

SAFETY DATA SHEET

Honeywell

Sid Harvey item # R422DX25, R422DX110, & R422DUR

SDS Z0464

Genetron® 422D

10642747

Version 1.5

Revision Date 05/02/2019

Print Date 07/26/2019

SECTION 1. IDENTIFICATION

Product name : Genetron® 422D

Number : 000000011691

Product Use Description : Refrigerant

Manufacturer or supplier's details : Honeywell International Inc.
115 Tabor Road
Morris Plains, NJ 07950-2546

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 : odourless

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

Genetron® 422D

10642747

Version 1.5

Revision Date 05/02/2019

Print Date 07/26/2019

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

:

Causes asphyxiation in high concentrations. The victim will not
realize that he/she is suffocating.
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
Pentafluoroethane	354-33-6	65.10 %
1,1,1,2-Tetrafluoroethane	811-97-2	31.50 %
Iso-butane	75-28-5	3.40 %

Genetron® 422D

10642747

Version 1.5

Revision Date 05/02/2019

Print Date 07/26/2019

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

- Indication of immediate medical attention and special treatment needed, if necessary : 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.

SECTION 5. FIREFIGHTING MEASURES

- Suitable extinguishing media : The product is not flammable.
ASHRAE 34
Water spray
Carbon dioxide (CO2)
Foam
Dry chemical
- 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

Genetron® 422D

10642747

Version 1.5

Revision Date 05/02/2019

Print Date 07/26/2019

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:
Halogenated compounds
Hydrogen fluoride
Carbon oxides
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.

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

SECTION 6. ACCIDENTAL RELEASE MEASURES

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.
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 and materials for : Ventilate the area.

Genetron® 422D**10642747**

Version 1.5

Revision Date 05/02/2019

Print Date 07/26/2019

containment and cleaning
up

SECTION 7. HANDLING AND STORAGE**Handling**

Precautions for 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.
Use only in well-ventilated areas.
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.

Precautions for safe handling : Perform filling operations only at stations with exhaust ventilation facilities.
Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Advice on protection against fire and explosion : Can form a combustible mixture with air at pressures above atmospheric pressure.
Keep product and empty container away from heat and sources of ignition.

Storage

Conditions for safe storage, including any incompatibilities : 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.

Genetron® 422D

10642747

Version 1.5

Revision Date 05/02/2019

Print Date 07/26/2019

Protect cylinders from physical damage.

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
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.
Self-contained breathing apparatus (EN 133) |
| 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. |

SAFETY DATA SHEET

Honeywell

Genetron® 422D

10642747

Version 1.5

Revision Date 05/02/2019

Print Date 07/26/2019

Exposure Guidelines

Components	CAS-No.	Value	Control parameters	Update	Basis
Pentafluoroethane	354-33-6	TWA : Time weighted average	4,900 mg/m3 (1,000 ppm)	2007	WEEL:US. OARS. WEELs Workplace Environmental Exposure Level Guide
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/m3 (1,000 ppm)	2007	WEEL:US. OARS. WEELs Workplace Environmental Exposure Level Guide
Iso-butane	75-28-5	STEL : Short term exposure limit	(1,000 ppm)	02 2013	ACGIH:US. ACGIH Threshold Limit Values
Iso-butane	75-28-5	REL : Recommended exposure limit (REL):	1,900 mg/m3 (800 ppm)	2005	NIOSH/GUIDE:US. NIOSH: Pocket Guide to Chemical Hazards

Genetron® 422D

10642747

Version 1.5

Revision Date 05/02/2019

Print Date 07/26/2019

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	: Liquefied gas
Color	: colourless
Odor	: odourless
Odor threshold	: Note: no data available
pH	: Note: neutral
Freezing point	: Note: no data available
Boiling point/boiling range	: -43 °C
Flash point	: Note: Not applicable
Lower explosion limit	: Note: None
Upper explosion limit	: Note: None
Vapor pressure	: 10,152 hPa at 21.1 °C(70.0 °F) 23,091 hPa at 54.4 °C(129.9 °F)
Vapor density	: 3.0 Note: (Air = 1.0)
Density	: 1.15 g/cm3 at 25 °C
Water solubility	: Note: not determined

Genetron® 422D**10642747**

Version 1.5

Revision Date 05/02/2019

Print Date 07/26/2019

Partition coefficient: n-octanol/water	: Note: no data available
Ignition temperature	: Note: not determined
Decomposition temperature	: > 250 °C Note: To avoid thermal decomposition, do not overheat.
Viscosity, dynamic	: Note: no data available
Viscosity, kinematic	: Note: no data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	: Not classified as a reactivity hazard.
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 55 °C. Can form a combustible mixture with air at pressures above atmospheric pressure. Do not mix with oxygen or air above atmospheric pressure.
Incompatible materials	: Strong oxidizing agents Finely divided metal powders such as aluminum, magnesium, or zinc.
Hazardous decomposition products	: Halogenated compounds Carbon oxides Hydrogen fluoride Carbonyl halides

Genetron® 422D

10642747

Version 1.5

Revision Date 05/02/2019

Print Date 07/26/2019

SECTION 11. TOXICOLOGICAL INFORMATION

Acute inhalation toxicity

Pentafluoroethane : > 769000 ppm
Exposure time: 4 h
Species: Rat

1,1,1,2-Tetrafluoroethane : LC50: > 500000 ppm
Exposure time: 4 h
Species: Rat

Iso-butane : LC50: 570000 ppm
Exposure time: 15 min
Species: Rat

Sensitisation

Pentafluoroethane : Cardiac sensitization
Species: dogs
Note: No-observed-effect level
75 000 ppm
Lowest observed effect level
100 000 ppm

1,1,1,2-Tetrafluoroethane : Cardiac sensitization
Species: dogs
Note: No-observed-effect level
50 000 ppm
Lowest observed effect level
75 000 ppm

Repeated dose toxicity

Pentafluoroethane : Species: Rat
Application Route: Inhalation
Exposure time: (4 Weeks)
NOEL: 50000 ppm
Subchronic toxicity

1,1,1,2-Tetrafluoroethane : Species: Rat

Genetron® 422D

10642747

Version 1.5

Revision Date 05/02/2019

Print Date 07/26/2019

	NOEL: 40000 ppm
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: Chinese Hamster Ovary Cells Result: negative
Teratogenicity 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. 1,1,1,2-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.

SECTION 12. ECOLOGICAL INFORMATION

Biodegradability

Genetron® 422D**10642747**

Version 1.5

Revision Date 05/02/2019

Print Date 07/26/2019

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

Further information on ecology

Additional ecological information : Accumulation in aquatic organisms is unlikely.
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 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 3163
Proper shipping name : LIQUEFIED GAS, N.O.S.
(Pentafluoroethane, 1,1,1,2-Tetrafluoroethane, Isobutane)
Class : 2.2
Packing group :
Hazard Labels : 2.2

IATA UN/ID No. : UN 3163
Description of the goods : LIQUEFIED GAS, N.O.S.
(Pentafluoroethane, 1,1,1,2-Tetrafluoroethane, Isobutane)
Class : 2.2
Hazard Labels : 2.2
Packing instruction (cargo) : 200

SAFETY DATA SHEET

Honeywell

Genetron® 422D

10642747

Version 1.5

Revision Date 05/02/2019

Print Date 07/26/2019

	aircraft)		
	Packing instruction	:	200
	(passenger aircraft)		
IMDG	UN/ID No.	:	UN 3163
	Description of the goods	:	LIQUEFIED GAS, N.O.S. (PENTAFLUOROETHANE, 1,1,1,2-TETRAFLUOROETHANE, ISOBUTANE)
	Class	:	2.2
	Hazard Labels	:	2.2
	EmS Number	:	F-C, S-V
	Marine pollutant	:	no

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
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. 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

Genetron® 422D

10642747

Version 1.5

Revision Date 05/02/2019

Print Date 07/26/2019

National regulatory information

- SARA 302 Components** : No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.
- SARA 313 Components** : 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
- 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	: Iso-butane	75-28-5
New Jersey RTK	: Pentafluoroethane	354-33-6
	: 1,1,1,2-Tetrafluoroethane	811-97-2
	: Iso-butane	75-28-5
Pennsylvania RTK	: Pentafluoroethane	354-33-6
	: 1,1,1,2-Tetrafluoroethane	811-97-2
	: Iso-butane	75-28-5

SECTION 16. OTHER INFORMATION

	HMIS III	NFPA
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.

Genetron® 422D**10642747**

Version 1.5

Revision Date 05/02/2019

Print Date 07/26/2019

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: 05/21/2014

Prepared by Honeywell Performance Materials and Technologies Product Stewardship Group

SAFETY DATA SHEET

Honeywell

Genetron 422D 25LB/11.3KG Jug

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 03/28/2018

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Genetron® 422D

MSDS Number : 000000011691

Product Use Description : Refrigerant

Manufacturer or supplier's details : Honeywell International Inc.
115 Tabor Road
Morris Plains, NJ 07950-2546

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 : odourless

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

SAFETY DATA SHEET

Honeywell

Genetron 422D 25LB/11.3KG Jug

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 03/28/2018

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: Causes asphyxiation in high concentrations. The victim will not
realize that he/she is suffocating.
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
Pentafluoroethane	354-33-6	65.10 %
1,1,1,2-Tetrafluoroethane	811-97-2	31.50 %
Iso-butane	75-28-5	3.40 %

SAFETY DATA SHEET

Honeywell

Genetron 422D 25LB/11.3KG Jug

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 03/28/2018

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.

