

Aspirating smoke detection in healthcare facilities

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Fire detection in healthcare facilities is rapidly becoming a major concern in all countries around the world.

An ever-growing population combined with increased requirements to cater for the elderly sees more demand for the construction and extensions of these facilities. Hospitals, clinics, aged care facilities and so on have a real need for good fire protection to ensure the safety of their patients, staff and visitors.



While most codes and standards govern the fire requirements in these facilities, these requirements are often the minimal requirements needed to provide a satisfactory level of fire safety for the risk and application. This does not mean the fire safety systems designed by competent engineers and installed professionally are inadequate, more that they are based on several criteria including a cost to the community.

Numerous fire hazards exist within healthcare facilities, these are not fireproof - the fact is that there is potential in any building for a fire and particularly where electrical equipment, oxygen and flammable combustible products exist, a fire can start anywhere and at anytime.

Fire loads

Healthcare environments contain various combustible products, paper, materials, plastics, alcohol-based preparations and more, that scream fire. From a single overheating contact in a switchboard or control panel to a failure in a lighting ballast, from a cigarette accidentally left in a bed in an aged care facility to an under rated cable in a MRI underfloor space aspirating systems have the sensitivity range to detect these potential fires at the earliest possible stage.

Consequences of loss

Apart from the millions of rands of equipment that is lost due to the fire, it is really the immeasurable loss due to inability of a healthcare facility to provide service through prolonged downtime that causes severe operational difficulty. Some facilities that experience a fire never recover.

Nature of asset

Because these healthcare facilities are truly involved in preserving life at the same time providing ongoing life safety support to the community their protection against fire is critical. These assets also demand the best protection for

the right risk. Aspirating systems are used in many healthcare environments, some include:

- * *Ward protection* - to provide the earliest possible warning, to allow time for intervention and control, to minimise the need for evacuation.
- * *Operating theatres* - to minimise service costs, this is achieved by mounting the detector outside the 'clean' environment.
- * *MRI (magnetic resonance imaging) facilities* - to protect high cost equipment and provide early warning of potential problems.
- * *Nuclear medicine environments* - to protect against contamination of equipment, consumables and special environments.
- * *Computer facilities* - hospitals run on computer systems, it needs high sensitivity protection.
- * *Switchboards and substation rooms* - power is an essential element in all healthcare facilities and is a fire risk as are backup site generation systems.

Protection of these high value assets is fundamental parameters for continued uninterrupted site operation.

The earlier a fire can be detected the safer occupants will be, evacuation becomes simpler and stress and anxiety on patients minimised, damage to property is typically minimal. Today, more than ever there is a need to ensure the fire safety equipment requirements installed in these facilities meet the needs, demands and risk within the respective areas and environments of these facilities. Too often we find the incorrect selection of detection equipment for the risk, wrong placement of detectors and poor maintenance of the systems.

Typical hospital environments

Fire zones are readily identified in hospitals. The compartmentalisation of numerous wards branching off one or more corridors makes that a simple process and the same is true for hospital wings.

The same compartmentalisation may also be an impediment to rapid and safe patient evacuation in a fire situation, particularly in older hospitals. Careful planning and frequent fire drills alleviate some of the problems associated with corridor congestion, but the number of staff available set a limit on the speed with which patients can be transferred to safety. This, in some facilities could be more of an issue during after-hours when staff levels may be reduced. The removal of those patients who are immobilised, or who can move quickly only with assistance - infants, the elderly, and those dependent upon life support facilities - exacerbate the evacuation problem and further reduce the safety margin.

Operating theatres

These environments contain what we might term ordinary combustibles, linen, bedding, plastics etc. along with various electrically powered equipment. Should a fire start in these environments there are several issues that come to light and are sometimes overlooked when planning effective fire detection:

- * *The spread of potentially dangerous smouldering smoke throughout the room.*
- * *Critical interruption of patient operations.*
- * *The immediate evacuation of patient and staff.*
- * *The risk of fast fire spread when there is little or no time to react.*
- * *Infection risks.*

MRI facilities

These facilities also ideally lend themselves to aspirating technology given the non-magnetic construction.

Any fire detection equipment or devices containing magnetic (especially ferromagnetic) components in MRI facilities unless they have been tested by the device manufacturer and have been labelled 'MR safe' for the specific MR environment should not be installed.

X-ray facilities and other forms of critical scanning equipment can be similarly protected with aspirating technology.

Roof spaces

Perhaps one of the most important areas where fire is a threat in Healthcare facilities is the concealed 'roof space'. Electrical cables, lighting, power, equipment and so on are all hidden in these spaces where little or no attention is paid to service inspections or ongoing maintenance. Yes, fire detection is generally a requirement in these areas in line with local codes and standards but has correct detection equipment been selected for this risk area and is it effective?

Heat detectors and optical point type smoke detection are generally the choice in roof spaces, but what about the environment and effect on equipment. Are heat detectors really suited in this area? - What size fire will ultimately have taken hold by the time heat detectors react? How soon will the fire be noticed? These are some of the questions being asked by fire authorities.

The use of optical type point detection has also been questioned in roof space applications by Australian fire authorities. The false alarm rate and inconsistent operational stability due to the effects of roof space contamination has seen a considerable cost to some clients through ongoing brigade call outs.

Aspirating systems have been successfully used in these environments worldwide where contaminants (dirt and dust) can be filtered out before the air reaches the detector chamber. Maintenance is simple as the detector is located below the ceiling thus providing a more reliable and cost effective early warning solution to fire detection.

Summary

Like most buildings, healthcare facilities require fire protection, what level of fire protection, as previously mentioned is determined by the designer in line with local codes and standards. The most important issue when considering fire detection in these applications and in fact any applications is the correct selection of equipment for the risk.

No one form of fire detection can be used in all applications effectively, each risk has individual idiosyncrasies that lend themselves to the need and selection of the right detection for that risk. Aspirating technology whilst lending itself to a wide and varied number of applications has proven to be ideally suited to specific areas and applications in healthcare facilities and complements other forms of fire systems.

Ideally the designer when assessing the application should look to a mix and match of equipment within the fire systems ensuring the individual risks within the facility are clearly defined and catered for, this and only this approach will ensure continued life safety in healthcare facilities.

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