HEALTHCARE FACILITIES

VESDA®

The **VESDA-E** Aspirating Smoke Detection (ASD) system combines world-leading technology with low Total Cost of Ownership (TCO) to ensure the best protection for healthcare facilities.

APPLICATIONS

- ❖ Hospitals and aged care facilities
- ❖ Operating rooms
- ❖ MRI and radiological areas
- ❖ Wards and rehabilitation facilities
- ❖ Laboratories and biohazard storage areas
- ❖ Public access zones such as reception halls, retail zones and cafeterias
- ❖ Commercial kitchens and maintenance areas

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OVERVIEW

Hospitals, rehabilitation clinics, aged- and palliative-care residential facilities, along with other medical treatment centres, present multiple challenges in the management of fire hazards and evacuation. Diagnostic and testing facilities – such as MRI centres, radiology rooms, and pathology laboratories – typically combine high-energy high-cost technology with hazardous chemical, radioactive or biological material. Major healthcare infrastructure also includes non-medical but potentially fire-prone areas such as shops, cafeterias, commercial kitchens, maintenance facilities and so on.

In short, the complex nature of the varying environments found within healthcare facilities demand fire detection systems capable of coping with a wide range of threats and nuisance alarm sources by offering design flexibility for different environments while providing guaranteed reliable protection throughout operational life. It should also provide unobtrusive maintenance that will not disrupt operations or for spaces with restrictive access through centralized maintenance.

Critically, a fire detection system in a healthcare facility must be able to provide warnings early enough to allow local control and mitigation. The number one priority has to be early detection, verification and mitigation of threats avoiding the need for the evacuating of large numbers of ill, incapacitated and highly vulnerable patients

CONFIGURE MULTIPLE DIFFERENT ENVIRONMENTS WITHIN A SINGLE BUILDING
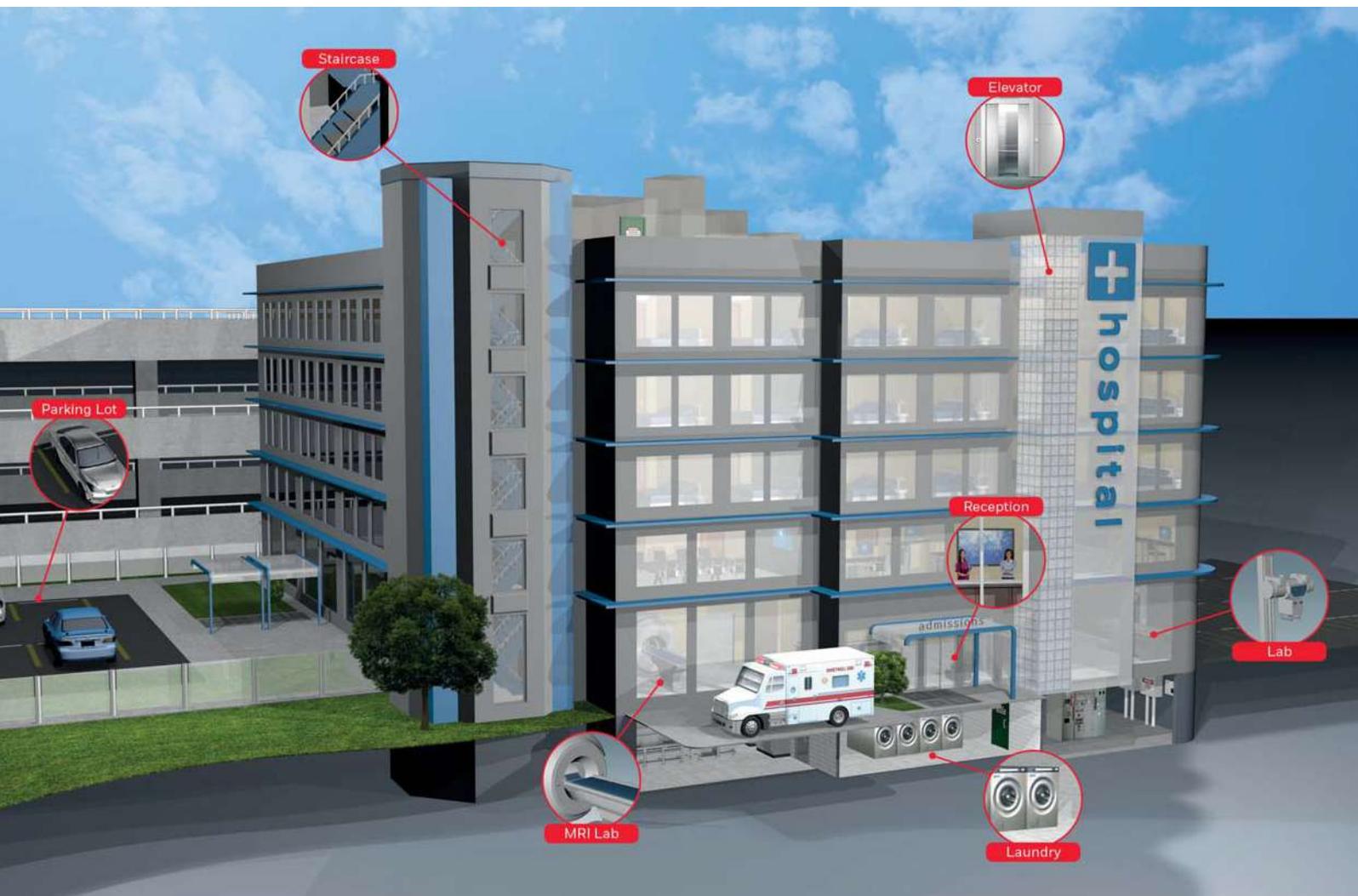
OBJECTIVES

- Protect healthcare facilities from fire, smoke and water damage caused by inadequate detection or false alarms.
- