

PRECISION CLEANING AND DEFLUXING

3M™ NOVEC™ HFE,

A new generation fluid

the long-term solution

Yes!



**Do 3M™ NOVEC™ HFE
products**

simplify
cleaning
and defluxing
processes?

Yes!



Montreal Protocol, Kyoto Protocol, revision of the VOC Directive 1999/13/EC, French decree 2001/97 on CMRs, sewage treatment, Reach legislation, etc.

In a world subject to environmental regulations, choosing an effective low-cost solvent has become complicated.

Environmental hygiene and security regulations have led people to limit the use of many solvents, to reconsider cleaning and defluxing operations and to invent safe alternatives. The 3M™ Novec™ HFE (hydrofluoroethers) line takes these constraints into account while maintaining excellent cleaning performance and being compatible with many materials.

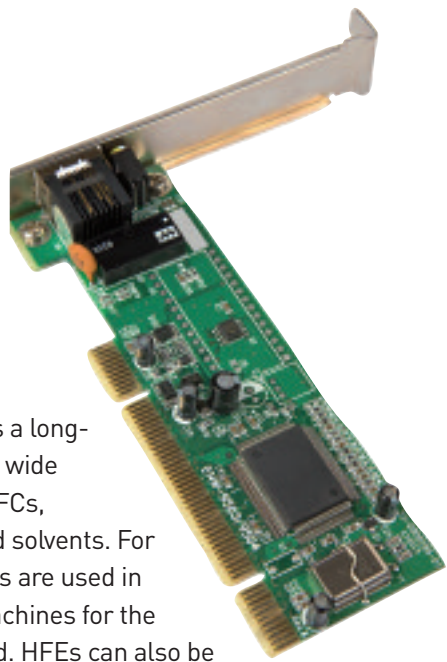
For any precision cleaning or defluxing operation, the process is easy to implement:

you only need a compact machine and 3M™ Novec™ HFE, the fluid that goes beyond norms. Not only does it boast stability and very low toxicity but it is also the most cost effective product of its generation.

A high-technology fluid,
a balanced solution
for precision cleaning
and defluxing

**Are 3M™ NOVEC™ HFE
products,
a long-term
for the
replacement
of many
solvents?**

Yes!



Yes, the 3M™ Novec™ HFE family is a long-term solution designed to replace a wide range of solvents, from CFCs to HCFCs, including chlorinated or brominated solvents. For cleaning-defluxing operations, HFEs are used in ultrasonic vapor phase cleaning machines for the part to be rinsed, dried and polished. HFEs can also be used in co-solvent formulations based on petroleum, which are known for their good cleaning qualities. Finally, HFEs may be used to clean circuit boards by eliminating dust, fingerprints and flux waste linked to lead assembling or disassembling.

Neat HFE

These products are highly stable to thermal and chemical reactions and are compatible with a wide range of materials. They can be used to remove particles and very light oils.

HFE and solvents in azeotropic formulations

They improve efficiency and are ideal to clean fingerprints and impurities such as flux, oil and grease waste.

HFE + petroleum solvent

HFE can be used in co-solvent formulations for cleaning-defluxing operations.

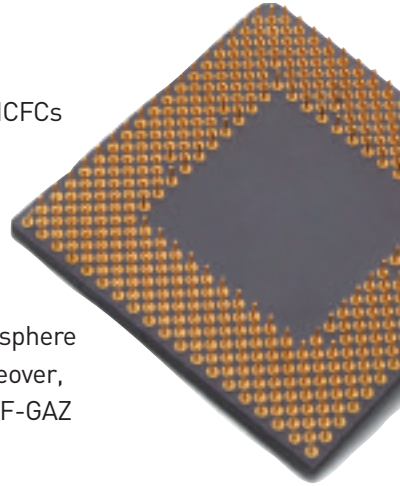
A close-up photograph of a vibrant green leaf with several clear water droplets resting on its surface. The leaf is positioned above a body of water, which shows gentle ripples and a reflection of the leaf and droplets. The overall scene is bathed in a soft, natural green light, creating a fresh and clean atmosphere.

**Are 3M™ NOVEC™ HFE
products ,
eco-friendly?**

Yes!

