

3M™ Novec™ 1230 Fire Protection Fluid
For Marine Applications



Created
for **Life**



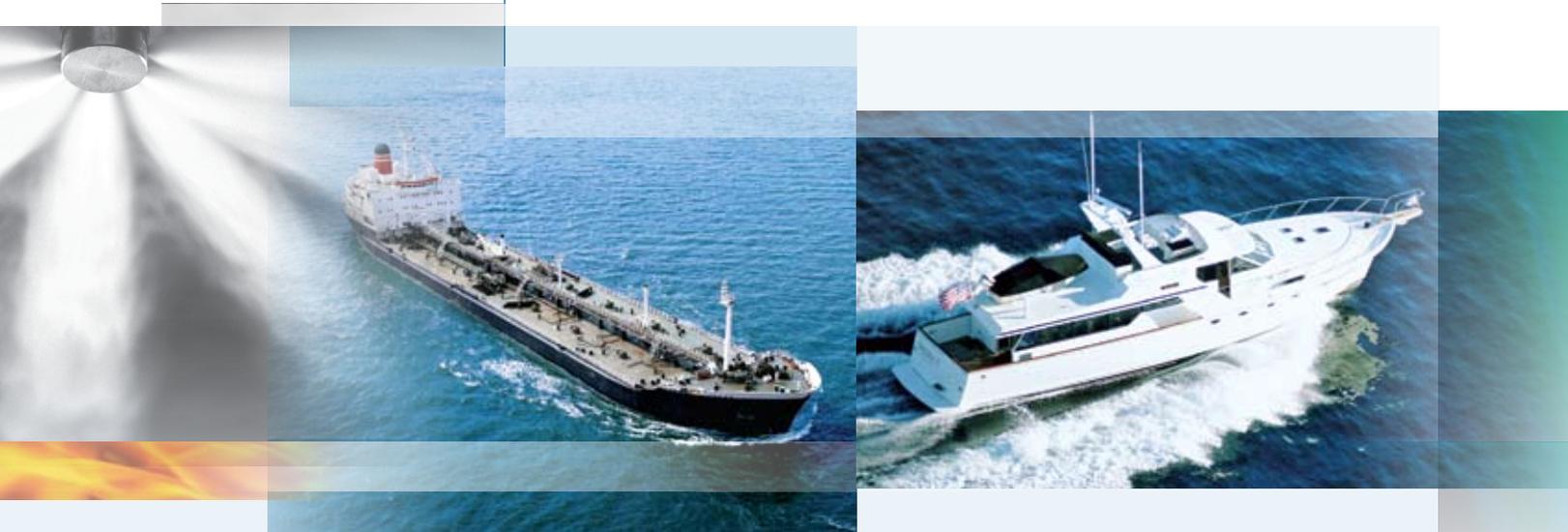
3M™ Novec™ 1230 Fire Protection Fluid is an advanced, “next-generation” halon and CO₂ replacement, offering a number of important advantages over other clean agents and CO₂ in marine applications.

The product is based on a proprietary chemistry from 3M. Its low acute toxicity, combined with high extinguishing efficiency, gives Novec 1230 fluid the widest margin of safety among all other chemical clean agents and CO₂ – even at relatively high extinguishing concentrations. This makes Novec 1230 fluid ideal for occupied spaces, including engine and pump rooms, paint lockers and communication and control centers where personnel may be exposed to the agent upon system discharge.

Novec 1230 fluid vaporizes rapidly during discharge, and it is non-corrosive and non-conductive, so it will not harm delicate electronics, radar, navigation and other equipment. And, unlike foams and powders, it leaves no residue to clean up, which means that operations can continue without interruption.

The bottom line? With Novec 1230 fluid, you get fast, effective fire protection—without compromising ship systems, the safety of passengers and crew, or the environment.

When
safety matters
most



The long-term, sustainable solution

From its initial development, 3M™ Novec™ 1230 Fire Protection Fluid was designed to address the global demand for a halon or CO₂ replacement that is safe, effective and not subject to current or anticipated regulatory restrictions, nor scheduled or targeted for future phaseout. With zero ozone depletion potential, short atmospheric lifetime and a global warming potential of 1, Novec 1230 fluid has proven to be the first chemical halon replacement to offer a viable, long-term, sustainable solution for marine fire protection.

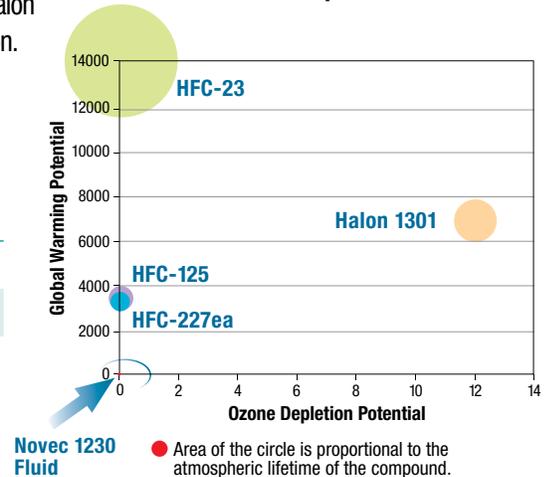
3M™ Novec™ 1230 Fire Protection Fluid Environmental Properties

| Properties | Novec 1230 | HFC-125 | HFC-227ea | HFC-23 |
|--|----------------|---------|-----------|--------|
| Ozone Depletion Potential (ODP) ¹ | 0.0 | 0.0 | 0.0 | 0.0 |
| Global Warming Potential–IPCC ² | 1 | 3500 | 3220 | 14800 |
| Atmospheric Lifetime (Years) | 0.014 (5 days) | 29 | 34.2 | 270 |

¹ World Meteorological Organization (WMO) 1998, Model-Derived Method.

² Intergovernmental Panel on Climate Change. (IPCC) 2007 Method, 100 Year ITH, CO₂ = 1.

Environmental Footprint Comparison Halocarbon Compounds



Why is sustainability important to consider?

In recent years, concerns about environmental issues – especially those relating to climate change – have led to increasing regulatory scrutiny of compounds with high global warming potentials. These “greenhouse gases” include several conventional halon and CO₂ replacements, such as HFCs.

Under the Kyoto Protocol and other international agreements, more and more industrialized nations have committed to reducing the amount of greenhouse gases emitted to the atmosphere. Although the use of HFCs in fire protection is still allowed today, there is growing concern about their future viability, as regulators look for industries and applications (such as fire protection) where alternatives exist to reduce greenhouse gas emissions, without harming economic growth.



Removal of HFCs from fire protection applications is one strategy that companies can employ to reduce their overall emissions from the “basket” of six greenhouse gases identified by the Kyoto Protocol. Given the inevitability of HFC regulations in the U.S, EU, and across the globe, companies are also contemplating the costs and business disruption associated with future restrictions on the use of HFCs in fire protection. Ultimately, a growing number of end-users are concluding that long-term economics – as well as good stewardship – favor the use of sustainable solutions, such as Novec 1230 fluid.

The Widest Margin of Safety

Because 3M™ Novec™ 1230 Fire Protection Fluid offers a much wider margin of safety than other halocarbon agents, its effective use concentration will not exceed safety limits in marine applications.

3M™ Novec™ 1230 Fire Protection Fluid Safety Margin-Class B Hazards

| Agent | Novec 1230 | HFC-125 | HFC-227ea | Inert Gas | CO ₂ |
|--------------------------------|------------|-----------|-----------|------------|--------------------------------|
| Use Concentration ¹ | 4.2-5.9% | 8.7-12.1% | 6.25-8.7% | 34.2-40.6% | 30-75% |
| NOAEL ² | 10% | 7.5% | 9% | 43% | <5% |
| Safety Margin | 69-138% | nil | 3-44% | 6-26% | Lethal at design concentration |

¹ 2008 NFPA 2001 and NFPA 12

² NOAEL for cardiac sensitization (halocarbons) and effects specific to CO₂

It's important to note that the complex geometry of engine rooms, communications centers and other shipboard locations makes it difficult to calculate their net volume accurately; such calculations are used to determine an effective (but safe) agent design concentration.

