



Horizons

New ways to balance safety, sustainability and performance, from the makers of 3M™ Novec™ Products

Newsletter

NOVEC

Victory at Sea

3M™ Novec™ Engineered Fluid provides safe harbor for world's largest squid



Back in 2004, 3M's Tom Brodbeck was at the Smithsonian Institution's National Museum of Natural History outside Washington, D.C. He had come to discuss the possibility of retrofitting the facility for a fire suppression system based on 3M™ Novec™ 1230 Fire Protection Fluid.

The massive building contains row upon row of shelves, each laden with specimens and artifacts – some more than a century old. Many of the specimens had been preserved in the field with alcohol, including potable spirits such as rum. “A new fire protection system was needed, in part because of all those flammable spirits,” recalls Brodbeck. “Also, unlike water, Novec 1230 fire protection fluid wouldn't damage any of the valuable artifacts stored in the facility.”

Brodbeck soon realized that the engineering costs associated with the retrofitting project would be prohibitive. But he and his colleague Dave Hesselroth wondered whether 3M could

help reduce the Smithsonian's risk of fire in another way: namely, by providing a less combustible storage medium than 100-year-old moonshine.

Their idea was to use a hydrofluoroether (HFE) from the 3M™ Novec™ Engineered Fluids family. Novec fluids are nonflammable and essentially inert, which suggested that they would have no harmful impact on biological specimens.

After several experiments, Hesselroth was most pleased with the results from 3M™ Novec™ 7100 Engineered Fluid, typically used for cleaning in the electronics industry and for heat transfer in semiconductor, chemical and pharmaceutical manufacturing.

The crystal-clear fluid seemed to work as well as alcohol. Furthermore, the fluid didn't turn yellow, or cause the specimens' natural colors to fade, as they did in alcohol. Using the nonflammable Novec 7100 engineered fluid

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From the Editor

When I bought my first computer over 20 years ago, I was assured that it was capable of doing all kinds of wonderful things to make life easier and more productive.

At the time, the only thing I knew how to use it for was as a typewriter. Gradually, however, as software developers and users began to realize the potential of this new technology, the utility of personal computers began to grow – to the point now where it's hard to imagine life without them.

In much the same way, when 3M™ Novec™ Fluid technology first offered industry a safe, effective, sustainable chemical alternative back in 1996, few people appreciated how these properties would soon play a critical role in applications that weren't even on the radar screen 13 years ago.

For example, in this issue of *Horizons*, we read about Novec fluids being used to preserve fragile museum specimens; as a medium to extract useful energy from waste heat sources; as a tool for use in “green building;” and as a plastics-safe aerosol cleaner that meets today's strictest air quality regulations.

As regulatory and competitive demands on industry continue to grow, our customers are finding more and more ways to benefit from the Novec promise of safe, effective, sustainable chemistry. Perhaps one of their experiences might even suggest a potential solution to a problem you face. If so, I invite you to challenge us, and see how we can put the Novec promise to work for you.

Sincerely,

Craig Schwartz



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Introducing

3M™ Novec™ Contact Cleaner Plus

3M's newest aerosol cleaner now packs more cleaning power in a safe, sustainable formulation

3M™ Novec™ Contact Cleaner Plus is the newest member of the Novec family of nonflammable aerosol cleaners, formulated to address the needs of performance, safety and the environment.

The added cleaning power of Novec Contact Cleaner Plus removes stubborn oils, greases and silicones, as well as fluorinated oils and greases, dust and particulates, from sensitive electrical and electronic equipment – while maintaining excellent compatibility with plastics. The product is best suited for medium-duty cleaning applications where sensitive devices like connectors, printed circuit boards, electromechanical devices, scales, relays

and circuit breakers need a fast-drying, non-conductive cleaner.


Novec Contact Cleaner Plus is non ozone-depleting, has low global warming potential and contains no HCFCs, HFCs, nPB or HAPs. In addition, its primary ingredient is VOC-exempt under California Air Resources Board (CARB) regulations.

