Typical Industries Served	Data Processing/Transmission Internet Service Exchange Co-location Facilities Wireless Communication ocal/ ong Distance

Since the first phone call made on March 10, 1876 by Alexander Graham Bell, telephones and telecommunications have played an important role in our lives. Telecommunications, which touch almost every facet of life include: internet service, ATMÕs (automatic teller machines), facsimile machines, video services, cable TV, teleconferencing and video-conferencing, electronic funds transfer, cellular phones, and standard telephone service. In todayÕs workplace, it is almost impossible to imagine getting through a single day without the services provided by the telecommunication industry.

Currently there are nearly 2000 service companies providing telecommunications services in the United States. These companies operate networks that are sized to serve a few thousand customers up to millions of customers. In order to make such an abundance of information and control options available from a single phone line there is obviously a very large network of facilities storing, maintaining, and routing information from place to place.

Telecommunication facilities contain rows of equipment that are fairly standard in function and appearance. Most modern equipment is mounted in metal cabinets and looks like ordinary computers. This arrangement, combined with miniaturization of equipment and higher energy densities, requires forced ventilation (internal fans and extensive room air conditioning systems) to dissipate heat generated during operation. It is important to provide heat dissipation for this type of equipment because rapid temperature and humidity changes can cause equipment problems.

Because of all the power in these facilities the potential for fire is large. Choosing adequate protection for these facilities requires special consideration. The critical nature of these installations, along with their sensitive electronic equipment, make them extremely vulnerable to a fire. Fire damage in a telecommunications facility can easily reach the multi-million dollar mark. Even greater losses in downtime and service disruption can be expected in the event of a fire disaster.

Leaving this responsibility to ÒordinaryÓ means of fire protection, such as hand-held portables or an automatic sprinkler system can be a costly mistake. The hand-held extinguisher relies on human response and, many times, even a small fire in a complex electrical system can be virtually inaccessible. An automatic sprinkler system provides adequate back-up protection, but due to its need for fixed temperature fusible elements, a major heat source must exist in order to actuate the system. By the time a fire reaches this level, serious and costly damage can occur from the fire itself and the quantity of water required to extinguish it.

To reduce the risks of personal injury, costly downtime and substantial equipment damage, an automatic fire suppression system is needed. More importantly, the system must be capable of rapidly detecting and extinguishing a fire without leaving damaging residue or creating a life safety hazard.

THE SOLUTION: FIKE HFC-227ea CLEAN AGENT SYSTEM

The fire suppression agent used, HFC-227ea, possesses many physical properties which make it desirable as a fire protection agent. HFC-227ea is odorless, colorless, electrically non-conductive, non-corrosive, and leaves no residue when discharged. Because HFC-227ea is electrically non-conductive it is especially appropriate for protecting telecommunication facilities. Since it is discharged as a gaseous vapor, it rapidly penetrates enclosures to get to the source of the fire, reaching areas that water or dry chemical agents cannot.

In a fire suppression system, HFC-227ea is stored as a liquid in HFC-227ea storage containers. When called upon by an approved control panel, the HFC-227ea will flow through the length of piping required and will immediately change from a liquid to a vapor as it is released through the discharge nozzle.

To provide proper fire protection for a telecommunication facility, it is imperative that a well-designed, fast response, and trouble free automatic fire detection system be installed. In most cases photoelectric smoke detectors will be used due to the high air flow in telecommunication facilities. Smoke damage is a concern in telecommunication facilities and a photoelectric detector will allow for the system to detect and react to a fire condition before there is any smoke damage. Special attention must be paid to air flow rates and how it impacts detector spacing. A great addition to the detection system is a VESDA aspirating smoke detection system. The VESDA system allows for the fire to be detected in its incipient stages, allowing for an opportunity to control the spread of a fire. The VESDA system offers a wide range of uses from ceiling mount, computer rack mount, and air handling system placement.

The example below walks through a typical telecommunication facility designed with a Fike HFC-227ea system.

EXAMPLE SYSTEM

This example walks through the design for a fire detection and suppression system in a telecommunication facility. This room houses telecommunications switch gear equipment and is equipped with high powered cooling and airflow equipment to keep the switch gear equipment from over heating. The room being protected is 40' X 40' in dimension with a 10 foot ceiling and a 2-1/2 foot sub-floor.

The first step is to determine the quantity of HFC-227ea required to protect the facility. Both the room and the sub-floor will be protected with HFC-227ea. The reasons to protect both the room and the sub-floor is that most fires start with an overheated wire or equipment in an equipment rack or sub-floor. With the leakage in most sub-floors it is impossible to contain the agent only in the room. As discussed earlier the fire hazard consists of Class A combustibles such as cable insulation and Class C electrical fires. Per NFPA Standards and other Approvals, a design concentration of 7 % HFC-227ea is used to protect this hazard. Per NFPA 2001 and Fike design manuals, a flooding factor of .0341 lb./ft^3 is multiplied by the room volume in cubic feet to calculate the amount of agent required. The volume of the room is 16000 ft^3 and requires 546 pounds of HFC-227ea to achieve a 7 % design concentration. The volume of the sub-floor is 4000 ft^3 and requires 137 pounds of HFC-227ea.