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

SAFETY DATA SHEET

Honeywell

Genetron 422D 25LB/11.3KG Jug

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 03/28/2018

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:
Hydrogen halides
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 $\geq 19.5\%$.

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

Methods for cleaning up : Ventilate the area.

Genetron 422D 25LB/11.3KG Jug

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 03/28/2018

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.
Use only in well-ventilated areas.
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.

Handling : Perform filling operations only at stations with exhaust ventilation facilities.
Containers which are opened must be carefully resealed and kept upright to prevent leakage.

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.

SAFETY DATA SHEET

Honeywell

Genetron 422D 25LB/11.3KG Jug

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 03/28/2018

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
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
------------	---------	-------	--------------------	--------	-------

SAFETY DATA SHEET

Honeywell

Genetron 422D 25LB/11.3KG Jug

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 03/28/2018

Pentafluoroethane	354-33-6	TWA : time weighted average	4,900 mg/m3 (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/m3 (1,000 ppm)	2007	WEEL:US. AIHA Workplace Environmental Exposure Level (WEEL) Guides
Iso-butane	75-28-5	TWA : time weighted average	(1,000 ppm)	01 2010	ACGIH:US. ACGIH Threshold Limit Values
Iso-butane	75-28-5	REL : Recomm ended exposure limit (REL):	1,900 mg/m3 (800 ppm)	2005	NIOSH/GUIDE:US. NIOSH: Pocket Guide to Chemical Hazards

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state : Liquefied gas

SAFETY DATA SHEET

Honeywell

Genetron 422D 25LB/11.3KG Jug

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 03/28/2018

Color : colourless

Odor : odourless

pH : Note: neutral

Melting point/freezing point : Note: no data available

Boiling point/boiling range : -43 °C

Flash point : Note: not applicable

Lower explosion limit : Note: None

Upper explosion limit : Note: None

Vapor pressure : 10,152 hPa
at 21.1 °C(70.0 °F)
23,091 hPa
at 54.4 °C(129.9 °F)

Vapor density : 3.0 Note: (Air = 1.0)

Density : 1.15 g/cm³ at 25 °C

Water solubility : Note: not determined

Ignition temperature : Note: not determined

Decomposition temperature : > 250 °C
Note: To avoid thermal decomposition, do not overheat.

SAFETY DATA SHEET

Honeywell

Genetron 422D 25LB/11.3KG Jug

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 03/28/2018

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 Powdered metals Aluminium Magnesium Zinc
Hazardous decomposition products	: In case of fire hazardous decomposition products may be produced such as: Hydrogen halides Hydrogen fluoride Carbon monoxide Carbon dioxide (CO ₂) Carbonyl halides

SECTION 11. TOXICOLOGICAL INFORMATION

Acute inhalation toxicity Pentafluoroethane	: > 769000 ppm Exposure time: 4 h Species: rat
1,1,1,2-Tetrafluoroethane	: LC50: > 500000 ppm Exposure time: 4 h

SAFETY DATA SHEET

Honeywell

Genetron 422D 25LB/11.3KG Jug

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 03/28/2018

	Species: rat
Iso-butane	: LC50: 570000 ppm Exposure time: 15 min Species: rat
Sensitisation 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 Pentafluoroethane	: Species: rat Application Route: Inhalation Exposure time: (4 Weeks) NOEL: 50000 ppm Subchronic toxicity
1,1,1,2-Tetrafluoroethane	: Species: rat NOEL: 40000 ppm
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: Chinese Hamster Ovary Cells Result: negative

SAFETY DATA SHEET

Honeywell

Genetron 422D 25LB/11.3KG Jug

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 03/28/2018

Teratogenicity
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.
1,1,1,2-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.

SECTION 12. ECOLOGICAL INFORMATION

Biodegradability
Pentafluoroethane

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

Further information on ecology

Additional ecological
information

: Accumulation in aquatic organisms is unlikely.
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.

SAFETY DATA SHEET

Honeywell

Genetron 422D 25LB/11.3KG Jug

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 03/28/2018

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 3163
Proper shipping name : LIQUEFIED GAS, N.O.S.
(Pentafluoroethane, 1,1,1,2-Tetrafluoroethane, Isobutane)
Class : 2.2
Packing group :
Hazard Labels : 2.2

IATA UN/ID No. : UN 3163
Description of the goods : LIQUEFIED GAS, N.O.S.
(Pentafluoroethane, 1,1,1,2-Tetrafluoroethane, Isobutane)
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.
(PENTAFLUOROETHANE, 1,1,1,2-TETRAFLUOROETHANE, ISOBUTANE)
Class : 2.2
Hazard Labels : 2.2
EmS Number : F-C, S-V
Marine pollutant : no

SAFETY DATA SHEET

Honeywell

Genetron 422D 25LB/11.3KG Jug

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 03/28/2018

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.
- 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.

SAFETY DATA SHEET

Honeywell

Genetron 422D 25LB/11.3KG Jug

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 03/28/2018

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 : Iso-butane 75-28-5

New Jersey RTK : Pentafluoroethane 354-33-6
: 1,1,1,2-Tetrafluoroethane 811-97-2
: Iso-butane 75-28-5

Pennsylvania RTK : Pentafluoroethane 354-33-6
: 1,1,1,2-Tetrafluoroethane 811-97-2
: Iso-butane 75-28-5

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.

SECTION 16. OTHER INFORMATION

	HMIS III	NFPA
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

SAFETY DATA SHEET

Honeywell

Genetron 422D 25LB/11.3KG Jug

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 03/28/2018

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: 09/13/2012

Prepared by Honeywell Performance Materials and Technologies Product Stewardship Group

SAFETY DATA SHEET

Honeywell

Sid Harvey item # R422DX25

SDS # Z0464

Genetron 422D 25lb/11.3kg Jug - Cn

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 07/27/2016

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Genetron® 422D

MSDS Number : 000000011691

Product Use Description : Refrigerant

Manufacturer or supplier's details : Honeywell International Inc.
115 Tabor Road
Morris Plains, NJ 07950-2546

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 : odourless

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

SAFETY DATA SHEET

Honeywell

Genetron 422D 25lb/11.3kg Jug - Cn

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 07/27/2016

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: Causes asphyxiation in high concentrations. The victim will not
realize that he/she is suffocating.
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
Pentafluoroethane	354-33-6	65.10 %
1,1,1,2-Tetrafluoroethane	811-97-2	31.50 %
Iso-butane	75-28-5	3.40 %

SAFETY DATA SHEET

Honeywell

Genetron 422D 25lb/11.3kg Jug - Cn

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 07/27/2016

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.

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

SAFETY DATA SHEET

Honeywell

Genetron 422D 25lb/11.3kg Jug - Cn

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 07/27/2016

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:
Hydrogen halides
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 $\geq 19.5\%$.

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

Methods for cleaning up : Ventilate the area.

SAFETY DATA SHEET

Honeywell

Genetron 422D 25lb/11.3kg Jug - Cn

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 07/27/2016

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.
Use only in well-ventilated areas.
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.

Handling : Perform filling operations only at stations with exhaust ventilation facilities.
Containers which are opened must be carefully resealed and kept upright to prevent leakage.

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.

SAFETY DATA SHEET

Honeywell

Genetron 422D 25lb/11.3kg Jug - Cn

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 07/27/2016

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
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
------------	---------	-------	--------------------	--------	-------

SAFETY DATA SHEET

Honeywell

Genetron 422D 25lb/11.3kg Jug - Cn

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 07/27/2016

Pentafluoroethane	354-33-6	TWA : time weighted average	4,900 mg/m3 (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/m3 (1,000 ppm)	2007	WEEL:US. AIHA Workplace Environmental Exposure Level (WEEL) Guides
Iso-butane	75-28-5	TWA : time weighted average	(1,000 ppm)	01 2010	ACGIH:US. ACGIH Threshold Limit Values
Iso-butane	75-28-5	REL : Recomm ended exposure limit (REL):	1,900 mg/m3 (800 ppm)	2005	NIOSH/GUIDE:US. NIOSH: Pocket Guide to Chemical Hazards

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state : Liquefied gas

SAFETY DATA SHEET

Honeywell

Genetron 422D 25lb/11.3kg Jug - Cn

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 07/27/2016

Color : colourless
Odor : odourless
pH : Note: neutral
Melting point/freezing point : Note: no data available
Boiling point/boiling range : -43 °C

Flash point : Note: not applicable

Lower explosion limit : Note: None

Upper explosion limit : Note: None

Vapor pressure : 10,152 hPa
at 21.1 °C(70.0 °F)
23,091 hPa
at 54.4 °C(129.9 °F)

Vapor density : 3.0 Note: (Air = 1.0)

Density : 1.15 g/cm3 at 25 °C

Water solubility : Note: not determined

Ignition temperature : Note: not determined

Decomposition temperature : > 250 °C
Note: To avoid thermal decomposition, do not overheat.

SAFETY DATA SHEET

Honeywell

Genetron 422D 25lb/11.3kg Jug - Cn

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 07/27/2016

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 Powdered metals Aluminium Magnesium Zinc
Hazardous decomposition products	: In case of fire hazardous decomposition products may be produced such as: Hydrogen halides Hydrogen fluoride Carbon monoxide Carbon dioxide (CO2) Carbonyl halides

SECTION 11. TOXICOLOGICAL INFORMATION

Acute inhalation toxicity Pentafluoroethane	: > 769000 ppm Exposure time: 4 h Species: rat
1,1,1,2-Tetrafluoroethane	: LC50: > 500000 ppm Exposure time: 4 h

SAFETY DATA SHEET

Honeywell

Genetron 422D 25lb/11.3kg Jug - Cn

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 07/27/2016

	Species: rat
Iso-butane	: LC50: 570000 ppm Exposure time: 15 min Species: rat
Sensitisation 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 Pentafluoroethane	: Species: rat Application Route: Inhalation Exposure time: (4 Weeks) NOEL: 50000 ppm Subchronic toxicity
1,1,1,2-Tetrafluoroethane	: Species: rat NOEL: 40000 ppm
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: Chinese Hamster Ovary Cells Result: negative

SAFETY DATA SHEET

Honeywell

Genetron 422D 25lb/11.3kg Jug - Cn

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 07/27/2016

Teratogenicity
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.
1,1,1,2-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.

SECTION 12. ECOLOGICAL INFORMATION

Biodegradability
Pentafluoroethane

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

Further information on ecology

Additional ecological
information

: Accumulation in aquatic organisms is unlikely.
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.

SAFETY DATA SHEET

Honeywell

Genetron 422D 25lb/11.3kg Jug - Cn

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 07/27/2016

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 3163
Proper shipping name : LIQUEFIED GAS, N.O.S.
(Pentafluoroethane, 1,1,1,2-Tetrafluoroethane, Isobutane)
Class : 2.2
Packing group :
Hazard Labels : 2.2

IATA UN/ID No. : UN 3163
Description of the goods : LIQUEFIED GAS, N.O.S.
(Pentafluoroethane, 1,1,1,2-Tetrafluoroethane, Isobutane)
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.
(PENTAFLUOROETHANE, 1,1,1,2-TETRAFLUOROETHANE, ISOBUTANE)
Class : 2.2
Hazard Labels : 2.2
EmS Number : F-C, S-V
Marine pollutant : no

SAFETY DATA SHEET

Honeywell

Genetron 422D 25lb/11.3kg Jug - Cn

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 07/27/2016

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.
- 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.

SAFETY DATA SHEET

Honeywell

Genetron 422D 25lb/11.3kg Jug - Cn

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 07/27/2016

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 : Iso-butane 75-28-5

New Jersey RTK : Pentafluoroethane 354-33-6
1,1,1,2-Tetrafluoroethane 811-97-2
Iso-butane 75-28-5

Pennsylvania RTK : Pentafluoroethane 354-33-6
1,1,1,2-Tetrafluoroethane 811-97-2
Iso-butane 75-28-5

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.

SECTION 16. OTHER INFORMATION

	HMIS III	NFPA
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

SAFETY DATA SHEET

Honeywell

Genetron 422D 25lb/11.3kg Jug - Cn

000000011691

Version 1.4

Revision Date 05/21/2014

Print Date 07/27/2016

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: 09/13/2012

Prepared by Honeywell Performance Materials and Technologies Product Stewardship Group

Sid Harvey item #'s R422DX25 & R422DX110

**Freon™ MO29 (R-422D) Refrigerant**

Version 3.0

Revision Date 02/16/2016

Ref. 130000027389

This SDS adheres to the standards and regulatory requirements of the United States and may not meet the regulatory requirements in other countries.

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	: Freon™ MO29 (R-422D) Refrigerant
Tradename/Synonym	: ISCEON® MO29 R-422D MO29
Product Grade/Type	: ASHRAE Refrigerant number designation: R-422D
Product Use	: Refrigerant, For professional users only.
Restrictions on use	: Do not use product for anything outside of the above specified uses
Manufacturer/Supplier	: The Chemours Company FC, LLC 1007 Market Street Wilmington, DE 19899 United States of America
Product Information	: 1-844-773-CHEM (outside the U.S. 1-302-773-1000)
Medical Emergency	: 1-866-595-1473 (outside the U.S. 1-302-773-2000)
Transport Emergency	: CHEMTREC: +1-800-424-9300 (outside the U.S. +1-703-527-3887)

SECTION 2. HAZARDS IDENTIFICATION**Product hazard category**

Gases under pressure

Liquefied gas

**Freon™ MO29 (R-422D) Refrigerant**

Version 3.0

Revision Date 02/16/2016

Ref. 130000027389

Label content

Pictogram :



Signal word : Warning

Hazardous warnings : Contains gas under pressure; may explode if heated.

Hazardous prevention measures : Protect from sunlight. Store in a well-ventilated place.

Other hazards

Misuse or intentional inhalation abuse may lead to death without warning.

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

Rapid evaporation of the liquid may cause frostbite.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Concentration
Pentafluoroethane (HFC-125)	354-33-6	65.1 %
1,1,1,2-Tetrafluoroethane (HFC-134a)	811-97-2	31.5 %

**Freon™ MO29 (R-422D) Refrigerant**

Version 3.0

Revision Date 02/16/2016

Ref. 130000027389

Isobutane (HC-600a)	75-28-5	3.4 %
---------------------	---------	-------

SECTION 4. FIRST AID MEASURES

General advice	: Never give anything by mouth to an unconscious person. When symptoms persist or in all cases of doubt seek medical advice.
Inhalation	: Remove from exposure, lie down. Move to fresh air. Keep patient warm and at rest. Artificial respiration and/or oxygen may be necessary. Consult a physician.
Skin contact	: In case of contact, immediately flush skin with plenty of water for at least 15 minutes. Take off all contaminated clothing immediately. Consult a physician. Wash contaminated clothing before re-use. Treat for frostbite if necessary by gently warming affected area.
Eye contact	: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Consult a physician if necessary.
Ingestion	: Is not considered a potential route of exposure.
Most important symptoms/effects, acute and delayed	: Anaesthetic effects Light-headedness irregular heartbeat with a strange sensation in the chest, heart thumping, apprehension, feeling of fainting, dizziness or weakness
Protection of first-aiders	: If potential for exposure exists refer to Section 8 for specific personal protective equipment.
Notes to physician	: Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, that may be used in situations of emergency life support should be used with special caution.



Freon™ MO29 (R-422D) Refrigerant

Version 3.0

Revision Date 02/16/2016

Ref. 130000027389

SECTION 5. FIREFIGHTING MEASURES

- | | |
|---|---|
| Suitable extinguishing media | : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. |
| Unsuitable extinguishing media | : No applicable data available. |
| Specific hazards | : Cylinders are equipped with pressure and temperature relief devices, but may still rupture under fire conditions. Decomposition may occur. Contact of welding or soldering torch flame with high concentrations of refrigerant can result in visible changes in the size and colour of the torch flame. This flame effect will only occur in concentrations of product well above the recommended exposure limit. Therefore stop all work and ventilate to disperse refrigerant vapors from the work area before using any open flames. This substance is not flammable in air at temperatures up to 100 deg. C (212 deg. F) at atmospheric pressure. However, mixtures of this substance with high concentrations of air at elevated pressure and/or temperature can become combustible in the presence of an ignition source. This substance can also become combustible in an oxygen enriched environment (oxygen concentrations greater than that in air). Whether a mixture containing this substance and air, or this substance in an oxygen enriched atmosphere become combustible depends on the inter-relationship of 1) the temperature 2) the pressure, and 3) the proportion of oxygen in the mixture. In general, this substance should not be allowed to exist with air above atmospheric pressure or at high temperatures; or in an oxygen enriched environment. For example this substance should NOT be mixed with air under pressure for leak testing or other purposes. Experimental data have also been reported which indicate combustibility of this substance in the presence of certain concentrations of chlorine. |
| Special protective equipment for firefighters | : In the event of fire, wear self-contained breathing apparatus. Use personal protective equipment. Wear neoprene gloves during cleaning up work after a fire. |



Freon™ MO29 (R-422D) Refrigerant

Version 3.0

Revision Date 02/16/2016

Ref. 130000027389

Further information : Cool containers/tanks with water spray. Water runoff should be contained and neutralized prior to release.

SECTION 6. ACCIDENTAL RELEASE MEASURES

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Safeguards (Personnel) : Evacuate personnel to safe areas. Ventilate area, especially low or enclosed places where heavy vapours might collect.

Environmental precautions : Should not be released into the environment. In accordance with local and national regulations.

Spill Cleanup : Evaporates. Ventilate area using forced ventilation, especially low or enclosed places where heavy vapors might collect.

Accidental Release Measures : Avoid open flames and high temperatures. Self-contained breathing apparatus (SCBA) is required if a large release occurs.

SECTION 7. HANDLING AND STORAGE

Handling (Personnel) : Avoid breathing vapours or mist. Avoid contact with skin, eyes and clothing. Provide sufficient air exchange and/or exhaust in work rooms. For personal protection see section 8.

Handling (Physical Aspects) : Contact with chlorine or other strong oxidizing agents should also be avoided.

Dust explosion class : Not applicable

Storage : Valve protection caps and valve outlet threaded plugs must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<3000 psig) piping or systems. Never attempt to lift cylinder by its cap. Use a



Freon™ MO29 (R-422D) Refrigerant

Version 3.0

Revision Date 02/16/2016

Ref. 130000027389

check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Cylinders should be stored upright and firmly secured to prevent falling or being knocked over.

