DuPont™ ISCEON® MO89 refrigerant

Version 4.0 (replaces: Version 3.1)
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This Safety Data Sheet adheres to the standards and regulatory requirements of Great Britain and may not meet the regulatory requirements in other countries.

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

1.1. Product identifier

Product name : DuPont™ ISCEON® MO89 refrigerant

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

Use of the Substance/Mixture : Refrigerant, For professional users only.

1.3. Details of the supplier of the safety data sheet

Company : Du Pont de Nemours (Nederland) B.V.
Baanhoekweg 22
NL-3313 LA Dordrecht
Netherlands

Telephone : +31-(0)-78-630-1011

E-mail address : sds-support@che.dupont.com

1.4. Emergency telephone number

Emergency telephone number : +(44)-870-8200418

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

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

Not a hazardous substance or mixture according to EC-directives 67/548/EEC or 1999/45/EC.

2.2. Label elements

Warning

H280 Contains gas under pressure; may explode if heated.

Special labelling of certain Kyoto: Contains fluorinated greenhouse gas covered by the Kyoto

substances and mixtures	Protocol.,HFC-125,FC-218,
P410 + P403	Protect from sunlight. Store in a well-ventilated place.

2.3. Other hazards

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

SECTION 3: Composition/information on ingredients

3.1. Substances

Not applicable

3.2. Mixtures

Registration number	Classification according to Directive 67/548/EEC	Classification according to Regulation (EU) 1272/2008 (CLP)	Concentration (% w/w)
Pentafluoroethane (CAS-No.354-33-6) (EC-No.206-557-8)			
01-2119485636-25		Press. Gas Liquefied gas; H280	86 %
Octafluoropropane (CAS-No.76-19-7) (EC-No.200-941-9)			
		Press. Gas Liquefied gas; H280	9 %
Propane (CAS-No.74-98-6) (EC-No.200-827-9)			
	F+;R12	Flam. Gas 1; H220 Press. Gas Liquefied gas; H280	5 %

The above products are compliant to REACH registration obligations; Registration number(s) may not be provided because substance(s) are exempted, not yet registered under REACH or are registered under another regulatory process (biocide uses, plant protection products), etc.

For the full text of the R-phrases mentioned in this Section, see Section 16.
For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1. Description of first aid measures

General advice : If unconscious place in recovery position and seek medical advice. Never give anything by mouth to an unconscious person. If breathing is irregular or

stopped, administer artificial respiration.

: First aider needs to protect himself.

: If symptoms persist, call a physician.

Inhalation : Remove from exposure, lie down. Consult a physician.

: Move to fresh air. Keep patient warm and at rest. Artificial respiration and/or oxygen may be necessary.

Skin contact : Take off contaminated clothing and shoes immediately. Flush area with lukewarm water. Do not use hot water. If frostbite has occurred, call a physician.

Eye contact : Hold eyelids apart and flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Ingestion : Is not considered a potential route of exposure.

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

Symptoms : 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

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

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

Treatment : Do not give adrenaline or similar drugs.

SECTION 5: Firefighting measures

5.1. Extinguishing media

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

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

5.2. Special hazards arising from the substance or mixture

Specific hazards during firefighting : Pressure build-up.

: Fire or intense heat may cause violent rupture of packages.
: Hazardous thermal decomposition products:
: Carbon oxides
: Hydrogen fluoride
: Fluorinated compounds

: Exposure to decomposition products may be a hazard to health.
: 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.

5.3. Advice for firefighters

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.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions : Evacuate personnel to safe areas. Ventilate area, especially low or enclosed places where heavy vapours might collect. Refer to protective measures listed in sections 7 and 8.

6.2. Environmental precautions

Environmental precautions : Should not be released into the environment.

In accordance with local and national regulations.

6.3. Methods and materials for containment and cleaning up

Methods for cleaning up : Evaporates.

6.4. Reference to other sections

For disposal instructions see section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Advice on safe handling : 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.

Vapours are heavier than air and may spread along floors.

Advice on protection against fire and explosion : 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.

