

# 3M™ Performance Fluid PF-5056 for Rigid Foam Formulations

## Introduction

3M™ Performance Fluid PF-5056 is a clear, colorless, fully-fluorinated liquid. Like other 3M Performance Fluids, PF-5056 is chemically and thermally stable, practically non-toxic and nonflammable. It is effective in reducing the thermal conductivity of polyurethane and other rigid foam formulations. The lower foam thermal conductivity helps manufacturers meet the continually tightening energy efficiency targets placed on appliances and other energy-sensitive applications. Performance Fluid PF-5056 foam additive, used in concentrations as low as 0.5% on the total foam weight, is effective at reducing the foam-cell size and thus the thermal conductivity of foam. The resulting foams display thermal conductivity that are typically 3% to 15% lower than those formulated without the additive. High dielectric strength and excellent materials compatibility also make performance fluid PF-5056 an effective alternative to chlorofluorocarbons (CFCs) in a wide range of applications, from lubricant deposition to low temperature cooling to process solvent applications.

## Typical Physical Properties

**Note:** The following technical information and data should be considered representative or typical only and should not be used for specification purposes. All values determined at 25°C unless otherwise specified.

Properties	PF-5056
Appearance	Clear, colorless
Boiling Point (101 kPa)	25°C - 80°C
Liquid Density	1.7 g/ml
Kinematic Viscosity	< 1 centistoke
Water Solubility	< 20 ppmw
Solubility in Water	< 5 ppmw

## Typical Applications

Used in combination with hydrocarbon blowing agents such as cyclopentane, 3M™ Performance Fluid PF-5056 is effective at reducing the cell size and the thermal conductivity of many rigid foam formulations. Examples of products potentially benefiting from the use of performance fluid PF-5056 include:

- Appliances
  - Refrigerators
  - Freezers
- Commercial Refrigeration
- Refrigerated Transport
- Building Construction Panels

## Foam Additive Performance

3M™ Performance Fluid PF-5056 has been shown to be effective at reducing the cell size and thermal conductivity of foam with concentrations as low as 0.5% of the total foam weight. Performance fluid PF-5056 foam additive acts as a nucleating agent during the foam blowing process and reduces the average size of the foam cells. The resulting foams have thermal conductivity that are typically 3% to 15% lower than those formulated without the additive. This higher efficiency insulation helps manufacturers to meet increasing energy efficiency requirements for appliances, buildings and other energy-sensitive applications.



## Safety and Handling

3M™ Performance Fluid PF-5056 is nonflammable, and is highly resistant to thermal breakdown and hydrolysis in storage and during use. Recommended handling procedures are provided in the Material Safety Data Sheet, which is available upon request.

## Environmental Properties

Although 3M™ Performance Fluid PF-5056 is a perfluorocarbon (PFC) with a high global warming potential, when used as a foam additive at low concentrations, the resulting direct climate impact is comparable to hydrofluorocarbon (HFC) blown foams. As pointed out earlier in this document, the increased efficiency resulting from smaller cell sizes creates a favorable, indirect climate impact. Guidelines for the safe handling and use of this 3M product are provided in the Material Safety Data Sheet, which is available upon request.

## Health, Safety and Handling Considerations

**Before using this product, please read the current product Material Safety Data Sheet (available online or through your 3M sales or technical service representative).**

## Global Customer Service Contact Information

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## Technical Information

The technical information, recommendations and other statements contained in this document are based upon tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed.

## Product Use

Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. Given the variety of factors that can affect the use and performance of a 3M product, user is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user's method of application.

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