



Novec™ Engineered Fluid HFE-71DE

Product Information

Introduction

3M™ Novec™ Engineered Fluids are 3M's advanced range of replacement products for ozone-depleting substances, designed to provide the industry with the desirable balance of performance, safety and environmental properties.

HFE-71DE is a hydrofluoroether, methoxy-nonafluorobutane (C₄F₉OCH₃), in an azeotrope formulation with trans-1,2-dichlorethylene. This mixture is a true azeotrope, with constant vapour and liquid composition at its boiling point.

This fluid is suited to medium-duty cleaning and degreasing tasks, and is intended to replace ozone-depleting materials. It has zero ozone depletion potential and other favourable environmental properties (see Page 2). Novec HFE-71DE azeotrope has a low toxicological profile, with a time-weighted average exposure guideline of 750 ppm for the 3M™ Novec™ HFE-7100 component, and 200 ppm for trans-1,2-dichlorethylene (eight hour average).

The increased solvency and low surface tension, non-flammability and constant composition during boiling of HFE-71DE azeotrope make it suitable for immersion and vapour degreasing applications. These properties may make the azeotrope suitable for certain coating and lubricant deposition applications where increased solvency is required.

Typical Applications

Cleaning, Rinsing and Drying Agent:
Medium-duty cleaning of oils, greases, waxes.
For information on other applications, contact your local 3M Specialty Fluids office.

Material Description

Methoxy-Nonafluorobutyl Ethers	50% by weight
Trans-1, 2-dichlorethylene	50% by weight
Appearance	Clear, colourless

Safety and Handling

Novec HFE-71DE azeotrope is non-flammable and does not exhibit flammability characteristics under normal operating and storage conditions. This fluid is highly resistant to thermal breakdown and hydrolysis in storage and during use. Detailed handling procedures are given in the pertinent material safety data sheet, which is available upon request.

3M™ Novec™ Engineered Fluid HFE-71DE vs. Selected Cleaning Fluids

Property @ 25° C	Unit	HFE-71DE	CFC-113	HCFC-141b	Tric	1,1,1-TCA
Formula		Azeotrope ¹	C ₂ Cl ₃ F ₃	C ₂ Cl ₂ H ₃ F	C ₂ Cl ₃ H	C ₂ Cl ₃ H ₃
Boiling Point	°C	41	48	32	87	74
Freeze Point	°C	-24 ²	-35	-103	-86	-39
Flashpoint		None	None	None	None	None
Liquid Density	g/cm ³	1.37	1.56	1.23	1.46	1.32
Surface Tension	mN/m	16.6	17.3	19.3	22.0	25.1
Heat Transfer						
Vapour Pressure	kPa	63.0	44.1	75.9	10	16.1
Dyn. Viscosity	mPa s	0.45	0.68	0.43	0.62	0.83
Heat of Vaporization	kJ/kg @ bp	201	146	223	265	243
Environmental						
Ozone Depletion Potential ³	ODP	0.00	0.80	0.10	< 0.005	0.1
Global Warming Potential ⁴	GWP	140	6000	700	140	140
Atmospheric Lifetime	years	4.1 ⁵	85	9.4	NA	50.4
Solubility in Water	ppm	< 10	170	210	1200	700
Toxicity						
Exposure, 8h av.	ppm	750/200	1000	400	100	350

¹ 50% HFE-7100 (C₄F₉OCH₃), 50% trans-1,2-dichloroethylene ² Critical Solution Temperature

³ CFC-11 = 1.0 ⁴ GWP-100 year ITH, IPCC 1995 ⁵ 4.1 - HFE-7100

Data compiled from published information.

Materials Compatibility

Novec HFE-71DE is generally compatible with the following materials. However, users should evaluate parts containing some plastics and elastomers for long term compatibility prior to cleaning with HFE-71DE.

Metals

Aluminium
Copper
Carbon Steel
302 Stainless Steel
Brass
Zinc
Molybdenum
Tantalum
Titanium
Tungsten
Cu/Be Alloy C 172
Magnesium Alloy AZ31B

Plastics

Epoxy
Nylon
PTFE
Polyethylene
Polypropylene
Polyester
Phenolic

Elastomers

Polysulphide
Chlorosulphonated PE
EPDM
Buna-S*
Butyl Rubber*
Natural Rubber*

(* Some Swelling)

	Formulation	Boiling Point	Application
HFE-7100	Methoxy-nonafluorobutane	61°C	light cleaning / formulations / heat transfer
HFE-7200	Ethoxy-nonafluorobutane	76°C	film cleaning & heat transfer
HFE-71DA	HFE-7100 with 44.6 % Trans-1,2-dichlorethylene and Ethanol (2.7 %)	40°C	flux removal / vapour degreasing
HFE-71IPA	HFE-7100 with 4.5 % Isopropylalcohol	54.8°C	polar soil removal

Resources

- For additional Novec HFE-71DE technical information, contact your local 3M Specialty Fluids office.
- OEM Support - Extensive OEM policies and equipment design guidelines have been prepared for system retrofit firms and cleaning equipment manufacturers in support of Novec HFE-71DE.
- Visit our Web site at: www.3M.com/specialtymaterials

Packaging and Availability

Novec HFE-71DE may be ordered in the following container sizes:
 200 kg drums, 20 and 5 kg pails.
 Small samples for limited or preliminary test work are available.

Distributors

Novec HFE-71DE is marketed through a network of authorised stocking distributors. For the name of a local distributor call your local 3M Specialty Fluids office.

Fluids Return Program

3M offers a programme for return of used 3M Specialty Liquids in Europe. A separate Return Fluids Programme information sheet describes the setup and product flow. The procedure starts with a Return Fluid Status Report, asking for important, use-related details to make sure the 3M fluid is not polluted by other substances after use. The necessary documentation is provided by the local 3M Distributor in your region.

Environmental Policy

3M will continue to recognise and exercise its responsibility to: Prevent pollution at the source wherever and whenever possible. Develop products that will have a minimal effect on the environment.

Conserve natural resources through the use of reclamation and other appropriate methods. Assure that its facilities and products meet and sustain the regulations of all national, state and local environmental agencies.

Assist, wherever possible, governmental agencies and other official organisations engaged in environmental activities.



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