7.2. Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers : 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. Keep at temperature not exceeding 52°C. Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from contamination. Protect cylinders from damage. Keep away from direct sunlight. Store only in approved containers.

Advice on common storage : No materials to be especially mentioned.

For further information see Section 10 of the safety data sheet.

Storage period : > 10 yr

Storage temperature : < 52 °C

7.3. Specific end use(s)

no data available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

If sub-section is empty then no values are applicable.

Derived No Effect Level (DNEL)

- Pentafluoroethane : Type of Application (Use): Workers
  Exposure routes: Inhalation
  Health Effect: Chronic effects, Systemic toxicity
  Value: 16444 mg/m3

  : Type of Application (Use): Consumers
  Exposure routes: Inhalation
  Health Effect: Chronic effects, Systemic toxicity
  Value: 1753 mg/m3

Predicted No Effect Concentration (PNEC)

- Pentafluoroethane : Value: 0.1 mg/l
  Compartment: Fresh water

  : Value: 1 mg/l

Compartment: Water
Remarks: Intermittent use/release

: Value: 0.6 mg/kg
Compartment: Fresh water sediment

8.2. Exposure controls

Engineering measures : Ensure adequate ventilation, especially in confined areas.

Local exhaust should be used when large amounts are released.

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.

Eye protection complying with EN 166. or ANSI Z87.1

Hand protection : Material: Leather gloves
The suitability for a specific workplace should be discussed with the producers of the protective gloves.

: Material: Low temperature resistant gloves

:

Protective gloves complying with EN 374. or US OSHA guidelines

:

The choice of an appropriate glove does not only depend on its material but also on other quality features and is different from one producer to the other. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time.

Skin and body protection : Wear suitable protective equipment. Wear as appropriate: Impervious clothing

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

The type of protective equipment must be selected according to the concentration and amount of the substance at the specific workplace.

Hygiene measures : Handle in accordance with good industrial hygiene and safety practice.

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.

Respiratory protection complying with EN 137.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Form	: Liquefied gas
Colour	: colourless
Odour	: slight, ether-like
pH	: neutral
Boiling point	: -53.4 °C
Flash point	: Not applicable
Upper explosion limit/ upper flammability limit	: The "as formulated product" has been determined to be non-flammable per ASTM 681-98. Computer model calculations indicate, under certain leak conditions at normal use and handling temperatures, the vapor above the liquid can become flammable. For the product to ignite, the volume % of vapor in air would have to exceed approximately 7% and an ignition source of sufficient energy would need to be present. Take appropriate precautions to avoid these conditions.
Vapour pressure	: 15,276 hPa at 25 °C
Density	: 1.0825 g/cm3 at 25 °C, (as liquid)
Relative density	: 1.09 at 25 °C
Water solubility	: not determined
Relative vapour density	: 4 at 25 °C

9.2. Other information

no data available

SECTION 10: Stability and reactivity

10.1. Reactivity	: Decomposes on heating.
10.2. Chemical stability	: The product is chemically stable.
10.3. Possibility of hazardous reactions	: Stable at normal temperatures and storage conditions.
10.4. Conditions to avoid	: Avoid open flames and high temperatures. 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. Pressurized container: Do not pierce or burn, even after use. Do not spray on a naked flame or any incandescent material. Keep at temperature not exceeding 52°C.

10.5. Incompatible materials : Alkali metals
Alkaline earth metals
Powdered metals
Powdered metal salts

10.6. Hazardous decomposition products : Hazardous thermal decomposition products may include:
Hydrogen fluoride
Carbon oxides
Fluorocarbons
Carbonyl fluoride

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute oral toxicity

- Propane
  Not applicable

Acute inhalation toxicity

- Pentafluoroethane
  LC50 / 4 h Rat :> 800000 ppm
  Method: OECD Test Guideline 403

  No Observed Adverse Effect Concentration / Dog :75000 ppm
  Cardiac sensitization

  Low Observed Adverse Effect Concentration (LOAEC) / Dog :100000 ppm
  Cardiac sensitization

