



# QUEST

## KV FIRE NEWS

### CLEAN FIRE EXTINGUISHING AGENTS



Conventional fire extinguishing agents like water, sand, dry chemical powders and foam concentrate have good fire fighting performance and are suitable in respective areas. But they leave residue which not only requires cleaning up but damages sensitive equipments, artifacts, books, textiles, other valuables and the loss is non repairable & not replaceable. On many occasions conventional extinguishing agents damage equipment which are even unaffected by the fire.

**In present age it is important to have not only good extinguishing efficiency, but along with it**

- Protect sensitive data and information in documents and data storage devices, equipments.
- Reduce equipment damage
- Facilitate fast retrieval of equipment back in service.
- Avoid prolonged shutdowns and operation downtime.
- Easier and convenient cleaning, mopping up process.
- Assuring the recovery of sensitive equipments as in pre-fire functional state.
- Suitable for all classes of general fire incident A, B and C.

**In such scenario, the clean agent extinguishing agent is the best alternative**

- Clean agent systems not only protect an enclosure from fire, they protect the contents including people, documents, and equipment.
- Clean agents extinguish fires as a gas, which gives them the ability to permeate into cabinets and obstructed areas or hard to reach fires.
- Their use may contribute points towards LEED® certification.

Earlier Halon 1301 and Halon 1211 due to their unique chemical, physical, thermodynamic & ecological properties, were considered ideal fire suppression agents for over 30 years. However, due to their implication in the destruction of stratospheric ozone, their manufacturing is stopped and usage is restricted.

Three classes of chemical compounds have been commercially developed for halon replacements: hydrofluorocarbons (HFCs), inert gases, and perfluorinated ketones.

#### **COST FACTOR:**

Cost for installation of inert gas system is higher in comparison with HFC due to the requirements of high pressure piping & container material and the required large number of storage containers. The costs further escalates much more rapidly with increase in system size.

Cost of Perfluoro ketone system is higher in comparison with HFC as perfluoroketone system requires more suppression agent on a weight basis. Further, the perfluoroketone agent is more expensive than HFC agents.



# QUEST

## KV FIRE NEWS

### COMMERCIALLY AVAILABLE HALON REPLACEMENTS

	Designation	Chemical Formula	Trade Name
HFCs	HFC-227	CF <sub>3</sub> CHF <sub>2</sub> CF <sub>3</sub>	FM-200
	HFC-125	CF <sub>3</sub> CF <sub>2</sub> H	FE-25
	HFC-23	CF <sub>3</sub> H	FE-13
	HFC-236	CF <sub>3</sub> CH <sub>2</sub> CF <sub>3</sub>	FE-36
	HCFC Blend	CF <sub>3</sub> CHCl <sub>2</sub> , CF <sub>4</sub> , Ar	Halotron I
Inert Gases	IG-541	N <sub>2</sub> (52%), Ar (40%), CO <sub>2</sub> (8%)	Inergen
	IG-55	N <sub>2</sub> (50%), Ar (50%)	Argonite
	IG-01	Ar	Argotec
	IG-100	N <sub>2</sub>	N-100
Perfluorinated Ketones	FK-5-1-12	CF <sub>3</sub> CF <sub>2</sub> C(O)CF(CF <sub>3</sub> ) <sub>2</sub>	Novec-1230

\* In the HFC category, only FE-36 & Halotron are suitable for portable extinguishers, others are used in total flooding systems.

#### REACTIVITY:

Halon, HFCs, and inert gas agents have very low chemical reactivity. Perfluoroketones has high chemical reactivity, undergoes reactions with water, alcohols & amines, forming Heptafluoropropane and Perfluoropropionic acid.

#### HFC Clean Fire Suppression Agents

Because the HFC agents form no corrosive or abrasive residues, they are suitable for use on delicate, expensive assets that might otherwise be totally destroyed by non-clean agents such as foam or water (for example books, paintings, and other cultural heritage items). The HFC clean agents are also characterized by low chemical reactivity, ensuring their compatibility with a wide range of construction materials.

The HFC clean agents are applicable to Class A, B and C fires and thoroughly flood a protected area, affording rapid extinguishment of even obscured or hard to reach fires.

