

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

Background:

Construction of new buildings frequently requires the installation and integration of high-value electronics and communications equipment. That equipment requires a fire protection system that, unlike water, won't damage the equipment and preserves continuity of operations. These systems use suppressants referred to as clean agents, and their "clean" properties are also exploited in protecting museums, libraries, and document storage facilities. Although the systems available for protecting these enclosures differ dramatically in their potential environmental impact, this aspect of building construction has not been directly addressed by LEED (Leadership in Energy & Environmental Design) and, therefore, can be considered for LEED innovation credits.

Although the choice of a fire suppression system is not directly addressed in LEED documentation, it is indirectly addressed through New Construction (NC) v2.2-Energy and Atmosphere (EA) Credit 4 and similarly in Existing Building (EB) v2.0 – EA Credit 4. NC EA Credit 4 specifies as a requirement for achieving a credit associated with Enhanced Refrigerant Management that a project also can not, "install fire suppression systems that contain ozone-depleting substances (CFCs, HCFCs, or Halons)."

Although the intent under EA Credit 4 clearly states an interest in minimizing contributions to global warming, the prerequisite related to fire protection establishes a very low bar for climate impact and opens the opportunity to claim innovation credits through choice of a fire suppression system.

The standard choice for clean agent fire protection during the 1990s and through 2003 was hydrofluorocarbons (HFCs). HFCs played an important role in enabling the phase-out of halons used in fire protection but carry the significant liability of being potent greenhouse gases and are targeted for emission reduction by the Kyoto Protocol and other National and State 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.

Innovative performance can be achieved by considering the climate impact of the project's fire suppression system. The ozone depletion and global warming potential of commercial clean agents is described in the Table 1, below.

Table 1. Environmental Properties of Clean Agent Fire Suppressants

Trade Name	ASHRAE Name	Ozone Depletion Potential	Global Warming Potential*
Novec 1230 Fluid	FK-5-1-12	0	1
FM-200, FE-227	HFC-227ea	0	3220
ECARO-25, FE-25	HFC-125	0	3500

*CO₂ = 1, 2007 IPCC

Novec 1230 fluid is distributed through global OEMs. Contact information for these OEMs can be found at: www.3M.com/Novec1230fluid

The only chemical agent that is considered to have an inconsequential impact on both environmental endpoints is 3M™ Novec™ 1230 Fire Protection Fluid.

Novec 1230 fluid was commercialized in 2002 as a sustainable clean agent and is now widely recognized as the future in clean agent fire suppression.

To help reassure a market that has evolved through a number of non-sustainable technologies to protect their valuable resources, 3M has backed Novec 1230 fluid with a Blue SkySM Warranty which guarantees 3M will pay for the replacement cost of the agent if it is ever restricted due to concerns related to stratospheric ozone depletion or contributions to climate change.



Documentation:

To assist you in completing your LEED project documentation, please consider the following responses under, “Innovation and Design Process”

Intent: Consider the climate impact of the “clean agent” fire suppression system incorporated into the project. Although EA Credit 4 precludes use of an ozone depleting substances in a fire suppression system, climate impact is not specifically addressed in LEED certification. The impact of the various agents and systems that could be installed varies dramatically.

Requirement: Do not install fire suppression systems that contain ozone-depleting substances (CFCs, HCFCs, or Halons) or compounds with high global warming potential such as hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs). HFCs and PFCs are excluded because the GWP of those agents is greater than 3000 and 7000 times that of CO₂, respectively. In addition, there is no indirect benefit of energy efficiency when an HFC is used in a fire protection system.

Submittals:

1. A peer reviewed summary of the agents used in fire suppression can be found in the fire protection chapter of the Intergovernmental Panel on Climate Change, “Special Report on Safeguarding the Ozone Layer and the Global Climate System.” The report can be found at, http://www.ipcc.ch/pdf/special-reports/sroc/sroc_full.pdf
2. The atmospheric properties of Novec 1230 fluid are described in: Taniguchi, N., Wallington, T.J., Hurley, M.D., Guschin, A.G., Molina, L.T., Molina, M.J., *Journal of Physical Chemistry A*, 107(15), 2674-2679, 2003.
3. The U.S. EPA list of approved agents can be found at: <http://www.epa.gov/ozone/snap/lists/index.html>. In their approval of Novec 1230 fluid, the U.S. EPA noted that, a.) “EPA has reviewed the potential environmental impacts of this substitute and has concluded that, by comparison to halon 1301 and other acceptable substitutes, (FK-5-1-12) significantly reduces overall risk to the environment.” and, b.) “(FK-5-1-12) provides an improvement over use of halon 1301, hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs) in fire protection. We find that C₆-perfluoroketone is acceptable because it reduces overall risk to public health and the environment in the end use listed.”

–U.S. EPA 12/20/02 Federal Register

Design Approach:

This project will use a will use a fire suppression system that incorporates 3M™ Novec™ 1230 Fire Protection Fluid.

The 3M™ Novec™ Brand Family

The Novec brand is the hallmark for a variety of patented 3M compounds. 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

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