Separate full containers from empty containers. Keep at temperature not exceeding 52°C. Do not store near combustible materials. Avoid area where salt or other corrosive materials are present.

The product has an indefinite shelf life when stored properly.

Storage period : > 10 yr

Storage temperature : < 52 °C (< 126 °F)

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls : Normal ventilation for standard manufacturing procedures is generally adequate. Local exhaust should be used when large amounts are released. Mechanical ventilation should be used in low or enclosed places. Refrigerant Concentration monitors may be necessary to determine vapor concentrations in work areas prior to use of torches or other open flames, or if employees are entering enclosed areas.

Personal protective equipment

Respiratory protection : Under normal manufacturing conditions, no respiratory protection is required when using this product.

Hand protection : Additional protection: Impervious gloves

Eye protection : Wear safety glasses with side shields. Additionally wear a face shield where the possibility exists for face contact due to splashing, spraying or airborne contact with this material.

Protective measures : Self-contained breathing apparatus (SCBA) is required if a large release occurs.

Exposure Guidelines

Exposure Limit Values

Pentafluoroethane (HFC-125)

**Freon™ MO29 (R-422D) Refrigerant**

Version 3.0

Revision Date 02/16/2016

Ref. 130000027389

No applicable data available.

1,1,1,2-Tetrafluoroethane (HFC-134a)

No applicable data available.

Isobutane (HC-600a)

TLV

(ACGIH)

1,000 ppm

STEL

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical state : gaseous
Form : Liquefied gas
Color : colourless

Odor : slight, ether-like

Odor threshold : No applicable data available.

pH : neutral

Melting point/freezing point : Melting point/range
Not available for this mixture.

Boiling point/boiling range : Boiling point
-43.2 °C (-45.8 °F)

Flash point : does not flash

Evaporation rate : No applicable data available.

Flammability (solid, gas) : Not applicable

Upper explosion limit : Method: None per ASTM E681

**Freon™ MO29 (R-422D) Refrigerant**

Version 3.0

Revision Date 02/16/2016

Ref. 130000027389

Lower explosion limit	: Method: None per ASTM E681
Vapor pressure	: 11,279 hPa at 25 °C (77 °F)
Vapor density	: 3.9 at 25°C (77°F) and 1013 hPa (Air=1.0)
Specific gravity (Relative density)	: 1.15 at 25 °C (77 °F)
Water solubility	: No applicable data available.
Solubility(ies)	: No applicable data available.
Partition coefficient: n-octanol/water	: No applicable data available.
Auto-ignition temperature	: No applicable data available.
Decomposition temperature	: No applicable data available.
Viscosity, kinematic	: No applicable data available.
Viscosity, dynamic	: No applicable data available.
% Volatile	: 100 %

SECTION 10. STABILITY AND REACTIVITY

Reactivity	: No applicable data available.
Chemical stability	: Stable under recommended storage conditions.
Possibility of hazardous reactions	: Polymerization will not occur.
Conditions to avoid	: The product is not flammable in air under ambient conditions of temperature and pressure. When pressurised with air or oxygen, the mixture may become flammable. Certain mixtures of HCFCs or HFCs with chlorine may become flammable or reactive under certain conditions.

**Freon™ MO29 (R-422D) Refrigerant**

Version 3.0

Revision Date 02/16/2016

Ref. 130000027389

Incompatible materials	: Alkali metals Alkaline earth metals, Powdered metals, Powdered metal salts
Hazardous decomposition products	: Decomposition products are hazardous., This material can be decomposed by high temperatures (open flames, glowing metal surfaces, etc.) forming hydrofluoric acid and possibly carbonyl fluoride., These materials are toxic and irritating., Avoid contact with decomposition products

SECTION 11. TOXICOLOGICAL INFORMATION

Pentafluoroethane (HFC-125)

Inhalation 4 h LC50	: > 800000 ppm , Rat
Inhalation No Observed Adverse Effect Concentration	: 75000 ppm , Dog Cardiac sensitization
Inhalation Low Observed Adverse Effect Concentration (LOAEC)	: 100000 ppm , Dog Cardiac sensitization
Skin sensitization	: Does not cause respiratory sensitisation., human
Repeated dose toxicity	: Inhalation Rat - gas No toxicologically significant effects were found.
Carcinogenicity	: Not classifiable as a human carcinogen. Overall weight of evidence indicates that the substance is not carcinogenic.
Mutagenicity	: Animal testing did not show any mutagenic effects. Evidence suggests this substance does not cause genetic damage in cultured mammalian cells. Did not cause genetic damage in cultured bacterial cells.
Reproductive toxicity	: No toxicity to reproduction Animal testing showed no reproductive toxicity.
Teratogenicity	: Animal testing showed no developmental toxicity.



Freon™ MO29 (R-422D) Refrigerant

Version 3.0

Revision Date 02/16/2016

Ref. 130000027389

Further information	: Cardiac sensitisation threshold limit : 490000 mg/m3
1,1,1,2-Tetrafluoroethane (HFC-134a)	
Inhalation 4 h LC50	: > 567000 ppm , Rat
Inhalation No Observed Adverse Effect Concentration	: 40000 ppm , Dog Cardiac sensitization
Inhalation Low Observed Adverse Effect Concentration (LOAEC)	: 80000 ppm , Dog Cardiac sensitization
Skin irritation	: No skin irritation, Rabbit
Eye irritation	: No eye irritation, Rabbit
Skin sensitization	: Does not cause skin sensitisation., Guinea pig Does not cause respiratory sensitisation., Rat
Repeated dose toxicity	: Inhalation Rat - gas NOAEL: 50000, No toxicologically significant effects were found.
Carcinogenicity	: Not classifiable as a human carcinogen. Overall weight of evidence indicates that the substance is not carcinogenic.
Mutagenicity	: Animal testing did not show any mutagenic effects. Tests on bacterial or mammalian cell cultures did not show mutagenic effects.
Reproductive toxicity	: No toxicity to reproduction No effects on or via lactation Animal testing showed no reproductive toxicity.
Teratogenicity	: Animal testing showed no developmental toxicity.



Freon™ MO29 (R-422D) Refrigerant

Version 3.0

Revision Date 02/16/2016

Ref. 130000027389

Further information	: Cardiac sensitisation threshold limit : 334000 mg/m3
Isobutane (HC-600a)	
Inhalation 4 h LC50	: 276808 ppm , Rat The toxicological data has been taken from products of similar composition.
Inhalation 4 h LC50	: > 31 mg/l , Rat
Inhalation Low Observed Adverse Effect Concentration (LOAEC)	: 50000 ppm , Dog Cardiac sensitization
Inhalation No Observed Adverse Effect Concentration	: 25000 ppm , Dog Cardiac sensitization
Dermal	: Not applicable
Oral	: Not applicable
Skin irritation	: No skin irritation, Not tested on animals Not expected to cause skin irritation based on expert review of the properties of the substance.
Eye irritation	: No eye irritation, Not tested on animals Not expected to cause eye irritation based on expert review of the properties of the substance.
Skin sensitization	: Not tested on animals Not expected to cause sensitization based on expert review of the properties of the substance.
Repeated dose toxicity	: Inhalation Rat - No toxicologically significant effects were found.
Mutagenicity	: Tests on bacterial or mammalian cell cultures did not show mutagenic effects. Animal testing did not show any mutagenic effects.

**Freon™ MO29 (R-422D) Refrigerant**

Version 3.0

Revision Date 02/16/2016

Ref. 130000027389

Reproductive toxicity : No toxicity to reproduction
Animal testing showed no reproductive toxicity.

Teratogenicity : Animal testing showed no developmental toxicity.

Further information : Cardiac sensitisation threshold limit : 118.9 mg/m3

Carcinogenicity

The carcinogenicity classifications for this product and/or its ingredients have been determined according to HazCom 2012, Appendix A.6. The classifications may differ from those listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or those found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest edition).

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, or OSHA, as a carcinogen.

SECTION 12. ECOLOGICAL INFORMATION**Aquatic Toxicity****Pentafluoroethane (HFC-125)**

96 h LC50 : Oncorhynchus mykiss (rainbow trout) 450 mg/l
Information given is based on data obtained from similar substances.

96 h ErC50 : Algae 142 mg/l
Information given is based on data obtained from similar substances.

72 h NOEC : Pseudokirchneriella subcapitata (green algae) 13.2 mg/l
Information given is based on data obtained from similar substances.

48 h EC50 : Daphnia magna (Water flea) 980 mg/l
Information given is based on data obtained from similar substances.

1,1,1,2-Tetrafluoroethane (HFC-134a)

96 h LC50 : Oncorhynchus mykiss (rainbow trout) 450 mg/l

96 h ErC50 : Algae 142 mg/l

**Freon™ MO29 (R-422D) Refrigerant**

Version 3.0

Revision Date 02/16/2016

Ref. 130000027389

Information given is based on data obtained from similar substances.

72 h NOEC : Pseudokirchneriella subcapitata (green algae) 13.2 mg/l
Information given is based on data obtained from similar substances.

