

ZHEJIANG YONGHE REFRIGERANT CO., LTD.

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Material Safety Data Sheet

(REFRIGERANT R417A)

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R-417A

IDENTIFICATION OF THE SUBSTANCE/ PREPARATION AND THE COMPANY/UNDERTAKING

Material Identification

Corporate MSDS Number: YH000818 CAS Name: R-417A

Company Identification

MANUFACTURER/DISTRIBUTOR: Zhejiang Yonghe Refrigerant Co., Ltd.

PHONE NUMBERS

Product Information: 86-570-8886807

Transport Emergency: 86-570-3832797

Medical Emergency: 86-570-3832776

COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL NATURE OF MIXTURE BASED ON:

THE PREPARATION R600 (ISOBUTANE) CAS: 106-97-8

R125 (PENTAFLUOROETHANE) CAS: 354-33-6

R134a (1,1,1,2-TETRAFLUOROETHANE) CAS: 811-97-2

HAZARDS IDENTIFICATION

MOST IMPORTANT HAZARDS -

PHYSICAL AND CHEMICAL HAZARDS Thermal decomposition giving toxic and corrosive products.

FIRST AID MEASURES

GENERAL ADVICE -

INHALATION Move to fresh air.

Oxygen or artificial respiration if needed.

In case of persistent problems: Consult a doctor.

SKIN CONTACT Frostbite: treat as thermal burns.

EYE CONTACT Wash immediately, abundantly and thoroughly with water.

If irritation persists, consult an ophthalmologist.

PROTECTION OF FIRST-AIDERS In case of insufficient ventilation, wear suitable respiratory equipment.

INFORMATION FOR DOCTORS Do not administer catecholamines (because of the cardiac effect caused by the product.)

FIRE FIGHTING MEASURES

SPECIFIC HAZARDS Thermal decomposition giving toxic and corrosive products.

Hydrogen fluoride

Carbon oxides

One of the components of this preparation gives flammable mixtures with air.

SPECIFIC METHODS Cool containers/tanks with water spray.

Prohibit all sources of sparks and ignition-Do not smoke.

SPECIAL PROTECTIVE EQUIPMENT Wear a self-contained breathing apparatus and protective suit.

FOR FIREFIGHTERS

ACCIDENTAL RELEASE MEASURES

PERSONAL PROTECTION Avoid contact with skin and eyes and inhalation of vapours.

Wear personal protective equipment.

In enclosed areas: ventilate or wear a self-contained breathing apparatus (risk of anoxia).

Do not smoke.

ENVIRONMENT PROTECTION Minimize as much as possible discharge into the environment.

HANDLING AND STORAGE

Technical measures /Precautions Storage and handling precautions applicable to products: GAS UNDER PRESSURE.

Ensure appropriate exhaust and ventilation at machinery.

Safe handling advice Prohibit ignition sources and contact with hot surfaces-DO NOT SMOKE.

Technical measures Store at ambient temperature in the original container.

/Storage conditions Keep away from naked flames, hot surfaces and sources of ignition.

Keep in a cool, well-ventilated place.

Protect full containers from sources of heat to avoid overpressurization.

Recommended Ordinary steel.

To be avoid Alloys containing more than 2% of magnesium.

Plastic materials.

EXPOSURE CONTROLS/PERSONAL PROTECTION

PROTECTIVE PROVISIONS Ensure sufficient air exchange and/or exhaust in work areas.

CONTROL PARAMETERS -

Exposure Limits R-134a VME=1000ppm

R600 VME=1000ppm

R125 VME=1000ppm

PERSONAL PROTECTION EQUIPMENT -

Respiratory protection In case of insufficient ventilation, wear suitable respiratory equipment.

Hand protection Gloves

Eye protection Safety glasses.

PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE (20 °C) Liquefied gas

COLOUR colourless

ODOUR Slightly ether-like

pH Not applicable

BOILING POINT/RANGE -38.0°C

FLASH POINT No flash point (in the test conditions)

VAPOR PRESSURE (25 °C): 1.13MPa (11.3bar)

(50 °C): 2.11MPa (21.1bar)

(70 °C): 3.26Mpa (32.6bar)

VAPOUR DENSITY At the boiling point: 4.54kg/m³

DENSITY (25 °C): 1133kg/m³

(50 °C): 1004kg/m³

(70 °C): 861kg/m³

PARTITION COEFFICIENT $\log P_{ow}=0.21(R32)-\log P_{ow}=1.48(R125)-\log P_{ow}=1.06(R134a)$

(noctanol/water)

OTHER DATA R134a: Does not dissociate in water.

Critical temperature: 89°C

Critical pressure: 4.64MPa

STABILITY AND REACTIVITY

CONDITIONS TO AVOID Avoid contact with flames and red hot metallic surfaces.

HAZARDOUS DECOMPOSITION Thermal decomposition into toxic products

PRODUCTS containing fluorine.

Hydrogen fluoride (hydrofluoric acid)

Carbon oxides.