- Octafluoropropane
  LC50 / 4 h Rat :400000 ppm

  No Observed Adverse Effect Concentration / Dog :300000 ppm
  Cardiac sensitization

  Low Observed Adverse Effect Concentration (LOAEC) / Dog :400000 ppm
  Cardiac sensitization

- Propane
  LC50 / 4 h Rat :> 200000 ppm

  Low Observed Adverse Effect Concentration (LOAEC) / Dog :100000 ppm
  Cardiac sensitization

  No Observed Adverse Effect Concentration / Dog :50000 ppm
  Cardiac sensitization

Acute dermal toxicity

- Propane

Not applicable

Skin irritation

- Propane
  Not applicable

Eye irritation

- Propane
  Not applicable

Sensitisation

- Pentafluoroethane
  human
  Classification: Does not cause respiratory sensitisation.
  Result: Does not cause respiratory sensitisation.

- Propane
  Not applicable

Repeated dose toxicity

- Pentafluoroethane
  Inhalation Rat
  No toxicologically significant effects were found.

- Propane
  Inhalation Rat
  No toxicologically significant effects were found.

Mutagenicity assessment

- Pentafluoroethane
  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.

- Octafluoropropane
  Animal testing did not show any mutagenic effects. Did not cause genetic damage in cultured bacterial cells.

- Propane
  Tests on bacterial or mammalian cell cultures did not show mutagenic effects. Animal testing did not show any mutagenic effects.

Carcinogenicity assessment

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

Toxicity to reproduction assessment

- Pentafluoroethane
  No toxicity to reproduction Animal testing showed no reproductive toxicity.

- Propane
  No toxicity to reproduction Animal testing showed no reproductive toxicity.

Assessment teratogenicity

- Pentafluoroethane
  Animal testing showed no developmental toxicity.

- Propane
  Animal testing showed no developmental toxicity.

Further information

Avoid skin contact with leaking liquid (danger of frostbite).

SECTION 12: Ecological information

12.1. Toxicity

Toxicity to fish

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

- Octafluoropropane
  This product has no known ecotoxicological effects.

- Propane
  LC50 / 96 h / Fish: 24.11 mg/l

Toxicity to aquatic plants

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

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

- Octafluoropropane
  This product has no known ecotoxicological effects.

- Propane
  EC50 / 72 h / Algae: 7.71 mg/l

Toxicity to aquatic invertebrates

- Pentafluoroethane

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

- Octafluoropropane
  This product has no known ecotoxicological effects.

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

Chronic toxicity to fish

- Octafluoropropane
  NOEC / Fish (unspecified species)
  Due to its physical properties, there is no potential for adverse effects.

Chronic toxicity to aquatic Invertebrates

- Octafluoropropane
  NOEC / Daphnia (water flea)
  Due to its physical properties, there is no potential for adverse effects.

12.2. Persistence and degradability

Biodegradability

- Pentafluoroethane
  Not rapidly biodegradable

- Octafluoropropane
  Not biodegradable
  Not readily biodegradable.

- Propane
  Readily biodegradable

12.3. Bioaccumulative potential

no data available

12.4. Mobility in soil

no data available

12.5. Results of PBT and vPvB assessment

no data available

12.6. Other adverse effects

Ozone depletion potential

0

Global warming potential (GWP)

3805

Additional ecological information

IPCC - AR4 (Fourth Assessment Report of the Intergovernmental Panel on Climate Change) - 2007

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Product	:	Can be used after re-conditioning. If re-conditioning is not practicable, dispose of in compliance with local regulations.
Contaminated packaging	:	Empty pressure vessels should be returned to the supplier. If recycling is not practicable, dispose of in compliance with local regulations.