48 h EC50 : Daphnia magna (Water flea) 980 mg/l

Isobutane (HC-600a)

96 h LC50 : Fish 24.11 mg/l

72 h EC50 : Algae 7.71 mg/l

48 h EC50 : Daphnia (water flea) 14.22 mg/l

SECTION 13. DISPOSAL CONSIDERATIONS

Waste disposal methods - Product : Can be used after re-conditioning. Recover by distillation or remove to a permitted waste disposal facility. Comply with applicable Federal, State/Provincial and Local Regulations.

Contaminated packaging : Empty pressure vessels should be returned to the supplier.

SECTION 14. TRANSPORT INFORMATION

DOT	UN number	: 1078
	Proper shipping name	: Refrigerant gases, n.o.s. (1,1,1,2-Tetrafluoroethane, Pentafluoroethane)
	Class	: 2.2
	Labelling No.	: 2.2
IATA_C	UN number	: 1078
	Proper shipping name	: Refrigerant gas, n.o.s. (1,1,1,2-Tetrafluoroethane, Pentafluoroethane)
	Class	: 2.2

**Freon™ MO29 (R-422D) Refrigerant**

Version 3.0

Revision Date 02/16/2016

Ref. 130000027389

IMDG	Labelling No.	: 2.2
	UN number	: 1078
	Proper shipping name	: REFRIGERANT GAS, N.O.S. (1,1,1,2-Tetrafluoroethane, Pentafluoroethane)
	Class	: 2.2
	Labelling No.	: 2.2

SECTION 15. REGULATORY INFORMATION

SARA 313 Regulated Chemical(s)	: 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.
PA Right to Know Regulated Chemical(s)	: Substances on the Pennsylvania Hazardous Substances List present at a concentration of 1% or more (0.01% for Special Hazardous Substances): Isobutane (HC-600a)
NJ Right to Know Regulated Chemical(s)	: Substances on the New Jersey Workplace Hazardous Substance List present at a concentration of 1% or more (0.1% for substances identified as carcinogens, mutagens or teratogens): Isobutane (HC-600a)
California Prop. 65	: Chemicals known to the State of California to cause cancer, birth defects or any other harm: none known

SECTION 16. OTHER INFORMATION

Freon™ and any associated logos are trademarks or copyrights of The Chemours Company FC, LLC. Chemours™ and the Chemours Logo are trademarks of The Chemours Company. Before use read Chemours safety information. For further information contact the local Chemours office or nominated distributors.

Revision Date : 02/16/2016



Freon[™] MO29 (R-422D) Refrigerant

Version 3.0

Revision Date 02/16/2016

Ref. 130000027389

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.

Significant change from previous version is denoted with a double bar.

Safety Data Sheet

Sid Harvey item #'s R422DX25 & R422DX110 SDS # Z0464



DuPont™ ISCEON® MO29 (R-422D) Refrigerant

Version 2.0

Revision Date 04/01/2015

Ref. 130000027389

This SDS adheres to the standards and regulatory requirements of the United States and may not meet the regulatory requirements in other countries.

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	DuPont™ ISCEON® MO29 (R-422D) Refrigerant
Tradename/Synonym	:	ISCEON® MO29 R-422D MO29
Product Grade/Type	:	ASHRAE Refrigerant number designation: R-422D
Product Use	:	Refrigerant, For professional users only.
Restrictions on use	:	Do not use product for anything outside of the above specified uses
Manufacturer/Supplier	:	DuPont 1007 Market Street Wilmington, DE 19898 United States of America
Product Information	:	+1-800-441-7515 (outside the U.S. +1-302-774-1000)
Medical Emergency	:	1-800-441-3637 (outside the U.S. 1-302-774-1139)
Transport Emergency	:	CHEMTREC: +1-800-424-9300 (outside the U.S. +1-703-527-3887)

SECTION 2. HAZARDS IDENTIFICATION

Product hazard category

Gases under pressure

Liquefied gas

DuPont™ ISCEON® MO29 (R-422D) Refrigerant

Version 2.0

Revision Date 04/01/2015

Ref. 130000027389

Label content

Pictogram

:



Signal word

: Warning

Hazardous warnings

: Contains gas under pressure; may explode if heated.

Hazardous prevention
measures

: Protect from sunlight. Store in a well-ventilated place.

Other hazards

Misuse or intentional inhalation abuse may lead to death without warning.

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

Rapid evaporation of the liquid may cause frostbite.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Concentration
Pentafluoroethane (HFC-125)	354-33-6	65.1 %
1,1,1,2-Tetrafluoroethane (HFC-134a)	811-97-2	31.5 %
Isobutane (HC-600a)	75-28-5	3.4 %

**DuPont™ ISCEON® MO29 (R-422D) Refrigerant**

Version 2.0

Revision Date 04/01/2015

Ref. 130000027389

SECTION 4. FIRST AID MEASURES

General advice	: Never give anything by mouth to an unconscious person. When symptoms persist or in all cases of doubt seek medical advice.
Inhalation	: Remove from exposure, lie down. Move to fresh air. Keep patient warm and at rest. Artificial respiration and/or oxygen may be necessary. Consult a physician.
Skin contact	: In case of contact, immediately flush skin with plenty of water for at least 15 minutes. Take off all contaminated clothing immediately. Consult a physician. Wash contaminated clothing before re-use. Treat for frostbite if necessary by gently warming affected area.
Eye contact	: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Consult a physician if necessary.
Ingestion	: Is not considered a potential route of exposure.
Most important symptoms/effects, acute and delayed	: Anaesthetic effects Light-headedness irregular heartbeat with a strange sensation in the chest, heart thumping, apprehension, feeling of fainting, dizziness or weakness
Protection of first-aiders	: If potential for exposure exists refer to Section 8 for specific personal protective equipment.
Notes to physician	: Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, that may be used in situations of emergency life support should be used with special caution.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	: Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Unsuitable extinguishing media	: No applicable data available.

**DuPont™ ISCEON® MO29 (R-422D) Refrigerant**

Version 2.0

Revision Date 04/01/2015

Ref. 130000027389

- Specific hazards** : Cylinders are equipped with pressure and temperature relief devices, but may still rupture under fire conditions. Decomposition may occur. Contact of welding or soldering torch flame with high concentrations of refrigerant can result in visible changes in the size and colour of the torch flame. This flame effect will only occur in concentrations of product well above the recommended exposure limit. Therefore stop all work and ventilate to disperse refrigerant vapors from the work area before using any open flames. This substance is not flammable in air at temperatures up to 100 deg. C (212 deg. F) at atmospheric pressure. However, mixtures of this substance with high concentrations of air at elevated pressure and/or temperature can become combustible in the presence of an ignition source. This substance can also become combustible in an oxygen enriched environment (oxygen concentrations greater than that in air). Whether a mixture containing this substance and air, or this substance in an oxygen enriched atmosphere become combustible depends on the inter-relationship of 1) the temperature 2) the pressure, and 3) the proportion of oxygen in the mixture. In general, this substance should not be allowed to exist with air above atmospheric pressure or at high temperatures; or in an oxygen enriched environment. For example this substance should NOT be mixed with air under pressure for leak testing or other purposes. Experimental data have also been reported which indicate combustibility of this substance in the presence of certain concentrations of chlorine.
- Special protective equipment for firefighters** : In the event of fire, wear self-contained breathing apparatus. Use personal protective equipment. Wear neoprene gloves during cleaning up work after a fire.
- Further information** : Cool containers/tanks with water spray. Water runoff should be contained and neutralized prior to release.

SECTION 6. ACCIDENTAL RELEASE MEASURES

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

- Safeguards (Personnel)** : Evacuate personnel to safe areas. Ventilate area, especially low or enclosed places where heavy vapours might collect.
- Environmental precautions** : Should not be released into the environment. In accordance with local and national regulations.



DuPont™ ISCEON® MO29 (R-422D) Refrigerant

Version 2.0

Revision Date 04/01/2015

Ref. 130000027389

- Spill Cleanup : Evaporates.
Ventilate area using forced ventilation, especially low or enclosed places where heavy vapors might collect.
- Accidental Release Measures : Avoid open flames and high temperatures. Self-contained breathing apparatus (SCBA) is required if a large release occurs.

SECTION 7. HANDLING AND STORAGE

- Handling (Personnel) : Avoid breathing vapours or mist. Avoid contact with skin, eyes and clothing. Provide sufficient air exchange and/or exhaust in work rooms. For personal protection see section 8.
- Handling (Physical Aspects) : Contact with chlorine or other strong oxidizing agents should also be avoided.
- Dust explosion class : Not applicable
- Storage : Valve protection caps and valve outlet threaded plugs must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<3000 psig) piping or systems. Never attempt to lift cylinder by its cap. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Cylinders should be stored upright and firmly secured to prevent falling or being knocked over.
Separate full containers from empty containers. Keep at temperature not exceeding 52°C. Do not store near combustible materials. Avoid area where salt or other corrosive materials are present.
The product has an indefinite shelf life when stored properly.
- Storage period : > 10 yr
- Storage temperature : < 52 °C (< 126 °F)

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

- Engineering controls : Normal ventilation for standard manufacturing procedures is generally adequate. Local exhaust should be used when large amounts are released. Mechanical ventilation should be used in low or enclosed places. Refrigerant Concentration monitors may be necessary to determine vapor concentrations

**DuPont™ ISCEON® MO29 (R-422D) Refrigerant**

Version 2.0

Revision Date 04/01/2015

Ref. 130000027389

in work areas prior to use of torches or other open flames, or if employees are entering enclosed areas.

