

# 3M™ Novec™ 71D90 Engineered Fluid

## Introduction

3M™ Novec™ 71D90 Engineered Fluid is a mixture of trans-1,2-dichloroethylene and 3M™ Novec™ 7100 Engineered Fluid. The mixture is azeotrope-like in behavior as evidenced by the depressed boiling point of the product relative to either of its components. Novec 71D90 fluid does not have a closed cup flashpoint,\* has zero ozone-depletion potential and an extremely low global warming potential. The excellent solvency of Novec 71D90 fluid makes it an ideal replacement for HCFC-141b in many aerosol cleaners. The physical properties of Novec 71D90 fluid are shown in Table 1.

\*ASTM D3278-96e1 Setaflash closed cup

For information on other applications, contact your 3M representative or 3M authorized distributor.

## Applications

Novec 71D90 fluid is intended for use in aerosol cleaning formulations. With 90% trans-1,2-dichloroethylene (t-DCE), Novec 71D90 fluid offers increased formulating flexibility.

**Note:** Novec 71D90 fluid will not maintain a constant composition during evaporation due to the differential evaporation rates of the mixture components. Evaporation of this material, such as from a spill, cleaning bath, or vapor degreaser, may change the composition of the material, resulting in a potentially flammable liquid. Because of this, the product is not recommended for use in vapor degreasing or cold cleaning baths. This attribute is also an important consideration in determining suitability for aerosol formulations.

## Material Description

Ingredients	3M™ Novec™ 71D90 Engineered Fluid
Methyl Nonafluorobutyl Ethers <sup>1</sup>	10% by weight
Trans-1,2-dichloroethylene	90% by weight
Appearance	Clear, colorless

<sup>1</sup> Novec 7100 fluid (C<sub>4</sub>F<sub>9</sub>OCH<sub>3</sub>) consists of two inseparable isomers with essentially identical properties. These are (CF<sub>3</sub>)<sub>2</sub>CF<sub>2</sub>OCH<sub>3</sub> (CAS No. 163702-08-7) and CF<sub>3</sub>CF<sub>2</sub>CF<sub>2</sub>OCH<sub>3</sub>

## Typical Physical Properties

**Table 1**

Properties	3M™ Novec™ 71D90 Engineered Fluid
Formulation	Blend <sup>1</sup>
Boiling Point (°C)	42.6
Freeze Point (°C)	-45
Liquid Density (g/ml)	1.26
Surface Tension (dynes/cm)	21.1
Vapor Pressure (mmHg)	405
Viscosity (cps)	0.40
Heat of Vaporization (cal/g @ boiling point)	64

Data compiled from published information.

Not for specification purposes. All values @ 25°C unless otherwise specified.

<sup>1</sup> 90% (by weight) trans-1,2-dichloroethylene/10% (by weight) Novec 7100 Engineered Fluid (C<sub>4</sub>F<sub>9</sub>OCH<sub>3</sub>)

## Environmental and Safety Properties

**Table 2**

Properties	3M™ Novec™ 71D90 Engineered Fluid
Ozone Depletion Potential–ODP <sup>1</sup>	0.00
Global Warming Potential <sup>2</sup>	32
Atmospheric Lifetime, years <sup>3</sup>	4.1 <sup>5</sup>
Exposure Guideline, 8-hour TWA, ppm <sup>4</sup>	200/750
Flash Point <sup>5</sup>	None

<sup>1</sup> CFC-11 = 1.0

<sup>2</sup> GWP – 100 year 1TH, CO<sub>2</sub> = 1.0

<sup>3</sup> 4.1 – Novec 7100 fluid, 0.01 – trans-1,2-dichloroethylene

<sup>4</sup> Exposure guideline of components, trans-1,2-dichloroethylene 200 ppm, Novec 7100 750 ppm

<sup>5</sup> ASTM D3278-96e1 Setaflash closed cup

## Regulatory Status

The U.S. Environmental Protection Agency (EPA) has listed all components of 3M™ Novec™ 71D90 Engineered Fluid as “acceptable,” without restrictions, under the EPA’s Significant New Alternatives Policy (SNAP) program.

## Regulations on Chlorine-Containing Solvents

**Table 3**

Regulation	Trans-1,2-dichloroethylene	Trichloroethylene	Perchloroethylene	Methylene Chloride
VOC Designation	Yes	Yes	Yes	No
Reportable Quantity for Accidental Release	1000 lbs.	100 lbs.	100 lbs.	1000 lbs.
Regulated if Emitted into Water	Yes	Yes	Yes	Yes
Hazardous Air Pollutant	No	Yes	Yes	Yes
Annual Reporting (EPCRA 313) (SARA)	No	Yes	Yes	Yes
OSHA List of toxins/carcinogens	No	Yes	Yes	Yes

## Regulations and Reporting

Trans-1,2-dichloroethylene (trans) is less regulated compared to the other chlorinated solvents in Table 3. Regulations affecting Novec 71D90 fluid include VOC emissions of trans and reporting requirements if trans is emitted into water or if a spill of 1111 lbs. or more occurs. Trans is not considered a Hazardous Air Pollutant (HAP).

