



Automatic Fire Suppression system

Clean Agent Fire Suppression Systems used for all electrical enclosures/ Servers/ CNC / EDM/ Dust Collectors/ Food processing plants/ Laboratory Fume hoods/ wind turbine/ Power generators and Gene sets.

Automatic Fire Detection And Suppression System With Linear Pneumatic Heat Detection Tube as 'Direct' Gas Flooding System For Electric Panels.

SCOPE

The scope covers Supply, Installation, Testing and Commissioning of Automatic Clean Agent Flooding System complete for electrical panels with Fire Finder tube, cylinder, valves, integration with Main Fire Alarm Control Panel for status monitoring etc. The work to be executed by authorized & certified Fire Finder installer shall cover:

- i. Providing Direct Panel Gas Flooding System with linear Fire Finder tube inside the panels.
- ii. Arrangement of Clean Gas Agent for flooding inside the panels.
- iii. Audio-visual annunciation devices for indicating incidence of fire.
- iv. Any other item required to the successful commissioning of the system

The electrical panel fire suppression system shall be complete with Direct Clean Gas storage cylinders for required capacities, extinguishing agent as specified, linear Fire Finder tubing, filling and end-of-line adaptors, pressure switches, control equipment and all necessary accessories and push on fittings to form a complete and working installation to protect the Electrical panel in case of fire.

The panels to be protected shall be determined as per the approval of the engineer

The system will have an interface with Main Fire Alarm and Control Panel. In case of fire in the concerned Panel, indication of Fire Finder discharge status should come in Main Fire Alarm and Control Panel.



REGULATORY REQUIREMENTS

- 2.1 All installations shall conform to NFPA requirements.
- 2.2 Clean Agent used should be hfc227ea/ hfc236
- 2.3 The system should be as per IS 15496
- 2.4 National Electric code SP 30: 1985

SYSTEM DESCRIPTION

3.1 The Clean Agent Pre-Engineered automatic direct fire suppression system.

3.2 Each clean agent pre-engineered automatic system is equipped with its own detection/discharge Fire Finder tubing. The pre-engineered concept minimizes the amount of engineering involved in system Design. When the detection/Discharge tubing is installed within the limitations stated in the manufacturer manual, no hydraulic calculations are required to determine the pressure drop, agent flow or discharge time.

3.3 Each Clean Agent extinguishing unit, when installed, is a self-contained system, meaning that it is equipped with its own automatic (non-electric) detection system, which when actuated, automatically releases the suppression agent into the Electric Panel.

3.4 The Clean Agent Automatic Direct System consists of the following major components:

Clean Agent Cylinder/Valve Assembly. Cylinder Mounting Bracket. Fire finder Detector, Actuation and Discharge Fire Finder Tubing and Fittings (No-Substitute). Pressure Switch.

3.5 The Clean Agent Automatic Direct System utilizes unique Fire finder flexible tubing is attached to the top of the cylinder valve. This Fire Finder tubing is pressurized with dry nitrogen, is temperature sensitive and acts as a continuous linear thermal detector that ruptures upon Flame impingement. Once the detector tubing is ruptured forming a nozzle at the rupture point, it allows the Clean Agent to flow through, distributing the extinguishing agent into the protected area. Upon system actuation, the pressure switch can be used to indicate system discharge, shutdown ventilation, shut-off electrical power etc may be required.



3.6 The Clean Agent Automatic Direct System is designed and listed as an Automatic unit. No manual or electric means is provided for simultaneous actuation of multiple systems. Only one (1) unit can be used to protect one hazard. These extinguishing units cannot be combined to protect a larger size hazard, since they are not designed to provide for simultaneous actuation of two or more units.

3.7 The Clean Agent is stored in cylinders as a liquefied compressed gas, super pressurized with Dry Nitrogen to 150 psi at 70⁰ F. The ambient operating temperature range for all system components is: -20⁰ C to 80⁰ C).

