

# ACTIVE FIRE PROTECTION – CLEAN AGENT FIRE EXTINGUISHING SYSTEM



**A**ctive fire protection (AFP) systems is one of fire protection system other than passive fire protection. Different from passive fire protection, AFP consist of those that take an additional action to activate in the event of a fire. AFP consist of fire alarm, fire detection system, hydrant system, sprinkler system and fire suppression system. Clean agent fire extinguishing system is one of fire suppression system.

## Clean Agent Extinguishing System

Clean agent extinguisher is electrically nonconducting, volatile, or gaseous fire extinguishant that does not leave residue upon evaporation.

Clean agent fire extinguishing systems are either liquefied halocarbon gas or inert gas types for total flooding application only.

Clean agents are frequently referred to as halon alternatives since they are primarily intended for applications previously covered by the halons which are no longer produced, particularly Halon 1301 and Halon 1211.

Table 15. Currently Recognized Clean Agents within NFPA 2001/ISO 14520

Agent/Extinguishant	Chemical Name	Trade Name
<b>Halocarbons</b>		
FC-2-1-8	Perfluoropropane	CEA-308
FC-3-1-10	Perfluorobutane	CEA-410
FIC-1311	Trifluoriodomethane	Triodide
<b>HCFC Blend A</b>		
HCFC-123	Dichlorotrifluoroethane (4.75)	NAF S-III
HCFC-22	Chlorodifluoromethane (82)	
HCFC-124	Chlorotetrafluoroethane (9.5)	
	Isopropenyl-1-methylcyclohexene (3.75)	
HCFC-124	Chlorotetrafluoroethane	FE-241
HFC-23	Trifluoromethane	FE-13
HFC-125	Pentafluoroethane	FE-25
HFC-227ea	Heptafluoropropane	FM-200, FE-227
HFC-236fa	Hexafluoropropane	FE-36
<b>Inert Gases</b>		
IG-01	Argon	Argotec
IG-100	Nitrogen	
IG-65	Nitrogen (50), Argon (50)	Argonite
IG-541	Nitrogen (52), Argon (42), Carbon Dioxide (8)	Inergen

HCFC Blend A constituents are listed in percent by weight.  
Inert gas constituents are listed in percent by volume.

## Application

Clean agent fire extinguishing systems are useful within the limits of NFPA standard for extinguishing fires in specific hazards or equipment and in occupancies where an electrically nonconductive medium is essential or desirable or where cleanup of other media presents a problem.

Total flooding clean agent fire extinguishing systems are used primarily to protect hazards that are in enclosures or equipment that, in itself, includes an enclosure to contain the agent. Some typical hazards that could be suitable include, but are not limited to, the following:

1. Electrical and electronic hazards
2. Subfloors and other concealed spaces
3. Flammable and combustible liquids and gases
4. Other high-value assets
5. Telecommunications facilities

Clean agent systems could also be used for explosion prevention and suppression where flammable materials could collect in confined areas.

## Safety

Regarding the agents, some safety precautions shall be required as follow:

1. Any agent is to be recognized by this standard or proposed for inclusion in this standard shall be first evaluated in manner equivalent to the process used by the U.S Environmental protection Agency (EPA) Significant New Alternatives Policy (SNAP) Program for total flooding agents.
2. Unnecessary exposure to halocarbon clean agents-including exposure at and below the no observable adverse effect level (NOAEL) – and halocarbon decomposition products shall be avoided.
3. Means shall be provided to limit exposure no longer than 5 minutes.
4. Unprotected personnel shall not enter a protected space during or after agent discharge.
5. Unnecessary exposure to inert gas agent systems resulting in low oxygen atmosphere shall be avoided.

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6. The maximum exposure time in any case shall not exceed 5 minutes.
7. A pre-discharge alarm and time delays shall be provided.
8. Unprotected personnel shall not enter the area during or after agent discharge
9. Suitable safeguards shall be provided to ensure prompt evacuation of and prevent entry into hazardous atmosphere and also to provide means for prompt rescue of any trapped personnel
10. Safety items such as personnel training, warning sign, discharge alarms, self-contained breathing apparatus, evacuation plans, and fire drills shall be considered.
11. Consideration shall be given to the possibility of clean agent migrating to adjacent areas outside the protected space
12. For system protecting occupiable enclosures or spaces where the clean agent design concentration exceeds that approved for use in normally occupied spaces, system shall include the following:
  - a. Supervised system lockout valves
  - b. Pneumatic pre-discharge alarm
  - c. Pneumatic time delays
  - d. Warning signs
13. All persons who inspect, test, maintain, or operate fire extinguishing system shall be trained in all aspects of safety related to the system

### Reference:

- NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems*
- Factory Mutual Data Sheet 0409, *Clean Agent Extinguishing System*
- Factory Mutual Data Sheet 0400, *Special Protection Systems*

### **Disclaimer**

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