FURTHER INFORMATION The product is stable under normal handling and storage conditions.

TOXICOLOGICAL INFORMATION

ACUTE TOXICITY -

Inhalation Experimental effects on animals:

FORANE 134a, FORANE 600, FORANE 125

Practically not harmful by inhalation.

No mortality in rat at 500000ppm/4h.

As with other volatile aliphatic halogenated compounds, through vapour accumulation and/or inhalation of large quantities, the product can cause:

Loss of consciousness and cardiac disorders aggravated by stress and lack of oxygen: risk of mortality.

LOCAL EFFECTS -

Skin-contact Ejection of liquefied gas: frostbite possible.

CHRONIC TOXICITY FORANE 134a, FORANE 600, FORANE 125

Studies of prolonged inhalation in animals have not shown sub-chronic toxic effects.

(rat/3 months/Inhalation: 50000ppm)

SPECIFIC EFFECTS

GENOTOXICITY According to available experimental data:

FORANE 134a, FORANE 600, FORANE 125: Not: genotoxic.

CARCINOGENICITY FORANE 134a

Experimentation on animals has not shown clear evidence of carcinogenic effect.

(rat/Inhalation " oral route

REPRODUCTIVE TOXICITY

Foetal development: R134a, R600, R125

According to available experiment data:

Absence of toxic effects for foetal development

(Inhalation/rat-rabbit)

Fertility:

According to limited available data in animals:

FORANE 134a Absence of toxic effects on fertility

(mouse/Inhalation)

ECOLOGICAL INFORMATION

-SUBSTANCE CONCERNED FORANE 600

PERSISTENCE/DEGRADABILITY -

In water Not readily biodegradable: 5%after 28d

BIOACCUMULATION Practically not bioaccumulable: log Pow =0.21(measured)

-SUBSTANCE CONCERNED FORANE 125

MOBILITY Rapid evaporation: t1/2 life= 3.2h (estimated)

PRESISTENCE/DEGRADBILITY -

In water Not readily biodegradable 5% after 28d

In air Degradation in the troposphere: t1/2 life= 28.3y (estimated)

Ozone depletion potential: ODP (R11=1) =0

Global warming potential (GWP): (HGWP) =0.58

In soils and sediments Slight adsorption: log Koc= 1.3-1.7

BIOACCUMULATION Practically not bioaccumulable: log Koc=1.48

-SUBSTANCE CONCERNED FORANE 134a

MOBOLITY Rapid evaporation; t1/2 life= 3h(estimated)

PERSISTENCE/DEGRADABILITY -

In water Not readily biodegradable: 3% after 28d

In air Degradation in the atmosphere: 3% after 28d

Ozone depletion potential: ODP(R-11=1)= 0

Global warming potential (GWP)= 0.26

BIOACCUMULATION Practically not bioaccumulable: log Pow= 1.06

DISPOSAL CONSIDERATIONS

DISPOSAL OF PRODUCT Recycle or incinerate at an approved waste disposal site only.

TRANSPORTATION INFORMATION

UN Number 3163

ADR/RID Class: 2.2

Item (letter): 2;A

Prescriptions Labels: 2

H.I. Nr/ID Nr: 20/3340

IMDG Class: 2.2

UN Nr (IMDG): 3340

Prescriptions Labels: 2.2

IATA Class: 2.2

UN Nr (IATA) or ID Nr: 3340

Prescriptions Labels: 2.2

REGULATORY INFORMATION

EEC DIRECTIVE -

SAFETY DATA SHEETS D.91/155/EEC amended by D.93/112/EEC: Dangerous substances and preparations

EC CLASSIFICATION/LABELLING -

DANGEROUS D.88/379/EEC amended by D.93/18/EEC (3rd ATP)

PREPARATIONS Not classified as dangerous

SUBSTANCE DAMAGING EC Regulation Nj 3093/94 of 15.12.94

TO THE OZONE LAYER

INVENTORIES EINECS (EU): conforms

TSCA (USA): conforms

OTHER INFORMATION

RECOMMENDED USES Refrigerant

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This information applies to the product as such and conforming to specifications of Zhejiang Yonghe.

In case of formulations or mixtures, it is necessary to ascertain that a new danger will not appear. The information contained is based on our knowledge of the product, at the date of publishing and it is given quite sincerely. However the revision of some data is in progress.

Users are advised of possible additional hazards when the product is used in applications for which it was not intended. This sheet shall only be used and reproduced for prevention and security purposes.

The references to legislative, regulatory and codes of practice documents cannot be considered as exhaustive.

It is the responsibility of the person receiving the product to refer to the totality of the official

documents concerning the use, the possession and the handling of the product.

It is also the responsibility of the handlers of the product to pass on to any subsequent persons who will come into contact with the product (usage, storage, cleaning of containers, other processes) the totality of the information contained within this safety data sheet and necessary for safety at work, the protection of health and the protection of environment.

End of MSDS