

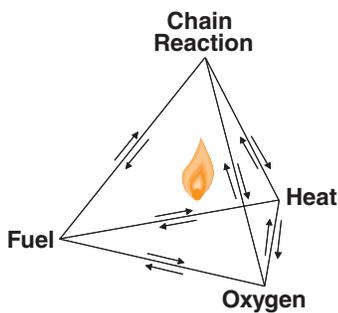
Novec™ 1230

Fire Protection Fluid

Extinguishing mechanism of Novec 1230 Fluid

3M™ Novec™ 1230 Fire Protection Fluid was developed as a sustainable clean extinguishing agent for use in total flooding applications. This unique agent is a replacement for halon and first generation halon alternatives.

**Figure 1:
The Fire Tetrahedron**



In order to understand how Novec 1230 fluid extinguishes a fire, it is important to review the principal aspects of fire chemistry. Four components– fuel, oxygen, heat and the combustion chain reaction – are often referred to as the “fire tetrahedron,” seen in Figure 1.

All four of these factors are required in the correct combination for a fire to ignite and sustain burning. The fire tetrahedron shows that a fire can be extinguished by breaking one or more of the links between these components or by changing the balance between them:

1. By interrupting the combustion chain reaction
2. By containing or eliminating the source of fuel
3. By cutting off or diluting the source of oxygen
4. By removing sufficient heat from the fire

Halons extinguish fire primarily by the first mechanism. When exposed to flame temperatures, a bromine atom is cleaved from of the halon molecule, chemically inhibiting the combustion chain reaction. Inert gases such as argon and nitrogen extinguish fire mainly by the third mechanism, diluting the oxygen level below 15 volume percent, the level required to support combustion.

Novec 1230 fluid, like other halocarbon halon alternatives, extinguishes principally via the fourth mechanism – removing heat from the fire. Upon discharge, Novec 1230 fluid creates a gaseous mixture with air. This agent/air mixture has a heat capacity much larger than that of air alone. A higher heat capacity means that this gas mixture will absorb more energy (heat) for each degree of temperature change it experiences.

At a proper system design concentration, the agent/air mixture absorbs sufficient heat to upset the balance of the fire tetrahedron. The amount of heat the fire loses to the surroundings is increased by the presence of the agent. This causes the combustion zone to cool to the point that the fire extinguishes. Novec 1230 fluid has the highest heat capacity of any commercially available halon alternative, resulting in the lowest extinguishing concentrations for a given fuel.

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