Great Lakes Chemical Corporation

FM-200™

THE BEST FIRE PROTECTION FOR HIGH-VALUE ASSETS

THE HALON ALTERNATIVE.

For many years, people recognized Halon 1301 as one of the most effective fire suppression agents for a diverse array of applications. It quickly extinguished all major classes of fires. It was especially effective in high-value asset protection situations where it caused no residual damage to delicate equipment. In addition, Halon 1301 systems were utilized for both occupied and unoccupied spaces and were easily installed by professionally trained fire protection systems dealers.

But Halon 1301 was thought to have significant environmental consequences due to its potential contribution to depleting the stratospheric ozone layer.

With the phaseout of Halon 1301 production, effective in nearly all countries at the end of 1993, the quest for a replacement resulted in the introduction of a number of clean fire suppression agents to the marketplace – but only one true alternative.

THE MARGIN OF SAFETY.

For the protection of people, sensitive and valuable facilities, other irreplaceable assets, and ultimately your business survival, fire protection isn't a relative thing. It's an absolute. You want all the effectiveness you can get, as fast as you can get it. FM-200 provides you with a significant margin of safety that only time can buy.

FM-200 EXTINGUISHES A FIRE IN 10 SECONDS OR LESS.

Fires grow at exponential rates until fully involved. Heat and smoke damage for delicate electronics is greatest in the first few minutes. And the generation of deadly combustion products is often greater in the initial stages of a fire.

FM-200 will completely knock down Class A, B and C fires in 10 seconds or less – before the fire can effectively develop. Stopping the fire in those critical few seconds can save millions of dollars worth of equipment and lost production. Other extinguishants can take 60 seconds or longer to react. And that delay can translate to serious damage and substantial repair and downtime. FM-200's fast action and excellent explosion inerting capabilities can prevent catastrophic consequences.

WHY IT WORKS SO WELL.

FM-200's mechanism of extinguishing fires is active. Its primary action is through physically cooling the fire at the molecular level. FM-200

FM-200

Empirical Formula	CF_3-CHF-CF_3
IUPAC Designation	1,1,1,2,3,3,3,-Heptafluoropropane
ASHRAE Designation	HFC-227ea
Molecular Weight	170.03
Boiling Point °F °C	2.55 -16.36
Freezing Point °F °C	-204 -131
Liquid Density at 70° F at 21° C	87.58 lb/ft³ 1.4032 kg/l
Vapor Pressure at 70° F at 21° C	58.8 psia 4.04 bar
Ozone Depleting Potential (CFC 11=1)	0
Atmospheric Lifetime	31-42 years

NOTHING BETTER. NOTHING

(HFC-227ea) belongs to the same class of compounds used in refrigeration, and, as such, is an efficient heat transfer agent. FM-200 literally removes heat energy from the fire to the extent that the combustion reaction cannot sustain itself.

Additionally, there is a chemical extinguishing action contributed by FM-200. Trace amounts of free radicals are released in a fire, ultimately inhibiting the chain reaction of combustion.

IT PREVENTS MORE THAN FIRE DAMAGE.

FM-200 not only prevents extensive fire damage, it virtually eliminates collateral damage to delicate equipment and instruments from the extinguishant itself. FM-200 is a clean gaseous agent containing no particulates or oily residues. With some other systems such as water, foam or dry chemicals, the extinguishant itself can be as damaging as the fire.

FASTER. NOTHING CLEANER.

And, since FM-200 does not significantly reduce oxygen levels, it's safe for occupied spaces, where your most important assets reside. After FM-200 is discharged, it can be removed from the protected space by simple ventilation, allowing you to resume normal operations quickly.

Unlike FM-200, some fire extinguishants can be harmful to delicate electronic equipment, or can be slow to put out developing fires.

SAFE FOR THE PLANET.

To be the clean agent of the future, FM-200 had to have rapid and effective performance, be safe for occupied spaces and delicate equipment, and be environmentally friendly. The essential environmental consideration was for the product to have a zero ozone depletion potential.

A clean agent of the future also had to look beyond today to tomorrow's environmental issues. The impact of all human activities is emerging as one of the important environmental issues of the future, and is often measured in terms of global warming potential. Any valid evaluation of global warming must consider the direct and indirect contributions of the extinguishant, system and its operation.

