

## MATERIAL SAFETY DATA SHEET

### Opteon™ YF

(Please ensure that this MSDS is received by an appropriate person)

Date: June 2017

Version1

Ref no.: MS400

#### **1. PROUDCT AND COMPANY IDENTIFICATION**

Product name : Opteon™YF  
Trade name/Synonym : 2,3,3,3-Tetrafluoropropene  
HFO-1234yf  
R-1234yf  
Product use : R-1234yf (2,3,3,3-tetrafluoroprop-1-ene)  
: Heat transfer Fluids-Refrigerants, coolants, formation of  
Preparations, For professional and industrial installation  
and use only.  
Restriction on use : Do not use product for anything outside of the above specified  
Manufacture/Supplier : Afrox  
Company Address : 23 Webber Street, Selby  
Johannesburg, 2001  
South Africa  
23 Webber Street, Selby  
Johannesburg, 2001  
South Africa  
Emergency number : +27 (0) 860 020201

#### **SECTION 2. HAZARD IDENTIFICATION**

##### **Product hazard category**

Flammable gases : Category 1  
Gases under pressure : Liquefied gas

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Revised Date : 26/06/2017

**Label content** :

Pictogram



Signal word : Danger

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- Hazardous warnings : Extremely flammable gas contains gas under pressure;  
May explode if heated
- Hazardous prevention : Keep away from heat/sparks/hot surfaces. No smoking.
- Measures : Keep away from heat/sparks/open flames/hot surfaces.  
No smoking. Leaking gas fire. Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so. Protect from sunlight. Store in a well ventilated area.

#### Other hazards

Misuse or intentional inhalation abuse may cause death without warning symptoms, due to cardiac effects., 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
2,3,3,3-Tetrafluoropropene	754-12-1	>=99.5%wt

### **SECTION 4. FIRST AID MEASURES**

- General advice symptoms : Never give anything by mouth to an unconscious person. When symptoms
- 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 : Take off all contaminated clothing immediately. Flush area with Lukewarm 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.
- Most important symptoms/ : Contact with liquid or refrigerated gas can cause burns and frost

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Effects, acute and delayed        bite

Protection of first-aiders

Notes on physician                : Do not give adrenaline or similar drugs. Treat symptomatically.

### **SECTION 5. FIRE FIGHTING MEASURES**

Suitable extinguishing media    : Water spray alcohol, Alcohol-resistant foam, Dry chemical, Carbon dioxide ( CO<sub>2</sub> )

Unsuitable extinguishing media : No applicable data available

Specific hazards                    : Vapours are heavier than air and may spread along floors. Vapours  
May foam flammable mixtures with air. Fire for instance heat may  
Cause violent rupture of packages.  
Hazardous thermal decomposition products: Hydrogen fluoride  
Fluorinated compounds. Carbon oxides

Special protective equipment

For fire fighters                    : 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                : Use extinguishing measures that are appropriate to local  
Circumstances and the surrounding environment. Evacuate  
Personnel to safe areas. Cool containers/tanks with water spray.  
Fire or intense heat may cause violent rupture of packages.

### **SECTION 6. ACCIDENTAL RELEASE MEASURES**

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

Safeguards (Personnel)            : Evacuate personnel to safe areas. Ventilate the area. Vapours

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Are heavier than air and can cause suffocation by reducing oxygen Available for breathing. Refer to protective measures listed in Sections 7 and 8.

Environmental precautions : Should not be realised in the environment. In accordance with local And national regulations.

Spill Clean-up : Evaporators

Accidental Release Measures : Not applicable data available

### **SECTION 7. HANDLING AND STORAGE**

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

Handling (Physical aspects) : Vapours are heavier than air and may spread along floors. Vapours May form flammable mixture with the air. The product should only Be used in areas from which all naked lights and effective sources of ignition have been excluded. Electric equipment should be protected to the appropriate standard. May be ignited by open flame. Take measures to prevent the build-up of electrostatic charge. Keep away from open flames, hot surfaces and effective sources of ignition. When using do not smoke.

Dust explosion class : Not applicable data available

Storage : Do not drag, slide or roll cylinders. Never attempt to lift the cylinders by its cap. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Keep containers tightly closed in a cool, well-ventilated place. Store in an original container Protect from contamination. The product has an indefinite shelf Life when stored properly.

Storage period : > 10 yr

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

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

- Engineering controls : Ensure adequate ventilation, especially in confined areas.  
Vapours are heavier than air and can cause suffocation by reducing Oxygen available for breathing.
- 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 : Material: Heat insulated gloves  
Additional protection: Protective gloves complying with EN 374., or, US OSHA guidelines.
- Eye protection : Wear safety glasses or coverall chemical splash google. Eye Protection comply with EN 166. or ANSI Z87.1 additionally wear a Face shield where the possibilities exists for face contact due to Splashing, spraying or airborne contact with this material.
- Skin and body protection : Wear suitable Personal Protective Equipment.  
Wear as appropriate: Flame retardant antistatic protective clothing
- Protection measures : When using do not smoke. Self-contained breathing apparatus (SCBA) is required if a large release occurs.