If a significant portion of a room is filled with piping, conduits, machinery and other obstructions, agent concentration could quickly exceed its NOAEL (No Observable Adverse Effects Level), if the system was designed for the volume of room when it is empty.

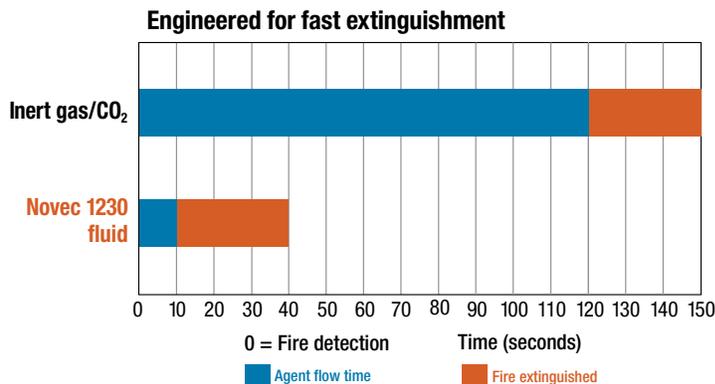
With Novec 1230 fluid, you get the stopping power you need to extinguish fires in obstructed spaces—without putting people at risk.*

*Industry standards require egress from a protected enclosure prior to system discharge



Performance you can depend on

In numerous laboratory and field tests around the world, witnessed by independent agencies, 3M Novec 1230 fluid has proven its effectiveness in marine flooding applications. Consequently, fire protection systems incorporating Novec 1230 fluid, developed and sold by the world's leading systems manufacturers, have been registered and certified by a growing number of marine approval authorities (see list on next page).



Novec 1230 fluid knocks down fires in about one quarter the time of inert gas/CO₂ agents. Fast extinguishment helps keep fires small, giving them less chance to spread.

For example, fixed fire protection systems using Novec 1230 fluid have successfully completed test protocol IMO MSC Circular #848. This protocol tests the ability of a system to extinguish effectively a variety of fires in total flooding applications. The fires occurred in a 500 m³ test enclosure, simulating machinery rooms and pump rooms, and were witnessed by agents from Underwriters Laboratories, the U.S. Coast Guard, Lloyd's Register and the United Kingdom's Maritime and Coastguard Agency (MCA).

The viable proven solution



Regulatory Status

Novec 1230 fluid complies with chemical notification requirements in the following regions:

- United States
- Australia
- Japan
- Korea
- Europe
- Canada
- China

Subsequently, systems using 3M™ Novac™ 1230 Fire Protection Fluid have received the Certificate of Type Approval from the MCA, indicating that these systems are accepted and in compliance with the requirements of:

- The Merchant Shipping Regulation 1998, S.I. 1012.
- The Merchant Shipping Regulation 1998, S.I. 1011.
- 1978 SOLAS Protocol as amended by the SOLAS amendments to date.
- HSC Code - Resolution MSC.36(63).
- The Code of Practice for Safety of Large Commercial Sailing & Motor Vessels.
- The International Maritime Organization MSC/Circ.848.

Fire suppression systems using Novac 1230 fluid have been successfully submitted by their manufacturers for certification by marine approval authorities around the world:

- | | | |
|--------------------------------|---|---|
| • UK MCA | • Australian Coast Guard | • American Bureau of Shipping (International) |
| • RINA, Italy | • Marine Marchand Approval | • Canadian Coast Guard |
| • LRS Type Approval | • Dutch Shipping Authority Acceptance, Inland & Sea | • Korean Registry of Shipping |
| • DNV Type Approval | • Belgium - Inland and Sea going Acceptance | • Germanische Lloyds |
| • Bureau Veritas Type Approval | • Icelandic Registry of Shipping | • U.S. Coast Guard |
| • UK Module B | | |
| • Polish Registry of Shipping | | |



Note: Before using this product, please read and follow the precautions and directions for use in the Material Safety Data Sheet, product label and manufacturer guidelines for refilling systems.

