Tube-Based Fire Suppression for Data Centers:

Data centres are high-value environments where even a few seconds of downtime can cause significant data loss or financial impact. Fire risks from servers, cabling, power distribution units (PDUs), and UPS systems demand a fast, reliable, clean, and localized suppression system.

Tube-based fire suppression systems are ideal for rack-level or cabinet-level protection, offering a compact, automatic solution that targets the fire at its source — inside server racks or electrical enclosures.

Why Tube Suppression in Data Centers?

Challenge	Tube-Based Solution
Tight spaces (server racks)	Small footprint and flexible installation
Sensitive electronics	Clean agent — no residue, no short circuit
Unattended operation	Fully automatic and self-contained
Need for localized suppression	Detects and suppresses fire inside specific enclosures
Avoid downtime and data loss	Rapid response reduces fire spread and service interruption

System Components:

Component	Description
Detection Tube	Pressurized, flexible polymer tubing routed inside the rack. Bursts when exposed to fire (~150–180°C).
Agent Cylinder	Holds the suppression agent (e.g., NOVEC 1230 or FM-200). Mounted outside the rack.
Valve System	Triggered by tube rupture (direct or indirect discharge).
Nozzles *(indirect)*	Distribute agent uniformly if needed.
Optional Sensors	Alarms or notifications (GSM, pressure switch, BMS integration).

System Types:

Direct System

- **How it works: Tube ruptures at heat source and directly discharges agent through the break.**

- **Best for: Individual server racks, patch panels, and PDUs.**

◆ **Indirect System**

- **How it works: Tube rupture triggers a valve on the cylinder, releasing agent through strategically placed nozzles inside the rack.**

- **Best for: Larger cabinets, battery racks, or multiple compartments.**

Clean Agent Options (Safe for Electronics) :

Agent	Features
NOVEC 1230	Eco-friendly, zero residue, non-conductive
FM-200	Widely used, fast suppression, safe for electronics
CO_2	Effective but not used in occupied or small sealed data racks due to asphyxiation risk

Typical Applications in Data Centers:

- Individual server racks
- Electrical distribution panels
- Battery racks (BESS)
- UPS systems
- Patch panels
- Network cabinets

Advantages of Tube Suppression in Data Centers:

- ✅ Localized protection — only affected rack is suppressed
- ✅ No collateral damage — no water, no residue
- ✅ No external power — self-activating
- ✅ Fast response — activates within seconds
- ✅ Easy retrofit — ideal for upgrading legacy systems
- ✅ Reduces downtime — protects uptime-critical environments

Limitations:

- Only protects the enclosure where tubing is installed
- Not suitable for room-wide suppression (complement with room flooding system)
- Tube must be replaced after activation

Manufacturer, Supplier and installation of all type customize Automatic Fire Detection and Suppression System

Compliance & Standards:

🗹 **NFPA 2001: Clean agent systems**

🗹 **ISO 14520: Gaseous suppression**

🗹 **UL/CE/FM approved system components**

🗹 **Data center-specific fire safety guidelines (e.g., Uptime Institute, TIA-942)**

Ideal Use Case: Hybrid Suppression

- ✅ **Room-wide clean agent or VESDA system +**

- ✅ **Rack-level tube-based suppression =**
  Complete layered protection for mission-critical facilities

Add-Ons & Smart Features

- **Remote monitoring (SMS alerts, IP-based control)**

- **Integration with BMS or DCIM platforms**

- **Visual/audible alarms and status indicators**

- **Pre-discharge warnings (in advanced models)**