## Environmental Policy

3M will continue to recognize 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 federal, state and local environmental agencies; assist, wherever possible, governmental agencies and other official organizations engaged in environmental activities.

Data compiled from published information.

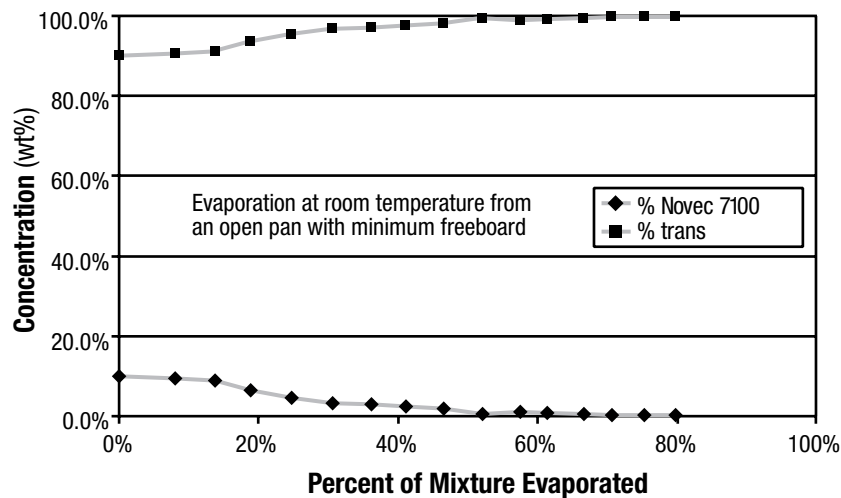
Not for specification purposes.

## Safety and Handling

Before using this product, please read the current product Material Safety Data Sheet (available through your 3M sales or technical service representative) and the precautionary statement on the product package. Follow all applicable precautions and directions.

3M™ Novec™ 71D90 Engineered Fluid is nonflammable and does not exhibit flammability characteristics under normal storage conditions. Evaporation of this material, such as from a spill, cleaning bath, or vapor degreaser, may change the composition of the material, resulting in a potentially flammable liquid. Because of this, the product is not recommended for use in vapor degreasing or cold cleaning baths. The graph below shows the change in composition of Novec 71D90 fluid during evaporation from an open container at room temperature.

This fluid is highly resistant to thermal breakdown and hydrolysis in storage and during use. Maintain storage temperature below 100°F (38°C) to prevent excess pressure on the container by the product. Contents may be under pressure if shipped at elevated temperatures. Open closure slowly to vent pressure.



## Packaging and Availability

Novec 71D90 fluid may be ordered in the following container sizes:

- 1-gallon bottles for limited or preliminary test work are available
- 55-gallon drum

## Recycle and Disposal Options

### Used Fluid Return Program

3M offers a program for free pickup and return of used 3M specialty fluids in the U.S. A pre-negotiated handling agreement between users and our authorized service provider offers users broad protection against future liability for used 3M product. The fluid return program is covered by independent third-party financial and environmental audits of treatment, storage and disposal facilities. Necessary documentation is provided. A minimum of 30 gallons of used 3M specialty fluid is required for participation in this free program.

For additional information on the 3M Used Fluid Return Program, contact your local 3M representative or call 3M Customer Service at 800.810.8513.

### Resources

3M™ Novec™ Engineered Fluids are supported by global sales, technical and customer service resources, with technical service laboratories in the U.S., Europe, Japan, Latin America and Southeast Asia. Users benefit from 3M's broad technology base and continuing attention to product development, performance, safety and environmental issues. For additional technical information on 3M™ Novec™ 71D90 Engineered Fluid in the United States or for the name of a local authorized distributor, call 3M Electronics Markets Materials Division: **800 810 8513**.

### The 3M™ Novec™ Brand Family

The Novec brand is the hallmark for a variety of patented 3M products. Although each has its own unique formula and performance properties, all Novec products are designed in common to address the need for safe, effective, sustainable solutions in industry-specific applications. These include precision and electronics cleaning, heat transfer, fire protection, lubricant deposition and several specialty chemical applications.

3M™ Novec™ Engineered Fluids • 3M™ Novec™ Aerosol Cleaners • 3M™ Novec™ 1230 Fire Protection Fluid • 3M™ Novec™ Electronic Coatings • 3M™ Novec™ Electronic Surfactants

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98-0212-2364-3

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