3.8 Each container is equipped with a nickel-plated brass valve, a pressure gauge to monitor container pressure, and a quarter-turn ball valve that interfaces with the Detection Tubing. The ball valve must be kept closed at all times when the container is not in service. In addition, the container valve is equipped with a pressure relief (rupture disc) device in compliance with Indian Standards.

3.9 A wall-mounted bracket is used to mount the container/valve assembly in a vertical (upright) position. Each bracket is equipped with two integral quick-clamp straps.

3.10 For the direct Clean Agent systems, the tubing performs three functions: Heat Detection, System Activation, and Clean Agent discharge. The tubing is installed throughout the Electrical Panel volume, with one end connected to the top of the Clean Agent container valve. The tubing is pressurized with Dry Nitrogen to 150 psig and maintains the system in the "OFF" position. An optional pressure gauge or pressure switch can be connected to the other end of the detector/discharge tube to monitor system pressure and /or signal of system actuation, etc. The detector/discharge tubing is heat sensitive and in a fire situation is designed to rupture at any point upon flame impingement. The rupture of the tube results in a formation of a discharge nozzle that will perform a complete discharge of the Clean Agent. Location and spacing of the tubing should be placed above the hazard areas being protected.



3.11 A pressure switch is connected at the end of line of the Detection Tubing to monitor system pressure, system actuation an /or to energize de-energize electrically operated equipment. Pressure switch is coupled with with either FSMon (Fire Suppression Monitor) or FSS4010GSM (Fire Suppression Messenger) manufactured by Vignaharta.

4.0 DESIGN REQUIREMENTS

4.1 Provide sufficient amount of Clean Agent FM 200/ NOVEC 1230 liquid to convert into 200/ NOVEC 1230. Considering the following when computing volume to verify suitability and to establish design limitations:

- Volume of hazard area.
- Specific volume of Clean Agent.
- Discharge time and flow rates.
- Design concentration and design factors.
- Detector/discharge tubing placement.

4.2 Locate Clean Agent supply near each hazard area.

4.3 Interface system with main control fire alarm system and BMS (if required).

4.4 Provide total flooding of 4.2 percent Clean Agent concentration by volume as per NFPA-2001

4.5 The pre-engineered automatic system concept minimizes the amount of engineering required when evaluation is design for a specific application.

4.6 No calculations are required for pressure drop, flow rates or discharge time as long as the discharge/detection tubing is installed within the limits as specified by this manufacturer.

4.7 When the additional limitations of hazard volume, area coverage, maximum height, design concentration, agent quantity, detection tubing arrangement etc are also met, the system installation shall be understood to comply with the design requirements, NFPA-2001, and FMRC approval.



4.8 Therefore, no discharge tests or concentration measurements shall be required.

4.9 All doors and holes in the enclosed/equipment should be closed or sealed to maintain the tightness of enclosure.

4.10 The system should have means to close the exhaust fans if installed in the panel at the time of system activation.

4.11 As desired by the engineer-in-charge the main supply of panel can be shut off with the system.

5.0 DETECTION TUBING

5.1 The automatic system shall become a self-contained, self-actuating unit does not require an external source of power or electricity.

5.2 The system shall utilize unique flexible tubing that shall be attached the top of the container valve. This tubing shall pressurized with Dry Nitrogen to 150 psig at 70⁰ F (1.034 KPA @21⁰C), is temperature sensitive and shall act as a continuous linear thermal detector that shall rupture upon flame impingement.

5.3 Once the detection tubing is ruptured, forming a nozzle at the rupture point, it shall allow the Clean Agent through the Nozzle into the protected area.

6.0 CLEAN AGENT CONTAINERS REQUIREMENT

6.1 Design, fabricate, certify and stamp containers in accordance with the requirements of NFPA. Containers shall be standard model and size of ease of replacement and addition.

