Warning! Container under pressure. This product is not flammable at ambient temperatures and atmospheric pressure. Gas reduces oxygen available for breathing. Causes asphyxiation in high concentrations. The victim will not realize that he/she is suffocating. Inhalation may cause central nervous system effects. May cause cardiac arrhythmia. May cause drowsiness and dizziness. Irritating to eyes and skin. Avoid contact with skin, eyes and clothing. At higher temperatures, (>250 C), decomposition products may

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include hydrofluoric acid (HF) and carbonyl halides. The ACGIH Threshold Limit Values (2007) for Hydrogen Fluoride are TLV-TWA 0.5 ppm and Ceiling Exposure Limit 2 ppm.

Potential Health Effects

- Skin** : Avoid skin contact with leaking liquid (danger of frostbite).
May cause frostbite.
Irritating to skin.
- Eyes** : Causes serious eye irritation.
May cause frostbite.
- Ingestion** : Unlikely route of exposure.
Effects due to ingestion may include:
Gastrointestinal discomfort
- Inhalation** : Gas reduces oxygen available for breathing.
Causes asphyxiation in high concentrations. The victim will not realize that he/she is suffocating.
Inhalation may cause central nervous system effects.
May cause cardiac arrhythmia.
Vapours may cause drowsiness and dizziness.
- Chronic Exposure** : None known.

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 Name	CAS-No.	Concentration
Chlorodifluoromethane	75-45-6	60.50 - 62.50 %
1-Chloro-1,2,2,2-tetrafluoroethane	2837-89-0	9.50 - 11.50 %

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1,1-Difluoroethane

75-37-6

27.00 - 28.00 %

SECTION 4. FIRST AID MEASURES

- 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.

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- 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.
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:
Gaseous hydrogen chloride (HCl).
Hydrogen fluoride
Carbon monoxide
Carbon dioxide (CO₂)
Carbonyl halides
- Special protective equipment for firefighters : In the event of fire and/or explosion do not breathe fumes.
Wear full protective clothing and self-contained breathing apparatus.
No unprotected exposed skin areas.

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 $\geq 19.5\%$.

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

Methods for cleaning up : Ventilate the area.

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.

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SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

- Protective measures : Do not breathe vapour.
Avoid contact with skin, eyes and clothing.
Ensure that eyewash stations and safety showers are close to 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.
Avoid contact with skin, eyes and clothing.
Remove and wash contaminated clothing before re-use.
Keep working clothes separately.

Exposure Guidelines

Components	CAS-No.	Value	Control parameters	Update	Basis

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Chlorodifluoromethane	75-45-6	TWA : time weighted average	(1,000 ppm)	2008	ACGIH:US. ACGIH Threshold Limit Values
Chlorodifluoromethane	75-45-6	STEL : Short term exposure limit	4,375 mg/m3 (1,250 ppm)	2005	NIOSH/GUIDE:US. NIOSH: Pocket Guide to Chemical Hazards
Chlorodifluoromethane	75-45-6	REL : Recomm ended exposure limit (REL):	3,500 mg/m3 (1,000 ppm)	2005	NIOSH/GUIDE:US. NIOSH: Pocket Guide to Chemical Hazards
Chlorodifluoromethane	75-45-6	TWA : time weighted average	3,500 mg/m3 (1,000 ppm)	1989	Z1A:US. OSHA Table Z-1-A (29 CFR 1910.1000)
1-Chloro-1,2,2,2-tetrafluoroethane	2837-89-0	TWA : time weighted average	(1,000 ppm)	2007	WEEL:US. Workplace Environmental Exposure Level (WEEL) Guides
1-Chloro-1,2,2,2-tetrafluoroethane	2837-89-0	TWA : time weighted average	(1,000 ppm)	1994	Honeywell:Limit established by Honeywell International Inc.
1,1-Difluoroethane	75-37-6	TWA : time weighted average	2,700 mg/m3 (1,000 ppm)	2007	WEEL:US. Workplace Environmental Exposure Level (WEEL) Guides