More power for hard-to-clean parts

Every Novec aerosol product can contains over 95% active solvent, for more cleaning power and more cleans per can. Only 5% of the can contents is devoted to the propellant, which is ordinary CO₂.

Many competitive aerosols contain only 75% active solvent in conjunction with propellants such as tetrafluoroethane (HFC-134a) – a formulating technique required in order to define these products as “nonflammable” and/or to achieve VOC limitations. Novec Contact Cleaner Plus, which is inherently non-flammable, is optimized for both compliance with the CARB VOC limits and high performance, because it does not resort to increased use of inert propellants (dilution) in order to achieve compliance.

“Our newest cleaner offers a plastic-safe formula with extra cleaning power that meets the latest California Air Resources Board regulations,” notes Ed DePauw, marketing manager, 3M Electronics Markets Materials Division. “Performance and value are important considerations for customers, as well as health, safety and environmental factors. To meet industry needs, 3M employs its technology base of non-flammable hydrofluoroethers to balance these important factors.”

3M Novec aerosol cleaners are available in four unique formulations, for use in a wide range of light to heavy-duty maintenance, rework and repair operations. All are nonflammable, fast-drying, non-corrosive and low in toxicity. In addition, they are non-ozone depleting and contain no HCFCs, HFC, nPB or HAPs. To learn more, visit us online at www.3M.com/novec. 

Victory at Sea *Continued from page 1*



Scientists prepare the giant squid for preservation before placing it in the container with 1,000 gallons of 3M™ Novec™ 7100 Engineered Fluid. The product is also being used for smaller wet specimens at the museum.

would also make it easier for field naturalists to ship newly collected specimens.

Perhaps most pressing, a new Washington, D.C. fire ordinance severely limited the amount of flammable fluids that could be stored in any building – a change that could have a dramatic impact on the institution’s ability to display specimens. With a switch to the Novec fluid, the exhibits would conform to the new law, removing a major hurdle for the Smithsonian National Museum of Natural History’s planned ocean hall and the exhibition of a rare giant squid that it had recently acquired.

From natural history to modern science

Brodbeck helped to arrange the donation of 1,000 gallons of Novec 7100 fluid, in which the museum is displaying the 330-pound, 24-foot-long giant squid in its newly opened Sant Ocean Hall. He believes the new application could find utility with companies, such as medical device and pharmaceutical manufacturers, that collect and store large quantities of specimens and who, like the Smithsonian, face challenges that result from the flammability of the storage fluid.





Taking the LEED

Use of innovative 3M fire protection technology to facilitate claims for LEED credits

Ask anyone to name the major sources of greenhouse gases, and most people will mention cars, trucks and industrial smokestacks. But surprisingly, the buildings that surround us – including homes, schools, offices, hospitals and other structures – actually account for over 39% of CO₂-equivalent emissions in the United States.

Recognizing this problem, the United States Green Building Council (USGBC), a non-profit organization comprised of building owners and users, architects, contractors, developers, government agencies and other stakeholders, instituted a program in 2000 designed to encourage sustainable building and development practices. Known as the LEED® (Leadership in Energy and Environmental Design) Green Building Rating System™, the program is essentially a third-party certification program that measures a building's performance in five key areas: energy efficiency, indoor environmental quality, materials selection, sustainable site development and water savings.

Fire protection for green buildings

As the number of new buildings housing “critical function” areas – such as telecommunications operations, data storage and processing, electronic control consoles and other applications – continues to grow, the need for special hazards fire protection that will not adversely affect the environment, damage equipment or put people at undue risk, assumes greater importance.

The choice of a fire suppression system is not directly addressed in LEED, but it is indirectly addressed through *New Construction (NC) v2.2-Energy and Atmosphere (EA) Credit 4* and in *Existing Building (EB) v2.0 – EA Credit 4*. These standards specify that a project can not “install fire suppression systems that contain ozone-depleting substances (CFCs, HCFCs, or Halons).”