6.2 Fill containers with required Clean Agent. Pressurize with dry nitrogen to 1,034 kPa(150 psig) at 21⁰ C (70⁰ F).



6.3 Each storage container is equipped with a nickel-plated brass valve, a pressure gauge to monitor container pressure, and a quarter-turn ball valve that interfaces with the detection tubing. The quarter ball valve shall be kept closed at all times when the container is not in service.

6.4 All container valves shall be equipped with a pressure relief valve (rupture disc) device with NFPA requirements.

6.5 The containers shall be located as close as possible to be protected enclosure. In some cases, the containers shall be mounted inside the protected enclosures. The container assemblies shall be located in a ready accessible location to allow for ease of inspection service and maintenance.

6.6 Each container shall be equipped with a straight siphon tube. Each container can only be mounted in a vertical upright position. The container discharge valve shall be capable of releasing the Clean Agent in a vertical direction, so that the discharge force is perpendicular to the floor.

6.7 The pressure gauge shall permit a quick visual inspection of the container pressure.



Automatic Tube Fire Suppression: ATFSS

Sr No	Product	Certification	Description
1	Automatic Direct Low Pressure Fire Suppression. Extinguisher and Valve with Tamper proof seal & cross over panel fitting	CE	Extinguishant :- 2 Kg Clean Agent Chemours (formerly DuPont)FM 200 (HFC 227 ea)
		Conforms to IS:15683 and CE	Can: Stored Pressure Type, Deep drawn and Argon welded, Sheet metal thickness and dia as per standard, 100% Hydraulic Pressure tested, conform to EN/PED standard. Can shall be manufactured as per IS: 15683 and complete tests of the body as per IS 15683, shall be demonstrated.(Vibration, tapping, drop test, cyclic pressure test, temperature range test) Burst pressure shall be greater than 35 bars . Cylinder Should be helium leak detection tested.
			DLP Valve: The valve should be nickel plated brass, equipped with a pressure gauge to monitor the system pressure, with a ball valve interfacing the tubing and the cylinder, and with a safety valve , Working pressure 10-18 bar, leakage rate: 0.0001mbar l/s, valves should be pressure tested at 50 bar for no leak.
2	Sensor Tube	DIN 73378, DIN 74324 and BS 5409 standards followed for manufacturing and testing	Sensor tube for automatic fire detection and suppression system made by special modified Polyamide (PA), Color Red, Black or specified, High grade quality, Inner diameter 4mm, Outer Diameter 6 MM, Melting Point approx. 220 degrees Celsius when heating up with 10 K/minute, Burst Pressure 100 bar at 20°C. Temperature range: minus 40°C to +80°C. Working Pressure 20 Bar at 20°C. Burst Temperature : when Pressurized with dry Nitrogen at 16 bar pressure approx. 100°C to 110°C.



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3	End of Line Adaptor with Pressure Gauge, And Push-on fittings	BSP / NPT	End of Line adapter with Pressure gauge for Automatic fire suppression tube used for fitting at the end of the tube for pressurizing and re pressurizing the tube includes check Valve, Pressure Gauge and fitting to connect to sensor tubing. Tube connection 6mm, Gauge scale: 0-28 bar. Fitting made by brass (plated), Copper Nickel plated, Temperature range - 20 ⁰ C till + 80 ⁰ C.
4	Pressure Switch	BIS	Pressure Switch to monitor Pressure drop in the tube, switch point 8 Bars. Switch Type DPDT, Normally Closed, Operating range 0-25 Bar.
5	End of Line Plug	BSP	End of Line Plug for Automatic fire suppression tube used for fitting at the tube end to terminate the point. Tube connection 6x4mm, Fitting made by brass nickel plated material, Temperature range TS -20 ⁰ C till + 80 ⁰ C, Maximum working pressure 50 Bars.
6	Fire Alarm Panel	IS Standard	Control unit to activate alarm, deactivate essential devices etc
7	Sounder	IS standard	85-100 dB