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1,1-Difluoroethane	75-37-6	TWA : time weighted average	(1,000 ppm)	Honeywell: Limit established by Honeywell International Inc.
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SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	: compressed liquefied gas
Color	: colourless
Odor	: slight ether-like
pH	: Note: neutral
Melting point/freezing point	: Note: not determined
Boiling point/boiling range	: -34.7 °C
Flash point	: Note: not applicable
Evaporation rate	: > 1 Method: Compared to CCl ₄ .
Lower explosion limit	: Note: None
Upper explosion limit	: Note: None
Vapor pressure	: 6,536 - 7,419 hPa at 21.1 °C(70.0 °F) 15,878 - 17,278 hPa at 54.4 °C(129.9 °F)
Vapor density	: ca. 3 Note: (Air = 1.0)

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Density	:	1.19 g/cm ³ at 25 °C
Water solubility	:	1 g/l at 25 °C at 1,013 hPa
Ignition temperature	:	Note: not determined
Decomposition temperature	:	> 250 °C
Molecular Weight	:	92.9 g/mol
Global warming potential (GWP)	:	1,288
Ozone depletion potential (ODP)	:	0.04

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	:	Finely divided aluminium Potassium Calcium Powdered metals Aluminium Magnesium

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Zinc

Hazardous decomposition products : In case of fire hazardous decomposition products may be produced such as:
 Gaseous hydrogen chloride (HCl).
 Gaseous hydrogen fluoride (HF).
 Carbonyl halides
 Carbon monoxide
 Carbon dioxide (CO₂)

SECTION 11. TOXICOLOGICAL INFORMATION

Acute oral toxicity
 1,1-Difluoroethane : LDLo: > 1,500 mg/kg
 Species: rat
 Note: No deaths

Acute inhalation toxicity : LC50: > 300000 ppm
 Exposure time: 4 h
 Species: rat
 Test substance: Chlorodifluoromethane (HCFC-22)

: LC50: 360000 ppm
 Exposure time: 4 h
 Species: rat
 Test substance: 2-chloro-1,1,1,2-tetrafluoroethane. (HCFC-124)

Sensitisation
 Chlorodifluoromethane : Cardiac sensitization
 Species: dogs
 Note: Chlorodifluoromethane (HCFC-22): Cardiac sensitisation threshold (dog): 50000 ppm.

1,1-Difluoroethane : Cardiac sensitization
 Note: No-observed-effect level
 >150,000 ppm

Repeated dose toxicity

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- Chlorodifluoromethane : Species: rat
Application Route: Inhalation
Exposure time: Lifetime Exposure ()
NOEL: 10000 ppm
Lifetime exposure of male rats was associated with a small increase in salivary gland fibrosarcomas.
- 1-Chloro-1,2,2,2-tetrafluoroethane : Species: rat (pups)
NOEL: 50000 ppm
Teratogenicity

Species: rat (dams)
NOEL: 15000 ppm
Teratogenicity
- 1-Chloro-1,2,2,2-tetrafluoroethane : Note: In vitro tests did not show mutagenic effects
1,1-Difluoroethane : Test Method: Ames test
Result: negative
- Carcinogenicity
1,1-Difluoroethane : Species: rat
Application Route: Inhalation
Exposure time: two-year
Note: Did not show carcinogenic effects in animal experiments.
- Teratogenicity
1-Chloro-1,2,2,2-tetrafluoroethane : Species: rat
Application Route: Inhalation exposure
Note: Did not show teratogenic effects in animal experiments.

