

# Precision & Electronics Cleaning FAQs

3M™ HFEs are now



3M™ Novec™  
Engineered Fluids

It's more than just a new name.

1. What is a 3M™ HFE?

HFE is an acronym for hydrofluoroether. The chemical formulation of 3M HFE-7100 is  $C_4F_9OCH_3$  (Methyl Nonafluorobutyl Ether). (1) 3M HFEs are characterized by their unique combination of properties -- the stability and safety of a fluorocarbon in addition to the environmental features and increased solubility of a hydrocarbon.

(1) 3M HFE-7100 ( $C_4F_9OCH_3$ ) consists of two inseparable isomers with essentially identical properties. These are  $(CF_3)_2CFCF_2OCH_3$  (CAS No. 163702-08-7) and  $CF_3CF_2CF_2CF_2OCH_3$  (CAS No. 163702-07-6).

2. When is it appropriate to use 3M HFE-7100 in its neat form, as an azeotrope (3M HFE-71DE or 3M HFE-71DA) or in a co-solvent process?

Generally, neat 3M HFE-7100 is used in light duty cleaning and degreasing, 3M HFE-71DE or 3M HFE-71DA is recommended for medium duty cleaning and degreasing. A co-solvent process, in which a solvating agent is used for cleaning followed by 3M HFE-7100 as a rinse agent is effective for heavy duty cleaning and defluxing.

3. What is a "solvating agent?"

This is a stronger and less-volatile solvent used in the co-solvent process, primarily to solubilize and remove heavy hydrocarbon soils and flux residue from parts.

4. Is the 3M HFE process a "drop-in" replacement for my present vapor degreasing equipment?

Although many existing pieces of equipment will be acceptable for use with the 3M HFE neat, azeotrope or co-solvent process, no cleaning chemistry is a perfect drop-in for another chemistry. In most cases, minimal process or equipment changes can be made to improve and optimize cleaning ability, fluid economics and/or product throughput.

5. What are the advantages of the 3M HFE process over alternative processes?

The 3M HFE process can produce clean, dry parts in very short cycle times, without exposing the parts to water. It produces very small volumes of waste products, and usually offers economic advantages compared to alternative processes. 3M HFE co-solvent chemistry has no ozone-depleting components, has a shorter atmospheric lifetime and lower global warming potential than CFCs and many fluorinated compounds, and a favorable toxicity profile. The azeotrope chemistry has similar characteristics. 3M HFE-7100 and 3M HFE-7200 are not ozone precursors and have been granted VOC exemption.

6. What are the economics of the 3M HFE process?

For those applications presently using vapor degreasing, it may often provide better economics than any other alternative. Ask your 3M representative or 3M authorized distributor for assistance in determining the relative economics of the alternatives available to you. Cost/benefit analysis data are also available.

7. Are there 3M HFE process demonstration facilities available?

Yes. There are facilities located in the United States, Japan, Singapore and Antwerp, Belgium. Other sites may be available at approved equipment manufacturers and other facilities. Please contact your local 3M authorized Specialty Fluids distributor for more information.

8. Can I submit parts for a cleaning test using the 3M HFE process?  
How do I schedule a trial?

Yes. Several questions on the parts, process needs and evaluation criteria need to be answered before the evaluation can start. Contact your local 3M HFE distributor or 3M sales representative to make arrangements.

9. How do I order 3M HFE process fluids?

3M HFEs and solvating agents can be ordered from your local 3M authorized distributor.