Known for depleting the ozone layer, CFCs and HCFCs are forbidden under the Montreal Protocol.

The line of fluids 3M™ Novec™ HFE is a family of new generation fluids that do not damage the ozone layer and respect norms and the environment. They also don't remain in the atmosphere as long as CFCs, HCFCs and other solvents. Moreover, 3M™ Novec™ HFE products are not subject to the F-GAZ regulations.



	Ozone layer destruction	Global warming ^[2]	Time spent in the atmosphere ^[3]
3M™ Novec™ HFE-7100	0	320	4,1
3M™ Novec™ HFE-71DE	0	160	4,1
3M™ Novec™ HFE-72DE	0	40	4,1
3M™ Novec™ HFE-7200	0	55	0,8
CFC113*	0,8	6000	85
HCFC 141b	0,1	700	9,2
HFC-4310mee	0	1700	17,1
nPB	0,026	0,31	0,03

^[1] **CFC11 = 1

^[2] ITH (100 years)

^[3] Years

**Do 3M™ NOVEC™ HFE
fluids**

preserve the safety
and security
of the operators?

Yes!

The 3M™ Novec™ HFE line is used in many industries and by many subcontractors in electronics, aeronautics, automobile and medical industries because, among other reasons, it is not subject to the French CMR decree that establishes regulations to limit risks of cancers, mutation and toxicity for reproduction. Even better, with the time-weighting average exposure being high, HFE products replace the solvents that might endanger the safety and security of the operators.

Under normal conditions of use, operators are only exposed to very small quantities of cleaning solvent. The toxicological tests 3M organized confirm that the 3M™ Novec™ HFE fluids have a low global toxicity.

With regard to security, the use of flammable materials is always complicated. Solvent blends considered as nonflammable on the basis of their initial compositions may lead to flammable formulations because of the selective evaporation of one of their components. This misconception can be dangerous for the users of these solutions. Because the 3M™ Novec™ HFE blends are azeotropic, there is no risk of selective evaporation. Thus, these products are non-flammable and safer.

The 3M™ Novec™ HFE products do not irritate the eyes or the skin.

Non flammable products without any flash point.

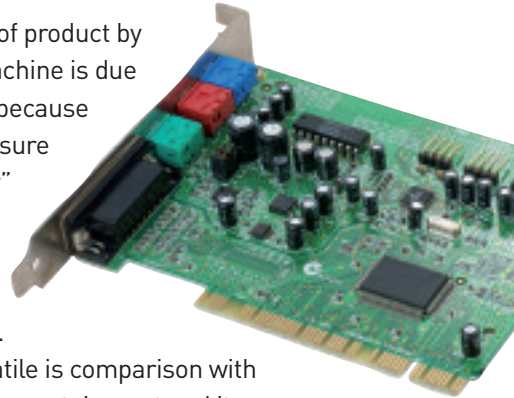
* An azeotropic blend is a mix keeping the same composition in liquid and vapor phases, with a unique boiling point.



Is 3M™ NOVEC™ HFE,
an economic
solution?

Yes!

It is known that the high consumption of product by an ultrasonic vapor phase cleaning machine is due to the fact that the solvent evaporates because of its boiling temperature and the pressure of its steam. Moreover, the “wettability” (surface tension of the solvent) is involved in the losses at the final stage of the cleaning process, when the parts are taken out of the machine.



The 3M™ Novec™ HFE line is little versatile in comparison with other solvents. Its low vapor pressure in containment and its very low surface tension reduces drive losses which reveals, one more time, the economical viability of the use of such fluids. The cleaning bath and the recuperation of the solvent for regeneration, two methods invented by INVENTEC, make the whole product even more economical and easy to use.

By reducing the evaporation of solvents, the 3M™ Novec™ HFE line also reduces operating costs

Obviously, the ultrasonic vapor phase cleaning machine must be adapted to this new kind of fluid. Compared to detergent machines, these machines are much more compact and are very good in terms of cluttering and

duration (no drying). Moreover, an aqueous process imposes a preliminary wastewater treatment. By choosing a machine that fits your needs, you will reduce your fluid consumption.



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