This specification, however, does not address the issue of global warming impact,



Because of its outstanding safety profile and low global warming potential, 3M™ Novec™ 1230 Fire Protection Fluid offers an opportunity to obtain Innovation Credits toward LEED Certification.

which is a concern with conventional halon alternatives such as HFCs. HFCs are potent greenhouse gases and are targeted for emission reduction by the Kyoto Protocol and other regulatory frameworks. Although the use of HFCs in fire suppression systems has not been prohibited as a prerequisite for LEED certification, the availability of alternative clean agents with low climate impact renders HFCs non-sustainable and inconsistent with LEED certification.

According to Joe Ziemba, marketing manager, 3M Electronics Markets Materials Division, this opens the opportunity to claim innovation credits through choosing a fire suppression system incorporating 3M™ Novec™ 1230 Fire Protection Fluid.

“A key objective of sustainability is to reduce or eliminate greenhouse gas emissions,” says Ziemba. “Because of its short atmospheric lifetime and very low global warming potential, Novec 1230 Fire Protection Fluid is

an option that enables facilities managers to effect a 99 percent reduction in greenhouse gases in critical function fire suppression. That is a tangible, meaningful advance in sustainability.”

Novec 1230 fluid, which is applied in flooding applications, presents a wide margin of safety for places where people are present. It is non-conductive and non-corrosive, and leaves no residue to clean, allowing systems to remain operational. Moreover, because it is stored as a liquid and becomes a gas upon discharge, it is easy to handle and store.

“This is a viable, sustainable technology that’s available to the green build community right now,” says Ziemba. “And it’s rapidly gaining the attention of developers, architects and engineers for projects that incorporate critical function capabilities.”

Novec 1230 fluid will be featured at the 3M booth during the 2009 Greenbuild International Conference and Expo in Phoenix, Arizona, November 11–13. Organized by the USGBC, the event is billed as the world’s largest conference and expo dedicated to green building.

Additional information about 3M Novec 1230 Fire Protection Fluid, including how it can help earn credits toward LEED certification, is available at www.3m.com/novec1230fluid.





Waste not, want not

Sustainable 3M™ Novec™ Fluid Technology points to more efficient, reliable Organic Rankine Cycle Systems

Dwindling fuel supplies, rising costs and the need to reduce greenhouse gases and other pollutants have spurred the development of technologies enabling more efficient use of all forms of power.

In particular, there has been growing interest in the *Organic Rankine Cycle (ORC)*, which uses low-grade waste heat or heat from geothermal, solar, or other heat sources to generate useful mechanical or electrical energy. ORC is being evaluated for its ability to increase the efficiency of a wide range of systems, from automotive engines to power plants and general industrial processes.

According to Erin Binder, marketing development manager, a critical element in the development of practical ORC systems is the fluid used to absorb heat from the primary energy source.

“This fluid is converted to a vapor, which drives a turbine before condensing and being re-routed to the heat source,” she explains. “An optimal working fluid for an Organic Rankine



Cycle must have the thermodynamic properties required for the specific application, be stable at maximum cycle temperatures and over time; and be non-corrosive, to protect the integrity of system components. In addition, it should be safe in use and storage, low in toxicity, and offer good environmental characteristics, in order to provide a long-term, sustainable solution.”

Binder states that 3M has developed two high-performance working fluids that are particularly suited to the unique requirements of ORC applications: 3M™ Novec™ 649 Engineered Fluid and 3M™ Novec™ 7000 Engineered Fluid. Both are from the Novec family of low global warming materials, designed to deliver safe, effective and sustainable solutions in a wide range of applications.

Novec fluids offer proven heat transfer performance, with properties that include good materials compatibility, low toxicity, nonflammability, zero ozone depletion potential and low global warming potential.

If you would like to receive more information on this subject, a new brochure, entitled “3M™ Novec™ Fluids for Organic Rankine Cycle Systems” is now available. To receive a free copy, visit www.3M.com/novec.



Working with 3M gives you access to world class technical service and sales specialists to help make sure you get the performance you need from 3M Novec products. Our experts can help you with equipment conversion; process development/optimization; environmental, health and safety support; and much, much more. In North America, our team of technical service and sales specialists can be reached at 3M.com/novec or at the following numbers.

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