Personal protective equipment

Respiratory protection : Under normal manufacturing conditions, no respiratory protection is required when using this product.

Hand protection : Additional protection: Impervious gloves

Eye protection : Wear safety glasses with side shields. Additionally wear a face shield where the possibility exists for face contact due to splashing, spraying or airborne contact with this material.

Protective measures : Self-contained breathing apparatus (SCBA) is required if a large release occurs.

Exposure Guidelines**Exposure Limit Values****Pentafluoroethane (HFC-125)**

AEL * (DUPONT) 1,000 ppm 8 & 12 hr. TWA

1,1,1,2-Tetrafluoroethane (HFC-134a)

AEL * (DUPONT) 1,000 ppm 8 & 12 hr. TWA

Isobutane (HC-600a)

TLV (ACGIH) 1,000 ppm STEL

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES**Appearance**

Physical state : gaseous
Form : Liquefied gas
Color : colourless

**DuPont™ ISCEON® MO29 (R-422D) Refrigerant**

Version 2.0

Revision Date 04/01/2015

Ref. 130000027389

Odor	: slight, ether-like
Odor threshold	: No applicable data available.
pH	: neutral
Melting point/freezing point	: Melting point/range Not available for this mixture.
Boiling point/boiling range	: Boiling point -43.2 °C (-45.8 °F)
Flash point	: does not flash
Evaporation rate	: No applicable data available.
Flammability (solid, gas)	: Not applicable
Upper explosion limit	: Method: None per ASTM E681
Lower explosion limit	: Method: None per ASTM E681
Vapor pressure	: 11,279 hPa at 25 °C (77 °F)
Vapor density	: 3.9 at 25°C (77°F) and 1013 hPa (Air=1.0)
Specific gravity (Relative density)	: 1.15 at 25 °C (77 °F)
Water solubility	: No applicable data available.
Solubility(ies)	: No applicable data available.
Partition coefficient: n-octanol/water	: No applicable data available.
Auto-ignition temperature	: No applicable data available.
Decomposition temperature	: No applicable data available.
Viscosity, kinematic	: No applicable data available.
Viscosity	: No applicable data available.

**DuPont™ ISCEON® MO29 (R-422D) Refrigerant**

Version 2.0

Revision Date 04/01/2015

Ref. 130000027389

% Volatile : 100 %

SECTION 10. STABILITY AND REACTIVITY

Reactivity	: No applicable data available.
Chemical stability	: Stable under recommended storage conditions.
Possibility of hazardous reactions	: Polymerization will not occur.
Conditions to avoid	: The product is not flammable in air under ambient conditions of temperature and pressure. When pressurised with air or oxygen, the mixture may become flammable. Certain mixtures of HCFCs or HFCs with chlorine may become flammable or reactive under certain conditions.
Incompatible materials	: Alkali metals Alkaline earth metals, Powdered metals, Powdered metal salts
Hazardous decomposition products	: Decomposition products are hazardous., This material can be decomposed by high temperatures (open flames, glowing metal surfaces, etc.) forming hydrofluoric acid and possibly carbonyl fluoride., These materials are toxic and irritating., Avoid contact with decomposition products

SECTION 11. TOXICOLOGICAL INFORMATION

Pentafluoroethane (HFC-125)

Inhalation 4 h LC50	: > 800000 ppm , Rat
Inhalation No Observed Adverse Effect Concentration	: 100000 ppm , Dog Cardiac sensitization
Inhalation Low Observed Adverse Effect Concentration (LOAEC)	: 75000 ppm , Dog Cardiac sensitization
Skin sensitization	: Does not cause respiratory sensitisation., human
Repeated dose toxicity	: Inhalation Rat - gas NOAEL: > 50000, No toxicologically significant effects were found.
Carcinogenicity	: Not classifiable as a human carcinogen.

**DuPont™ ISCEON® MO29 (R-422D) Refrigerant**

Version 2.0

Revision Date 04/01/2015

Ref. 130000027389

Overall weight of evidence indicates that the substance is not carcinogenic.

Mutagenicity : Animal testing did not show any mutagenic effects.
Evidence suggests this substance does not cause genetic damage in cultured mammalian cells.
Did not cause genetic damage in cultured bacterial cells.

Reproductive toxicity : No toxicity to reproduction
Animal testing showed no reproductive toxicity.

Teratogenicity : Animal testing showed no developmental toxicity.

Further information : Cardiac sensitisation threshold limit : 490000 mg/m3

1,1,1,2-Tetrafluoroethane (HFC-134a)

Inhalation 4 h LC50 : > 567000 ppm , Rat

Inhalation No Observed Adverse Effect Concentration : 40000 ppm , Dog
Cardiac sensitization

Inhalation Low Observed Adverse Effect Concentration (LOAEC) : 80000 ppm , Dog
Cardiac sensitization

Skin irritation : No skin irritation, Rabbit

Eye irritation : No eye irritation, Rabbit

Skin sensitization : Does not cause skin sensitisation., Guinea pig

Does not cause respiratory sensitisation., Rat

Repeated dose toxicity : Inhalation
Rat
-
gas
NOAEL: 50000,
No toxicologically significant effects were found.

Carcinogenicity : Not classifiable as a human carcinogen.
Overall weight of evidence indicates that the substance is not carcinogenic.

Mutagenicity : Animal testing did not show any mutagenic effects.

**DuPont™ ISCEON® MO29 (R-422D) Refrigerant**

Version 2.0

Revision Date 04/01/2015

Ref. 130000027389

Tests on bacterial or mammalian cell cultures did not show mutagenic effects.

- Reproductive toxicity : No toxicity to reproduction
No effects on or via lactation
Animal testing showed no reproductive toxicity.
- Teratogenicity : Animal testing showed no developmental toxicity.
- Further information : Cardiac sensitisation threshold limit : 334000 mg/m3

Isobutane (HC-600a)

- Inhalation 4 h LC50 : 276808 ppm , Rat
The toxicological data has been taken from products of similar composition.
- Inhalation 4 h LC50 : > 31 mg/l , Rat
- Inhalation Low Observed Adverse Effect Concentration (LOAEC) : 50000 ppm , Dog
Cardiac sensitization
- Inhalation No Observed Adverse Effect Concentration : 25000 ppm , Dog
Cardiac sensitization
- Dermal : Not applicable
- Oral : Not applicable
- Skin irritation : No skin irritation, Not tested on animals
Not expected to cause skin irritation based on expert review of the properties of the substance.
- Eye irritation : No eye irritation, Not tested on animals
Not expected to cause eye irritation based on expert review of the properties of the substance.
- Skin sensitization : Not tested on animals
Not expected to cause sensitization based on expert review of the properties of the substance.
- Repeated dose toxicity : Inhalation
Rat
-
No toxicologically significant effects were found.

**DuPont™ ISCEON® MO29 (R-422D) Refrigerant**

Version 2.0

Revision Date 04/01/2015

Ref. 130000027389

Mutagenicity	: Tests on bacterial or mammalian cell cultures did not show mutagenic effects. Animal testing did not show any mutagenic effects.
Reproductive toxicity	: No toxicity to reproduction Animal testing showed no reproductive toxicity.
Teratogenicity	: Animal testing showed no developmental toxicity.
Further information	: Cardiac sensitisation threshold limit : 118.9 mg/m3

Carcinogenicity

The carcinogenicity classifications for this product and/or its ingredients have been determined according to HazCom 2012, Appendix A.6. The classifications may differ from those listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or those found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest edition).

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, or OSHA, as a carcinogen.

SECTION 12. ECOLOGICAL INFORMATION**Aquatic Toxicity****Pentafluoroethane (HFC-125)**

96 h LC50	: Oncorhynchus mykiss (rainbow trout) 450 mg/l Information given is based on data obtained from similar substances.
96 h ErC50	: Algae 142 mg/l Information given is based on data obtained from similar substances.
72 h NOEC	: Pseudokirchneriella subcapitata (green algae) 13.2 mg/l Information given is based on data obtained from similar substances.
48 h EC50	: Daphnia magna (Water flea) 980 mg/l Information given is based on data obtained from similar substances.

1,1,1,2-Tetrafluoroethane (HFC-134a)

96 h LC50	: Oncorhynchus mykiss (rainbow trout) 450 mg/l
96 h ErC50	: Algae 142 mg/l

**DuPont™ ISCEON® MO29 (R-422D) Refrigerant**

Version 2.0

Revision Date 04/01/2015

Ref. 130000027389

Information given is based on data obtained from similar substances.

72 h NOEC : Pseudokirchneriella subcapitata (green algae) 13.2 mg/l
Information given is based on data obtained from similar substances.

48 h EC50 : Daphnia magna (Water flea) 980 mg/l

Isobutane (HC-600a)

96 h LC50 : Fish 24.11 mg/l

72 h EC50 : Algae 7.71 mg/l

48 h EC50 : Daphnia (water flea) 14.22 mg/l

SECTION 13. DISPOSAL CONSIDERATIONS

Waste disposal methods - Product : Can be used after re-conditioning. Recover by distillation or remove to a permitted waste disposal facility. Comply with applicable Federal, State/Provincial and Local Regulations.

Contaminated packaging : Empty pressure vessels should be returned to the supplier.