Since fire protection systems only discharge in the event of a fire, the use of clean agents for total flooding fire protection is considered to be essentially non-emissive. In the rare event a system does discharge, the rapid extinguishing performance of FM-200 mitigates the much more detrimental consequences of an uncontrolled fire.

Even when used to extinguish a fire, FM-200's short atmospheric lifetime of 31-42 years assures a minimal direct contribution to global warming and rapid removal from the atmosphere. Its relative efficiency compared to Halon 1301 assures a minimal indirect contribution to global warming.

Since other clean agents require substantially more steel storage cylinders than FM-200, the global warming contribution from the manufacture, installation and use of these systems is typically greater than that for FM-200.

SAFE FOR PEOPLE,

The global warming impact of an FM-200 system operating over a 15 year lifetime will be comparable to the global warming impact of a 100 watt lightbulb operating for about 15 years, or driving an automobile about 1,500 miles.

SAFE FOR SENSITIVE EQUIPMENT.

FM-200's relatively high boiling point, combined with proper system design, guards against the danger of thermal shock to electronics that could occur from the direct discharge of other agents such as CO_2. FM-200 is also electrically non-conductive and non-corrosive, so it's safe for use on electrically charged equipment.

FM-200 leaves no particulates or oily residue to damage electronic instruments, computers, software, data files, communications equipment or sophisticated medical devices. Nor does it require the clean-up of most extinguishants.

THE VOICES OF AUTHORITY.

The United States Environmental Protection Agency (U.S. EPA) states, "HFC-227ea [FM-200] does not deplete stratospheric ozone. In addition, HFC-227ea is the most effective of the proposed HFC substitutes for Halon 1301."

Federal Register, Vol. 58, No. 90, Wednesday, May 12,1993

Factory Mutual Research Corporation (FMRC) tested FM-200 in a wide variety of very severe fire tests to ensure product performance under many different conditions. FMRC awarded Component Approval to FM-200 and Approval for FM-200 Systems for use in Factory Mutual insured facilities.

Underwriters Laboratories (U.L.) carefully examined the chemical, toxicological and physical characteristics of the agent, including its extinguishing capability for Class A, B and C rated fires. U.L. granted Component Recognition to FM-200 and the U.L. Listing Mark for equipment used to dispense FM-200.

authorities who have reviewed FM-200 have approved it. No other fire extinguishant matches FM-200's combined credentials.

That's why leading fire protection systems manufacturers have made FM-200 their agent of choice.

DON'T HOLD YOUR BREATH.

Tests prove that FM-200 exposure is safer than exposure to Halon 1301. Additionally, FM-200 is effective at low concentrations, well below the EPA's maximum exposure levels.

FM-200 is so safe, in fact, that it has been designated as a replacement for CFC propellants in pharmaceutical metered dose inhalers – like the ones used to dispense asthma medications.

LACES, AND PLANET.

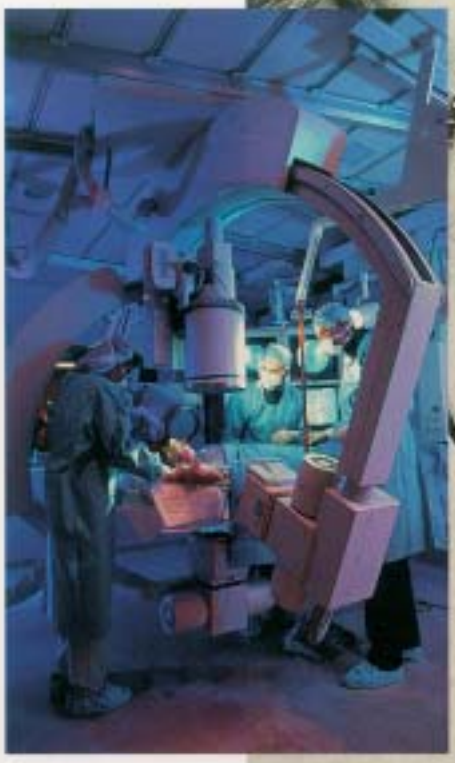
The U.S. EPA, in the *Federal Register*, May 12, 1993, recognized the inherent safety of FM-200 in accepting it for use in occupied space protection at up to 9.0% v/v without mandated egress times, or up to 10.5% v/v with mandated egress times. This means that occupied spaces can be safely evacuated, even in the presence of FM-200 at design concentrations.

THOROUGHLY TESTED.

