

Electrical Properties of 3M™ Novec™ 1230 Fire Protection Fluid

Compatibility with electrically energized equipment

Introduction

3M™ Novec™ 1230 Fire Protection Fluid is a next-generation clean extinguishing agent used to protect high-value assets such as computers, switching equipment, cameras, disk arrays and other critical equipment. An advanced halon and HFC replacement technology, Novec 1230 fluid offers a unique combination of safety, low environmental impact and outstanding extinguishing performance. This fire suppression agent not only helps protect people and property but also helps prevent costly service interruptions and data loss. Because of its excellent electrical properties, Novec 1230 fluid has extensively been specified by fire protection engineers to protect data centers, control rooms, telecommunications installations and other applications where continuity of operations is crucial.

Electrical Properties

Novec 1230 fluid is discharged as a gas, but is liquid at room temperature. It is electrically non-conducting in both liquid and gaseous states, so electrically energized equipment can be safely protected without powering down. As a clean agent, Novec 1230 fluid evaporates quickly during discharge and leaves no residue, so it will not damage sensitive electronics or other valuable equipment. Novec 1230 fluid is not only compatible with high voltage equipment, but its electrical properties are also superior to those of many other fire protection technologies.

The dielectric strength of a material is a measure of the maximum voltage it can withstand without breakdown of its insulating properties and conducting current. The dielectric properties of Novec 1230 fluid are shown in Table 1. The dielectric strength of Novec 1230 fluid vapor under saturated conditions at 1 atm, 21°C over a 2.7 mm electrode gap is 16 kV, which is 2.3 times that of dry nitrogen. The dielectric strength of liquid Novec 1230 fluid under the same conditions is 48 kV. In the unlikely event that the liquid agent should contact the electronics, the liquid dielectric strength demonstrates that Novec 1230 fluid's liquid state is even less electrically conductive than the vapor. A mixture of 5 volume percent of Novec 1230 fluid in air from a typical system discharge has a dielectric strength that is approximately 40% higher than that of air alone. As shown in Table 2, the dielectric strength for Novec 1230 fluid in the vapor state is higher than that of any other clean extinguishing agent.

Due to Novec 1230 fluid's dielectric strength, sensitive electronics or high voltage equipment which normally operate in air will be unaffected by contact with Novec 1230 fluid and will be able to maintain operations throughout a fire protection system discharge. You can add electrical properties to the long list of features that distinguish Novec 1230 fluid as a sustainable replacement for halons and HFCs.

Table 1. Dielectric Properties of 3M™ Novec™ 1230 Fire Protection Fluid

	Dielectric Strength ¹ (kV)	
Novec 1230 vapor	16	2.3 times that of dry nitrogen
Gaseous mixture 5 vol% Novec 1230 in air	9.2	1.4 times that of air
Novec 1230 liquid	48	

¹ According to a method consistent with ASTM D877

For Additional Information

To request additional product information or sales assistance, contact 3M Customer Service at one of the numbers below or visit www.3M.com/Novec1230fluid. For other 3M global offices or information on other 3M products for electronics, visit our website at 3M.com/electronics.

Table 2. Relative Dielectric Strengths of Fire Suppression Agents

Clean Agent	Relative Dielectric Strength ¹ at 1 atm, 25°C (N ₂ = 1.0)
3M™ Novec™ 1230 Fire Protection Fluid (FK-5-1-12)	2.3
HCFC Blend A	1.32
HCFC-124	1.55
HFC-125	0.955 at 21°C
HFC-227ea	2.0
HFC-23	1.04
HFC-236fa	1.0166
FIC-1311	1.41
HFC Blend B	1.014
IG-01	1.01
IG-100	1.0
IG-541	1.03
IG-55	1.01

¹ National Fire Protection Association, 2012. NFPA 2001: Table A.1.4.1(a), (b), (c) and (d).

The 3M™ Novec™ Brand Family

The Novec brand is the hallmark for a variety of proprietary 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, protective coatings and surface modifiers, 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 Grade Coatings • 3M™ Novec™ Electronic Surfactants

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