SECTION 14. TRANSPORT INFORMATION

DOT	UN number	: 1078
	Proper shipping name	: Refrigerant gases, n.o.s. (1,1,1,2-Tetrafluoroethane, Pentafluoroethane)
	Class	: 2.2
	Labelling No.	: 2.2
IATA_C	UN number	: 1078
	Proper shipping name	: Refrigerant gas, n.o.s. (1,1,1,2-Tetrafluoroethane, Pentafluoroethane)
	Class	: 2.2
	Labelling No.	: 2.2
IMDG	UN number	: 1078

**DuPont™ ISCEON® MO29 (R-422D) Refrigerant**

Version 2.0

Revision Date 04/01/2015

Ref. 130000027389

Proper shipping name	: REFRIGERANT GAS, N.O.S. (1,1,1,2-Tetrafluoroethane, Pentafluoroethane)
Class	: 2.2
Labelling No.	: 2.2

SECTION 15. REGULATORY INFORMATION

SARA 313 Regulated Chemical(s)	: 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.
PA Right to Know Regulated Chemical(s)	: Substances on the Pennsylvania Hazardous Substances List present at a concentration of 1% or more (0.01% for Special Hazardous Substances): Isobutane (HC-600a)
NJ Right to Know Regulated Chemical(s)	: Substances on the New Jersey Workplace Hazardous Substance List present at a concentration of 1% or more (0.1% for substances identified as carcinogens, mutagens or teratogens): Isobutane (HC-600a)
California Prop. 65	: Chemicals known to the State of California to cause cancer, birth defects or any other harm: none known

SECTION 16. OTHER INFORMATION

ISCEON is a registered trademark of E. I. du Pont de Nemours and Company

® DuPont's registered trademark

Before use read DuPont's safety information.

For further information contact the local DuPont office or DuPont's nominated distributors.

Revision Date : 04/01/2015

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.



DuPont™ ISCEON® MO29 (R-422D) Refrigerant

Version 2.0

Revision Date 04/01/2015

Ref. 130000027389

Significant change from previous version is denoted with a double bar.

**DuPont™ ISCEON® MO29™ refrigerant**

Version 2.2

Revision Date 09/12/2011

Ref. 130000027389

This SDS adheres to the standards and regulatory requirements of the United States and may not meet the regulatory requirements in other countries.

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	DuPont™ ISCEON® MO29™ refrigerant
Product Grade/Type	:	ASHRAE Refrigerant number designation: R-422D
Tradename/Synonym	:	Isceon® MO29 R-422D MO29
MSDS Number	:	130000027389
Product Use	:	Refrigerant
Manufacturer	:	DuPont 1007 Market Street Wilmington, DE 19898
Product Information	:	1-800-441-7515 (outside the U.S. 1-302-774-1000)
Medical Emergency	:	1-800-441-3637 (outside the U.S. 1-302-774-1139)
Transport Emergency	:	CHEMTREC: 1-800-424-9300 (outside the U.S. 1-703-527-3887)

SECTION 2. HAZARDS IDENTIFICATION**Emergency Overview**

Misuse or intentional inhalation abuse may lead to death without warning.
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Rapid evaporation of the liquid may cause frostbite.

Potential Health Effects

Skin	:	Contact with liquid or refrigerated gas can cause cold burns and frostbite.
Eyes	:	Contact with liquid or refrigerated gas can cause cold burns and frostbite.

**DuPont™ ISCEON® MO29™ refrigerant**

Version 2.2

Revision Date 09/12/2011

Ref. 130000027389

Inhalation : Misuse or intentional inhalation abuse may cause death without warning symptoms, due to cardiac effects.
Other symptoms potentially related to misuse or inhalation abuse are:
Anaesthetic effects, Light-headedness, dizziness, confusion,
incoordination, drowsiness, or unconsciousness, irregular heartbeat with a
strange sensation in the chest, heart thumping, apprehension, feeling of
fainting, dizziness or weakness.
Vapours are heavier than air and can cause suffocation by reducing oxygen
available for breathing.

Target Organs
Isobutane (<0.1% butadiene) : Central nervous system

Carcinogenicity
None of the components present in this material at concentrations equal to or greater than 0.1% are listed by
IARC, NTP, or OSHA, as a carcinogen.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Concentration
Pentafluoroethane (HFC-125)	354-33-6	65.7 %
1,1,1,2-Tetrafluoroethane (HFC-134a)	811-97-2	32.5 %
Isobutane (<0.1% butadiene)	75-28-5	3.4 %

SECTION 4. FIRST AID MEASURES

**DuPont™ ISCEON® MO29™ refrigerant**

Version 2.2

Revision Date 09/12/2011

Ref. 130000027389

Skin contact	: In case of contact, immediately flush skin with plenty of water for at least 15 minutes. Take off all contaminated clothing immediately. Consult a physician. Wash contaminated clothing before re-use. Treat for frostbite if necessary by gently warming affected area.
Eye contact	: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Consult a physician if necessary.
Inhalation	: Remove from exposure, lie down. Move to fresh air. Keep patient warm and at rest. Artificial respiration and/or oxygen may be necessary. Consult a physician.
Ingestion	: Is not considered a potential route of exposure.
General advice	: Never give anything by mouth to an unconscious person. When symptoms persist or in all cases of doubt seek medical advice.
Notes to physician	: Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, that may be used in situations of emergency life support should be used with special caution.

SECTION 5. FIREFIGHTING MEASURES**Flammable Properties**

Flash point	: does not flash
Lower explosion limit	: Method : None per ASTM E681
Upper explosion limit	: Method : None per ASTM E681
Fire and Explosion Hazard	: Cylinders are equipped with pressure and temperature relief devices, but may still rupture under fire conditions. Decomposition may occur. Contact of welding or soldering torch flame with high concentrations of refrigerant can result in visible changes in the size and colour of the torch flame. This flame effect will only occur in concentrations of product well above the recommended exposure limit. Therefore stop all work and ventilate to disperse refrigerant vapors from the work area before using any open flames.

**DuPont™ ISCEON® MO29™ refrigerant**

Version 2.2

Revision Date 09/12/2011

Ref. 130000027389

This substance is not flammable in air at temperatures up to 100 deg. C (212 deg. F) at atmospheric pressure. However, mixtures of this substance with high concentrations of air at elevated pressure and/or temperature can become combustible in the presence of an ignition source. This substance can also become combustible in an oxygen enriched environment (oxygen concentrations greater than that in air). Whether a mixture containing this substance and air, or this substance in an oxygen enriched atmosphere become combustible depends on the inter-relationship of 1) the temperature 2) the pressure, and 3) the proportion of oxygen in the mixture. In general, this substance should not be allowed to exist with air above atmospheric pressure or at high temperatures; or in an oxygen enriched environment. For example this substance should NOT be mixed with air under pressure for leak testing or other purposes. Experimental data have also been reported which indicate combustibility of this substance in the presence of certain concentrations of chlorine.

Firefighting Instructions : In the event of fire, wear self-contained breathing apparatus. Wear neoprene gloves during cleaning up work after a fire. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Cool containers / tanks with water spray.

SECTION 6. ACCIDENTAL RELEASE MEASURES

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Safeguards (Personnel) : Evacuate personnel to safe areas.

Spill Cleanup : Ventilate area using forced ventilation, especially low or enclosed places where heavy vapors might collect. Recover free liquid for reuse or reclamation.

Accidental Release Measures : Prevent material from entering sewers, waterways, or low areas. Avoid open flames and high temperatures. Self-contained breathing apparatus (SCBA) is required if a large release occurs.

SECTION 7. HANDLING AND STORAGE

**DuPont™ ISCEON® MO29™ refrigerant**

Version 2.2

Revision Date 09/12/2011

Ref. 130000027389

- Handling (Personnel)** : Avoid breathing vapours or mist. Avoid contact with skin, eyes and clothing. Provide sufficient air exchange and/or exhaust in work rooms. For personal protection see section 8.
Handle in accordance with good industrial hygiene and safety practice.
- Storage** : Valve protection caps and valve outlet threaded plugs must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Never attempt to lift cylinder by its cap. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Cylinders should be stored upright and firmly secured to prevent falling or being knocked over.
Separate full containers from empty containers. Keep at temperature not exceeding 52°C. Do not store near combustible materials. Keep container tightly closed in a dry and well-ventilated place. Store in original container. Protect from contamination.
- Storage temperature** : < 52 °C (< 126 °F)

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

- Engineering controls** : Ensure adequate ventilation, especially in confined areas. Local exhaust should be used when large amounts are released.
- Personal protective equipment**
- Respiratory protection** : For rescue and maintenance work in storage tanks use self-contained breathing apparatus. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
- Hand protection** : Additional protection: Impervious gloves
- Eye protection** : Wear safety glasses or coverall chemical splash goggles. Additionally wear a face shield where the possibility exists for face contact due to splashing, spraying or airborne contact with this material.
- Protective measures** : Self-contained breathing apparatus (SCBA) is required if a large release occurs.
- Exposure Guidelines**
- Exposure Limit Values**
- Pentafluoroethane**
- AEL *** (DUPONT) 1,000 ppm 8 & 12 hr. TWA

**DuPont™ ISCEON® MO29™ refrigerant**

Version 2.2

Revision Date 09/12/2011

Ref. 130000027389

1,1,1,2-Tetrafluoroethane
AEL * (DUPONT) 1,000 ppm 8 & 12 hr. TWA

Isobutane (<0.1% butadiene)
TLV (ACGIH) 1,000 ppm TWA

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form	: Liquefied gas
Color	: colourless
Odor	: slight, ether-like
pH	: neutral
Boiling point	: -43 °C (-45 °F)
% Volatile	: 100 %
Vapour Pressure	: 12,200 hPa at 25 °C (77 °F)
Density	: 1.157 g/cm ³ at 25 °C (77 °F) (as liquid)
Specific gravity	: 1.15 at 25 °C (77 °F)
Water solubility	: 5 g/l at 25 °C (77 °F)
Vapour density	: 3.9 at 25°C (77°F) and 1013 hPa (Air=1.0)

SECTION 10. STABILITY AND REACTIVITY

Stability	: Stable under recommended storage conditions.
Conditions to avoid	: The product is not flammable in air under ambient conditions of temperature and pressure. When pressurised with air or oxygen, the mixture may become flammable. Certain mixtures of HCFCs or HFCs with chlorine may become flammable or reactive under certain conditions. Avoid open flames and high temperatures.