With a database of more than 70 toxicity tests, FM-200 has the most extensive health and safety information of any Halon 1301 alternative. FM-200 has been recognized and approved by institutions and agencies around the world.

Whether reviewing extinguishing capability, environmental acceptability or human safety, all

VALUING AN AGENT BY WHAT IT SAVES.



If your responsibility is to protect high-value assets, whether computers, communications, medical equipment, aerospace applications or people, then the value of FM-200 is apparent.

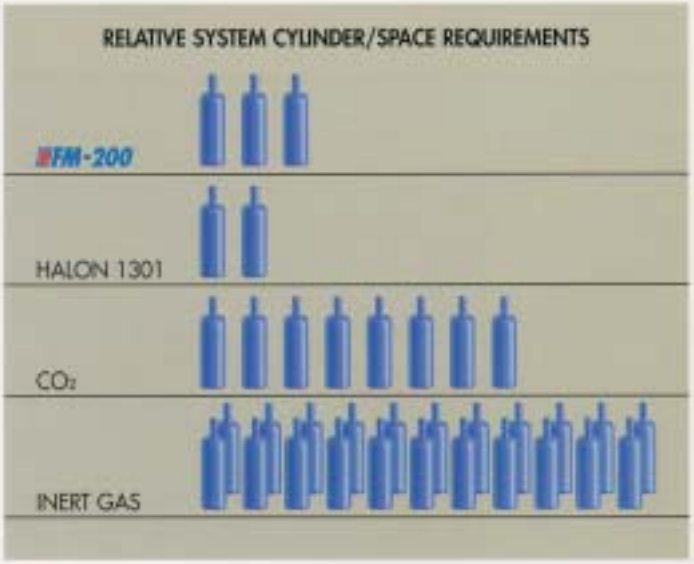
SAVE TIME.

There's nothing faster. FM-200 stops a fire in 10 seconds or less. When high-value assets are at risk, every second counts. Losses can range from being virtually non-existent to catastrophic. In this time, minor damage can increase exponentially, resulting in long-term interruption to services and productivity.

MAKING THE RIGHT FI

SAVE SPACE.

The extinguishing effectiveness of FM-200 requires only two-thirds more agent by weight than Halon 1301. Additional storage space requirements are minimal. There is no need to clutter a facility with bulky racks of heavy, high-pressure cylinders. In many cases, a Halon 1301



CLEAN AGENT DECISION CRITERIA	FM-200
Clean	✔
Effective	✔
Fast Acting	✔
Broad Spectrum Fire Effectiveness	✔
Safe for People	✔
Safe for the Planet	✔
Safe for Equipment	✔
Economical	✔
Space Efficient	✔
Ability to Retrofit Halon Systems	✔
Commercially Available	✔
Long-Term Availability	✔

system can be converted to FM-200 with simple alterations. Detection equipment and controls can often be reused, while storage capacity and distribution piping will require evaluation.

Electronic processing, storage and transmission of data is extremely vulnerable to fire and some extinguishants. The catastrophic loss of information because of fire could paralyze your business.

E PROTECTION CHOICE.

SAVE YOUR CONCERNS.

The cost of an FM-200 system is minor when compared to the loss of property or data to fire. Think of the damage averted. Think of the lack of clean-up required. Think of the business that wasn't interrupted or productivity that wasn't lost, or the injury to personnel that didn't occur.

If you measure FM-200's protection advantages, no other extinguishant measures up.

Great Lakes Chemical Corp. manufactures FM-200 under the strict international quality standards of ISO 9002.

ISO 9002

THE CHALLENGE.

Developing a true Halon alternative required a product that could meet or exceed all the criteria necessary to replace Halon 1301.

Great Lakes understood that the product must be effective, safe for people and valuable assets, environmentally friendly, cost-effective, and validated through independent approvals. To arrive at the single product that would meet these many requirements, Great Lakes screened more than 3,000 candidate molecules.

The result: FM-200 *(U.S. patent #5,124,053)*. The best fire protection for high-value assets.

But, then, would you expect anything less from the world's leading manufacturer of safe, clean, fire extinguishing agents.

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FM-200™ is a trademark of Great Lakes Chemical Corporation.

FM-200™ is protected under US Patent #5,124,053 dated June 23, 1992.

For more information on how FM-200 can protect your specific installation, contact your local fire protection systems dealer or Great Lakes Chemical Corporation.

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