Total flooding applications such as control towers and control rooms, computer facilities and record storage facilities and also for are suitable for protection by HFC.

Some of modern airports employing HFC clean agents for fire protection include the following:

Dubai Int'l Airport  
Newark Int'l Airport

Dusseldorf Int'l Airport  
San Francisco Int'l Airport

Madrid Int'l Airport  
New Bangkok Int'l Airport

The U.S. Environmental Protection Agency, in the Significant New Alternatives Policy (SNAP), provides toxicity guidance for the use of new clean extinguishing agents through the use of LOAEL (Lowest Observable Adverse Effect Level) and NOAEL (No Observable Adverse Effect Level) values. Occupied hazard areas can be safely protected by agents up to an agent's LOAEL concentration, provided the area can be exited in one minute. For longer exposures, agent concentration should remain below the NOAEL level.

#### APPLICATIONS

It is most suitable option to protect high-value assets such as computer rooms, telecommunications facilities, process control rooms, museums, archives, marine, hospitals, banks, laboratories, and airplanes. The HFC clean agents are also suitable for use onboard commercial aircraft. HFC-227ea and HFC-236fa both meet FAA/ICAO minimum performance standards for use in handheld extinguishers and lavatory extinguishment ("Lavex") applications onboard commercial aircraft. HFC-125 is widely employed for

# QUEST



## KV FIRE NEWS

protection of engine nacelles, for example by the US military in numerous aircraft.

### COMMERCIALY AVAILABLE HALON REPLACEMENTS

Sr.	PROPERTIES	Halotron I	NAF PIV	SACLON II (HFC 134A)	FE 36
1	Composition	C2HCl2F3 (HCFC 123) + Prop. Gas Mixture	HCFC Blend E (with d-limonene)	HFC Blend A, (HFC Blend with d-limonene)	HFC-236fa ; CF3CH2CF3
2	Ozone Depletion Potential (ODP)	0.014%	0.014	ZERO	ZERO
3	Acute Toxicity: Cardiotox NOAEL (No Observable Adverse Effects Level) A higher % is less toxic	1%	Data not available	4%	10%
4	Acute Toxicity : Cardiotox LOAEL (Lowest Observable Adverse Effects Level) A higher % is less toxic	2%	Data not available	8%	15%
5	Extinguishing conc. Cup burner, n-heptane	6 - 7%	Data not available	Data not available	5.9%
6	EPA SNAP approval	Approved	Approved	Approved as HFC 134 A	Approved
7	UL Approval	Approved	Approved	Not Approved	Approved
8	Boiling point	27 °C	-1.65 °C	-26.3 °C	-1.4 °C
9	LC 50 (Rats, 4 hr) (Higher value means lesser hazardous)	32,000 ppm	1,40,000 ppm	Data not available	4,57,000
10	Phase-Out per Protocol	The HCFC-123 component is scheduled for phase out in 2020 in developed, 2030 in developing countries	HCFC products are scheduled for phase out in 2020 in developed, 2030 in developing countries	Not Applicable	Not Applicable

#### Advantages of FE-36:

1. It does not contain d-limonene, which is flammable non-volatile residue. Extinguishing agents containing d- limonene may leave a coating of d- limonene.
2. In FE 36, variation between atmospheric temp. & B.P is less, hence it does not leave any condensed moisture as in case of CO2.
3. Unlike CO2, it is suitable for all classes of fire and does not even cause thermal shock.
4. FE 36 is not scheduled for phase out as HCFC like Halotron I, NAF PIV, which contains Chlorine.
5. The B.P of FE 36 is -1.6 °C, hence is discharged as gas, unlike Halotron I, which comes out as a liquid.
6. The Extinguishing concentration of FE 36 is well above is NOAEL and LOAEL values

\*Some of the above data and information is contributed by E.I. DuPont



### K.V. FIRE CHEMICALS (INDIA) PVT. LTD.

Kamala Niwas, Lane - D, Sector - 8, Vashi, Navi Mumbai - 400 703.

T: + 91 22 27820827 F: + 91 22 27824712

E : info@kvfire.com Website : www.kvfire.com