**DuPont™ ISCEON® MO29™ refrigerant**

Version 2.2

Revision Date 09/12/2011

Ref. 130000027389

Incompatibility : Alkali metals Alkaline earth metals, Powdered metals, Powdered metal salts

Hazardous decomposition products : Decomposition products are hazardous., This material can be decomposed by high temperatures (open flames, glowing metal surfaces, etc.) forming hydrofluoric acid and possibly carbonyl fluoride., These materials are toxic and irritating., Avoid contact with decomposition products

SECTION 11. TOXICOLOGICAL INFORMATION

Pentafluoroethane (HFC-125)

Dermal : not applicable

Oral : not applicable

Inhalation 4 h LC50 : > 800000 ppm , rat

Inhalation : dog
Cardiac sensitization

Skin irritation : No skin irritation, Not tested on animals
Not expected to cause skin irritation based on expert review of the properties of the substance.

Eye irritation : No eye irritation, Not tested on animals
Not expected to cause eye irritation based on expert review of the properties of the substance.

Skin sensitization : Does not cause skin sensitization., Not tested on animals
Not expected to cause sensitization based on expert review of the properties of the substance.

There are no reports of human respiratory sensitization.

Repeated dose toxicity : Inhalation
rat
No toxicologically significant effects were found.

Carcinogenicity : Overall weight of evidence indicates that the substance is not carcinogenic.

Mutagenicity : Did not cause genetic damage in animals.
Did not cause genetic damage in cultured mammalian cells.

**DuPont™ ISCEON® MO29™ refrigerant**

Version 2.2

Revision Date 09/12/2011

Ref. 130000027389

Did not cause genetic damage in cultured bacterial cells.

Reproductive toxicity : Evidence suggests the substance is not a reproductive toxin in animals.
Information given is based on data obtained from similar substances.

Teratogenicity : Animal testing showed no developmental toxicity.

Further information : Cardiac sensitisation threshold limit : 490000 mg/m3

1,1,1,2-Tetrafluoroethane (HFC-134a)

Dermal : not applicable

Oral : not applicable

Inhalation 4 h LC50 : 567000 ppm , rat

Inhalation : dog
Cardiac sensitization

Skin irritation : slight irritation, rabbit
Not expected to cause skin irritation based on expert review of the properties of the substance.

No skin irritation, human

Eye irritation : slight irritation, rabbit
Not expected to cause eye irritation based on expert review of the properties of the substance.

No eye irritation, human

Skin sensitization : Did not cause sensitization on laboratory animals., guinea pig
Not expected to cause sensitization based on expert review of the properties of the substance.

Did not cause sensitization on laboratory animals. There are no reports of human respiratory sensitization.

Repeated dose toxicity : Inhalation
rat
No toxicologically significant effects were found.

**DuPont™ ISCEON® MO29™ refrigerant**

Version 2.2

Revision Date 09/12/2011

Ref. 130000027389

Carcinogenicity	: Overall weight of evidence indicates that the substance is not carcinogenic. An increased incidence of benign tumours was observed in laboratory animals.
Mutagenicity	: Did not cause genetic damage in animals. Did not cause genetic damage in cultured mammalian cells. Did not cause genetic damage in cultured bacterial cells.
Reproductive toxicity	: Animal testing showed no reproductive toxicity.
Teratogenicity	: Animal testing showed effects on embryo-fetal development at levels equal to or above those causing maternal toxicity.
Further information	: Cardiac sensitisation threshold limit : 312975 mg/m3
Isobutane (<0.1% butadiene)	
Dermal	: not applicable
Oral	: not applicable
Inhalation 4 h LC50	: 276808 ppm , rat The toxicological data has been taken from products of similar composition.
Skin irritation	: No skin irritation, Not tested on animals Not expected to cause skin irritation based on expert review of the properties of the substance.
Eye irritation	: No eye irritation, Not tested on animals Not expected to cause eye irritation based on expert review of the properties of the substance.
Skin sensitization	: Not tested on animals Not expected to cause sensitization based on expert review of the properties of the substance.
Mutagenicity	: Did not cause genetic damage in animals. Did not cause genetic damage in cultured bacterial cells.

**DuPont™ ISCEON® MO29™ refrigerant**

Version 2.2

Revision Date 09/12/2011

Ref. 130000027389

SECTION 12. ECOLOGICAL INFORMATION

Aquatic Toxicity

Pentafluoroethane (HFC-125)

- | | | |
|-----------|---|--|
| 96 h LC50 | : | Oncorhynchus mykiss (rainbow trout) > 81.8 mg/l
Information given is based on data obtained from similar substances. |
| 96 h LC50 | : | Danio rerio (zebra fish) > 200 mg/l
Information given is based on data obtained from similar substances. |
| 96 h LC50 | : | Oncorhynchus mykiss (rainbow trout) 450 mg/l
Information given is based on data obtained from similar substances. |
| 72 h EC50 | : | Pseudokirchneriella subcapitata (green algae) > 118 mg/l
Information given is based on data obtained from similar substances. |
| 72 h EC50 | : | Pseudokirchneriella subcapitata (green algae) > 114 mg/l
Information given is based on data obtained from similar substances. |
| 96 h EC50 | : | Algae 142 mg/l
Information given is based on data obtained from similar substances. |
| 48 h EC50 | : | Daphnia magna (Water flea) > 200 mg/l
Information given is based on data obtained from similar substances. |
| 48 h EC50 | : | Daphnia magna (Water flea) > 97.9 mg/l
Information given is based on data obtained from similar substances. |

1,1,1,2-Tetrafluoroethane (HFC-134a)

- | | | |
|-----------|---|--|
| 96 h LC50 | : | Oncorhynchus mykiss (rainbow trout) 450 mg/l |
| 72 h EC50 | : | Algae > 118 mg/l
Information given is based on data obtained from similar substances. |
| 48 h EC50 | : | Daphnia magna (Water flea) 980 mg/l |

SECTION 13. DISPOSAL CONSIDERATIONS

Waste Disposal : Can be used after re-conditioning. Recover by distillation or remove to a

**DuPont™ ISCEON® MO29™ refrigerant**

Version 2.2

Revision Date 09/12/2011

Ref. 130000027389

permitted waste disposal facility. Comply with applicable Federal, State/Provincial and Local Regulations.

Environmental Hazards : Empty pressure vessels should be returned to the supplier.

SECTION 14. TRANSPORT INFORMATION

DOT	UN number	: 1078
	Proper shipping name	: Refrigerant gas, n.o.s. (1,1,1,2-Tetrafluoroethane, Pentafluoroethane)
	Class	: 2.2
	Labelling No.	: 2.2
IATA_C	UN number	: 1078
	Proper shipping name	: Refrigerant gas, n.o.s. (1,1,1,2-Tetrafluoroethane, Pentafluoroethane)
	Class	: 2.2
	Labelling No.	: 2.2
IMDG	UN number	: 1078
	Proper shipping name	: Refrigerant gas, n.o.s. (1,1,1,2-Tetrafluoroethane, Pentafluoroethane)
	Class	: 2.2
	Labelling No.	: 2.2

SECTION 15. REGULATORY INFORMATION

SARA 313 Regulated Chemical(s)	: 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.
California Prop. 65	: Chemicals known to the State of California to cause cancer, birth defects or any other harm: none known
PA Right to Know Regulated Chemical(s)	: Substances on the Pennsylvania Hazardous Substances List present at a concentration of 1% or more (0.01% for Special Hazardous

**DuPont™ ISCEON® MO29™ refrigerant**

Version 2.2

Revision Date 09/12/2011

Ref. 130000027389

Substances): Isobutane (<0.1% butadiene)

NJ Right to Know
Regulated Chemical(s) : Substances on the New Jersey Workplace Hazardous Substance List
present at a concentration of 1% or more (0.1% for substances
identified as carcinogens, mutagens or teratogens): Isobutane (<0.1%
butadiene)

SECTION 16. OTHER INFORMATION

HMIS

Health	:	1
Flammability	:	0
Reactivity/Physical hazard	:	1
PPE	:	Personal Protection rating to be supplied by user depending on use conditions.

ISCEON is a registered trademark of E. I. du Pont de Nemours and Company

Before use read DuPont's safety information.

For further information contact the local DuPont office or DuPont's nominated distributors.

® DuPont's registered trademark

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.

Significant change from previous version is denoted with a double bar.