SECTION 14: Transport information

ADR

14.1. UN number:	1078
14.2. UN proper shipping name:	REFRIGERANT GAS, N.O.S. (Pentafluoroethane, Perfluoropropane)
14.3. Transport hazard class(es):	2
14.4. Packing group:	Not applicable
14.5. Environmental hazards:	For further information see Section 12.
14.6. Special precautions for user:	
Tunnel restriction code:	(C/E)

RID

14.1. UN number:	1078
14.2. UN proper shipping name:	REFRIGERANT GAS, N.O.S. (Pentafluoroethane, Perfluoropropane)
14.3. Transport hazard class(es):	2
14.4. Packing group:	Not applicable
14.5. Environmental hazards:	For further information see Section 12.
14.6. Special precautions for user:	
no data available	

IATA_C

14.1. UN number:	1078
14.2. UN proper shipping name:	Refrigerant gas, n.o.s. (Pentafluoroethane, Perfluoropropane)
14.3. Transport hazard class(es):	2.2
14.4. Packing group:	Not applicable
14.5. Environmental hazards :	For further information see Section 12.
14.6. Special precautions for user:	
no data available	

IMDG

14.1. UN number:	1078
14.2. UN proper shipping name:	REFRIGERANT GAS, N.O.S. (Pentafluoroethane,

Perfluoropropane)

14.3.	Transport hazard class(es):	2.2
14.4.	Packing group:	Not applicable
14.5.	Environmental hazards :	For further information see Section 12.
14.6.	Special precautions for user: no data available	

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Not applicable

SECTION 15: Regulatory information

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

Other regulations : Take note of Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work.

EU. REACH, Annex XVII, Marketing and Use Restrictions (Regulation 1907/2006/EC)

Listed Substance : Propane (CAS-No.74-98-6) (EC-No.200-827-9)
List number: : 40

For information on uses please refer to Section 1.
For further information please refer to the list number in the regulation and relevant amendments.

15.2. Chemical Safety Assessment

No Chemical Safety Assessment has been carried out for this mixture.

SECTION 16: Other information

Text of R-phrases mentioned in Section 3

R12	Extremely flammable.

Full text of H-Statements referred to under section 3.

H220	Extremely flammable gas.
H280	Contains gas under pressure; may explode if heated.

Abbreviations and acronyms

ADR	European Agreement concerning the International Carriage of Dangerous Goods by Road
ATE	Acute toxicity estimate
CAS-No.	Chemical Abstracts Service number
CLP	Classification, Labelling and Packaging
EbC50	Concentration at which 50% reduction of biomass is observed
EC50	Median effective concentration
EN	European Norm
EPA	Environmental Protection Agency
ErC50	Concentration at which a 50% inhibition of growth rate is observed
EyC50	Concentration at which 50 % inhibition of yield is observed
IATA_C	International Air Transport Association (Cargo)

IBC	International Bulk Chemical Code
ICAO	International Civil Aviation Organization
ISO	International Standard Organization
IMDG	International Maritime Dangerous Goods
LC50	Median Lethal Concentration
LD50	Median Lethal Dose
LOEC	Lowest Observed Effect Concentration
LOEL	Lowest observed effect level
MARPOL	International Convention for the Prevention of Marine Pollution from Ships
n.o.s.	Not Otherwise Specified
NOAEC	No Observed Adverse Effect Concentration
NOAEL	No observed adverse effect level
NOEC	No Observed Effect Concentration
NOEL	No Observed Effect Level
OECD	Organisation for Economic Co-operation and Development
OPPTS	Office of Prevention, Pesticides and Toxic Substances
PBT	Persistent, Bioaccumulative and Toxic
STEL	Short term exposure limit
TWA	Time Weighted Average (TWA):
vPvB	very Persistent and very Bioaccumulative

Further information

® DuPont's registered trademark, Before use read DuPont's safety information., For further information contact the local DuPont office or DuPont's nominated distributors.
Based on the physico-chemical hazard assessment of this mixture, it was decided to include inside the main body of the safety data sheet all the relevant information coming from the exposure scenario of the lead/priority substances. Please refer to the safety data sheet of the individual components for additional information on exposure scenario.

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

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 guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The above information relates only to the specific material(s) designated herein and may not be valid for such material(s) used in combination with any other materials or in any process or if the material is altered or processed, unless specified in the text.