Easy handling, easy storage

3M™ Novec™ 1230 Fire Protection Fluid is an excellent choice for engine and equipment rooms, and other normally-occupied areas of pleasure craft and high-speed craft.

Because it is a liquid at room temperature, and stored at low vapor pressure, agent handling and charging of systems using Novec 1230 fluid is greatly simplified, and can be accomplished without moving the cylinders offsite—saving you time, and ensuring uninterrupted protection of your assets. Because the liquid is shipped non-pressurized, refilling after discharge is a straightforward procedure.

The liquid state of Novec 1230 fluid also allows for efficient use of space, requiring about the same number of cylinders as conventional halocarbon agents and many fewer cylinders than inert gas or CO₂ systems. Unlike high-pressure alternatives, the product can be shipped safely by air in bulk quantities, classified as non-hazardous and, thus, without restrictions.

Upgrading an existing fire protection system can be accomplished by reusing the existing system control equipment with the newly installed system designed for use with Novec 1230 fluid.

Compatible with fire system materials

Novec 1230 fluid has been shown to be compatible with typical materials of construction used in fire suppression systems, including stainless steel, carbon steel, aluminum, brass and copper. The material is stable and non-corrosive in end use. Long-term testing has demonstrated excellent compatibility with various elastomers used in o-rings, gaskets and other types of seals. Note: However, we recommend that the product not be used with fluoroelastomers, because they are both fluorine-based with an affinity for each other and, therefore, should not be used together.



3M™ Blue SkySM Warranty

20-year protection
against regulatory bans
or restrictions on the use
of 3M™ Novec™ 1230
Fire Protection Fluid



When it comes to environmental regulations, 3M gives you a clear advantage

Today's world is full of changes designed to help ensure a better tomorrow. But managing the risks created by these changes is challenging. Fortunately 3M understands your challenges and has the answer you're looking for with the 3M™ Blue SkySM Warranty.

Here's how it works: if Novec 1230 fluid is banned from or restricted in use as a fire protection agent due to ozone depletion potential or global warming potential, 3M will refund the purchase price of the fluid.

That's a promise and performance you can take to the bank.

For complete details on this program, please contact your 3M representative, or visit www.3M.com/novec1230fluid

The high global warming potential and atmospheric persistence of halon replacements such as HFCs are leading to concerns about whether their use will continue to be permitted. For example, F-Gas Regulations that have been introduced in Europe impose requirements specific to HFCs for technician training, inspections, testing, and reporting. It is likely that HFCs may follow the halon extinguishing agents that were so popular until the 1990s, when they became restricted, and are now banned from being manufactured and are being phased out in end use.

Measures addressing the use of HFCs are also being drafted in the USA. The U.S. House of Representatives has passed legislation that would phase down the production of HFCs. Similar measures are being considered at an international level. For example, proposals have been advanced to phase-down HFC production under the Montreal Protocol. In addition, an early action item identified under the California Global Warming Solutions Act of 2006 includes a consideration that, from 2012, all new fire protection systems in California must use an agent with a global warming potential below a minimum threshold level.

The California Air Resources Board (CARB) proposal and U.S. House bill reflect the regulators' concern that, while emissions from this sector are currently low, the installation base is growing quickly and the emission potential of this installed base represents a significant future liability. Thus, the only meaningful way to limit this future liability is to reduce the use of HFCs.

That's why 3M offers you the peace-of-mind made possible by our exclusive 3M™ Blue SkySM Warranty.

3M Resources

3M™ Novec™ 1230 Fire Protection Fluid is supported globally by 3M sales, technical and customer service resources, as well as by authorized fire suppression system manufacturers (OEMs).

For more information, please visit our web site:

www.3M.com/novec1230fluid

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

| United States | China | Europe | Japan | Korea | Singapore | Taiwan |
|--|----------------------------------|----------------------------------|--------------------------------------|------------------------------------|---------------------------------------|--------------------------------------|
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