Species: rabbit
Application Route: Inhalation exposure
Note: Did not show teratogenic effects in animal experiments.
- Further information : Note: Acute Health Hazard Chlorodifluoromethane (HCFC-22): Cardiac sensitisation threshold (dog): 50000 ppm. 2-chloro-1,1,1,2- tetrafluoroethane. (HCFC-124): Cardiac sensitisation threshold (dog): 25000 ppm. Vapours are heavier

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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 In vitro tests did not show mutagenic effects In vivo tests did not show mutagenic effects

SECTION 12. ECOLOGICAL INFORMATION**Toxicity to fish**

Chlorodifluoromethane : static test
LC50: 777 mg/l
Exposure time: 96 h
Species: Danio rerio (zebra fish)

Toxicity to daphnia and other aquatic invertebrates

Chlorodifluoromethane : static test
EC50: 433 mg/l
Exposure time: 48 h
Species: Daphnia magna (Water flea)

Further information on ecology

Additional ecological information : 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 residual must be recovered.
This product is subject to U.S. Environmental Protection Agency Clean Air Act Regulations at 40 CFR Part 82. Section 611 requires the following label text on all shipments of this product:
Warning: Contains Chlorotetrafluoroethane (HCFC-124),
Warning: Contains Chlorodifluoromethane (HCFC-22), a substance which harms public health and environment by destroying ozone in the upper atmosphere.
Refer to sections 610 and 612 for list of acceptable and unacceptable uses for this product.

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SECTION 13. DISPOSAL CONSIDERATIONS

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 3163
 Proper shipping name : LIQUEFIED GAS, N.O.S.
 (Chlorodifluoromethane, 1,1-Difluoroethane, 1-Chloro-1,2,2,2-tetrafluoroethane)
 Class : 2.2
 Packing group :
 Hazard Labels : 2.2

IATA UN/ID No. : UN 3163
 Description of the goods : LIQUEFIED GAS, N.O.S.
 (Chlorodifluoromethane, 1,1-Difluoroethane, 1-Chloro-1,2,2,2-tetrafluoroethane)
 Class : 2.2
 Hazard Labels : 2.2
 Packing instruction (cargo aircraft) : 200
 Packing instruction (passenger aircraft) : 200

IMDG UN/ID No. : UN 3163
 Description of the goods : LIQUEFIED GAS, N.O.S.
 (CHLORODIFLUOROMETHANE, 1,1-DIFLUOROETHANE, 1-CHLORO-1,2,2,2-TETRAFLUOROETHANE)
 Class : 2.2
 Hazard Labels : 2.2
 EmS Number : F-C, S-V
 Marine pollutant : no

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SECTION 15. REGULATORY INFORMATION**Inventories**

- 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 list.
- Korea. Existing Chemicals Inventory (KECI) : 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
- TSCA 12B : US. Toxic Substances Control Act (TSCA) Section 12(b) Export Notification (40 CFR 707, Subpt D)
- 1-Chloro-1,1,2,2-tetrafluoroethane 354-25-6

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** : The following components are subject to reporting levels established by SARA Title III, Section 313:
: Chlorodifluoromethane 75-45-6

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	:	1-Chloro-1,2,2,2-tetrafluoroethane	2837-89-0
	:	1-Chloro-1,1,2,2-tetrafluoroethane	354-25-6
SARA 311/312 Hazards	:	Acute Health Hazard Sudden Release of Pressure Hazard	
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.	
Massachusetts RTK	:	Chlorodifluoromethane	75-45-6
	:	1,1-Difluoroethane	75-37-6
New Jersey RTK	:	Chlorodifluoromethane	75-45-6
	:	1-Chloro-1,2,2,2-tetrafluoroethane	2837-89-0
	:	1,1-Difluoroethane	75-37-6
	:	1-Chloro-1,1,2,2-tetrafluoroethane	354-25-6
Pennsylvania RTK	:	Chlorodifluoromethane	75-45-6
	:	1-Chloro-1,2,2,2-tetrafluoroethane	2837-89-0
	:	1,1-Difluoroethane	75-37-6
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	:	1,288	
Ozone depletion potential (ODP)	:	0.04	

SECTION 16. OTHER INFORMATION**HMIS III****NFPA**

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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 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: 08/25/2009

Prepared by: Honeywell Performance Materials and Technologies Product Stewardship Group