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

Apperance

- Physical state : Gaseous
- Form : Liquefied gas
- Color : Colourless
- Odor : Slight, ether-like
- Odor threshold : No applicable data available
- pH : Neutral

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Melting point/freezing point : Melting point  
-152.2°C (-242.0°F)

Boiling point/boiling point range : Boiling point  
-29.4°C (-20.9°F)

Flash point : No applicable data available

Evaporation rate : No applicable data

Flammability (solid, gas) : No applicable data

Upper explosion limit : 12.3 vol% (21°C) (1013 hPa)  
Method: ASTM E681

Lower explosion limit : 6.2 vol% (21°C)  
Method: ASTM E681

Vapor pressure : 5,917.2 hPa at 20°C (68°F)

Vapor density : 4

Density : (Air = 1.0)

Specific gravity (Relative  
Density) : No application data available

Water solubility : 0.1982 g/l at 24°C (75°)

Solubility(ies) : No application data available

Partition coefficient: n-octanol/  
water : log Pow: 2 at 25°C (77°F)  
Method: High performance liquid chromatography

Auto-ignition temperature : 405 °C  
1,013 hPa  
Method: Directive 67/548/EEC, Annex V, A.15.  
Static test

Ignition temperature : Actual auto ignition Temperature (AIT) can be affected by the  
Concentration of vapours and oxygen, vapour/air contact time,  
Pressure, volume, catalytic impurities, etc.

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Decomposition temperature : No application data available

Viscosity, kinematic : No application data available

Viscosity dynamic : No application data available

### **SECTION 10. STABILITY AND REACTIVITY**

Reactivity : No application data available

Chemical stability : The product is chemically stable

Possibility of hazardous reactions : Hazardous polymerisation does not occur. Vapours may form Flammable mixtures.

reactions

Conditions to avoid : Keep away from: Heat, flames and sparks. Do not spray spray on a naked flame or any incandescent material.  
Gas cylinder: Keep at temperature not exceeding 52°C  
Pressurized container: Do not pierce or burn, even after use.

Incompatible materials : Strong bases Alkaline earth metals, finely divided metal powders, such as, Aluminium, Magnesium, Zinc, or, strong oxidizers.

Hazardous decomposition : Hazardous thermal decomposition products may include: Hydrogen fluoride, Fluorinated compounds, Carbon oxides.

### **SECTION 11. TOXICOLOGICAL INFORMATION**

Option™YF Further information: Cardiac sensitisation threshold limit: > 559509 mg/m3

Further information : Liquefied gas

Further information : Avoid skin contact with leaking liquid (danger of frostbite)

2,3,3,3-Tetrafluoropropene

Inhalation 4 h LC50 : > 4050000 ppm, Rat

Inhalation low observed : > 120000 ppm, Dog

Adverse Effect : Cardiac sensation

Concentration (LOAEC)

Inhalation No Observed : 120000ppm, Dog

Adverse effect Concentration : Cardiac sensation

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- Skin irritation : No skin irritation, not tested on animals
- 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. There are no reports of human respiratory sensitization
- Repeated dose toxicity : Inhalation  
Rat  
-  
gas  
NOAEL: 233 mg/l, 50,000 ppm,  
No toxicologically significant effects were found.  
Inhalation  
Rabbit  
-  
gas  
NOAEL: 2.33 mg/l, 500 ppm,  
No toxicological effects warranting significant target organ toxicity classification were seen below the recommended guidance values for classification.  
Inhalation  
Mini-pig  
-  
gas  
NOAEL: 50 mg/l, 10,000 ppm,
- Carcinogenicity : No toxicological, significant effects were found
- Mutagenicity : Not classifiable as a human carcinogen Sufficient data are available to conclude that the substance expected to be expected to be carcinogenic.
- Reproductive toxicity : No toxicity to reproduction 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.

### 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



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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

#### 2,3,3,3-Tetrafluoropropene

96 h LC50 : Cyprinus carpio (Carp) > 197 mg/l

72 h NOEC : Algae > 100 mg/l

48 h EC50 : Daphnia magna (Water flea) > 100 mg/l

#### Environmental Fate

#### Opteon™ YF

Biodegradability aerobic : < 5 % OECD Test Guideline 301F. According to the results of tests of biodegradability this product is not readily biodegradable

Bioaccumulation : No bioaccumulation is to be expected (log Pow <= 4).

### **SECTION 13. DISPOSAL CONSIDERATIONS**

Waste disposal methods : Can be used after re-conditioning. In accordance with local and national regulations

#### Product

Contaminated packaging : Empty pressure vessels should be returned to supplier

### **SECTION 14. TRANSPORTATION INFORMATION**

DOT UN number : 3161

Proper shipping : Liquefied gas, flammable, n.o.s. (2,3,3,3-Tetrafluoropropene)  
name

Class : 2.1

Labelling No. : 2.1

IATA\_C UN number : 3161

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Proper shipping : Liquefied gas, flammable, n.o.s. (2,3,3,3-Tetrafluoropropene)  
name

Class : 2.1

Labelling No. : 2.1

IMDG

UN number : 3161

Proper shipping : Liquefied gas, flammable, n.o.s. (2,3,3,3-Tetrafluoropropene)  
name

Class : 2.1

Labelling No. : 2.1

ICAO/ IATA cargo aircraft only

## **SECTION 15. REGULATORY INFORMATION**

Reference standard SANS 10234 and Supplement

National legislation OHSact and Regulations (85 of 1993)

## **SECTION 16. OTHER 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.

Significant change from previous version is denoted with a double bar

## **EXCLUSION OF LIABILITY**

Information contained in this publication is accurate at the date of publication. The company does not accept liability arising from the use of this information, or the use, application, adaptation or process of any products described herein.

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For product and safety enquiries please phone

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0860020202 (24 hr)