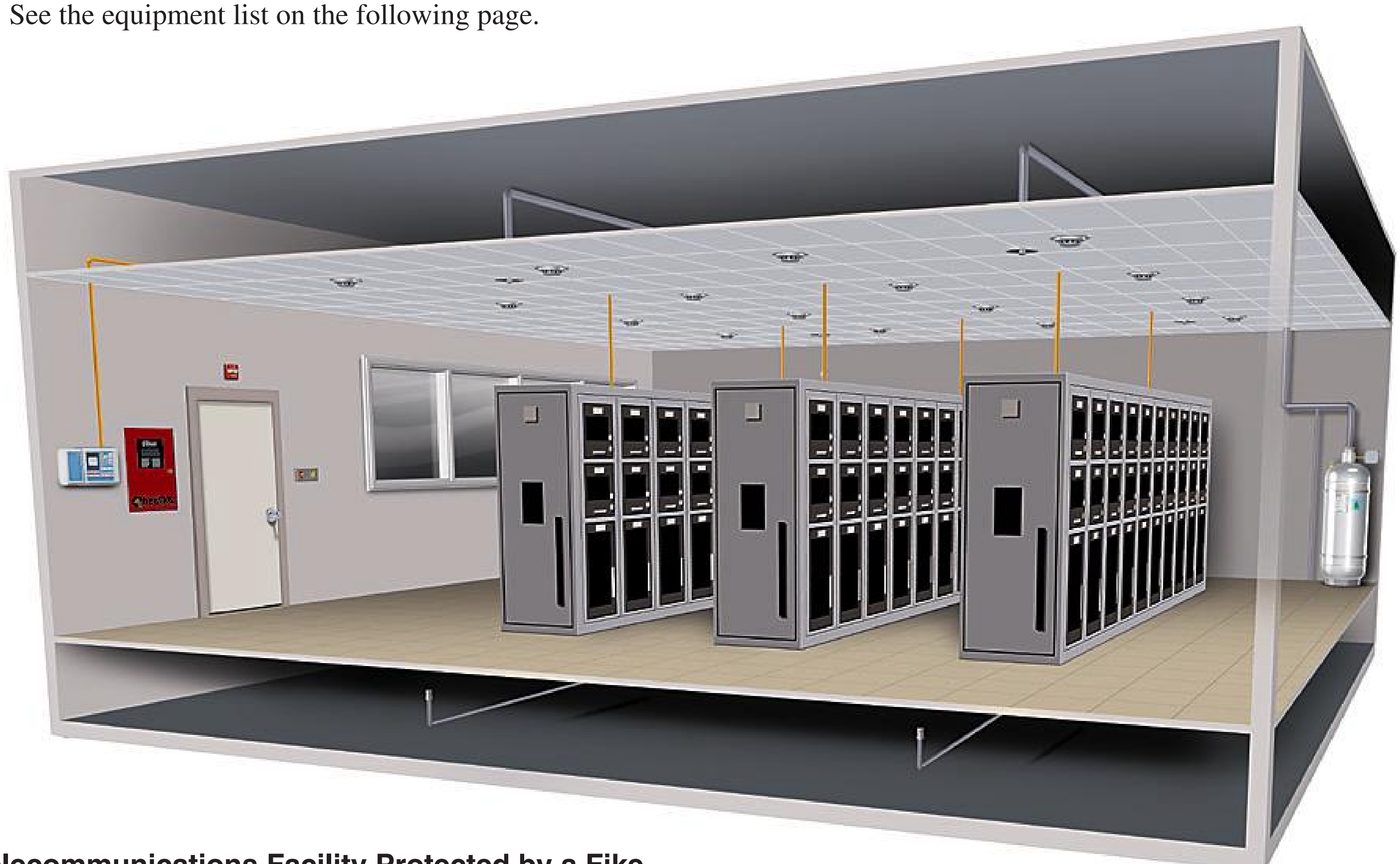
The most efficient method of protecting this hazard is to use an Engineered HFC-227ea system design. An Engineered system design allows the designer to use one HFC-227ea container to protect multiple hazards and allows for different flow rates at each nozzle in the system. In this system the hazards can be protected with one 1000 pound container filled with 683 pounds of HFC-227ea.

The next step in designing the system is to layout the system nozzles in the protected space. As mentioned before the room requires 546 pounds of HFC-227ea to protect the hazard. To minimize turbulence during system discharge, it is recommended that the flow rates of the system nozzles be at or below 20 lbs./sec over a 10 second discharge. In order keep a balanced system, I am placing four nozzles in the room that will each discharge approximately 136.5 pounds of HFC-227ea. For the sub-floor I am also placing four nozzles that will each discharge 34.25 pounds of HFC-227ea. This sub-floor could actually be protected with a single nozzle, but I have decided to use four nozzles because of the amount of obstructions in the sub-floor. It is very common to have sub-floors that contain a large amount of cable and it is not recommended to push the limits of the nozzle coverage in a crowded sub-floor. A diagram of the container and piping isometric is shown for your reference.

The next step is to layout the detection and control system for this facility. I have chosen to use photoelectric smoke detectors for the room and sub-floor. The reason for choosing photoelectric detectors is that they perform well in areas of high air flow. In order to determine the proper detector spacing consult NFPA 72 National Fire Alarm Code. Table 2-3.6.6.3 of NFPA 72 provides guidance for detector spacing in high air-movement areas. This hazard has 60 air changes per hour in the room and sub-floor. Therefor the detectors in the room and sub-floor will be spaced at 125 ft^2. This information results in 16 detectors in the room and 16 detectors in the sub-floor.

In order to provide the most time to react to a fire incident, I have designed a VESDA Aspirating Smoke Detection System in this hazard. The VESDA system allows for direct smoke detection in a variety of areas in a telecommunication facility. Common areas of protection include the return air duct of the air handling units (AHU's), ceiling spot detection, and equipment such as computer racks. For this facility I have used the VESDA unit for spot detection in the telecommunication equipment racks. The VESDA system is not used to release the HFC-227ea, it is installed to provide an opportunity to detect and control a potential fire before it does damage to a facility. The VESDA system communicates to the Fike Cheetah system directly and is able to display real time information from 1 to 255 VESDA detectors.

See the equipment list on the following page.



Telecommunications Facility Protected by a Fike HFC-227ea Clean Agent Suppression System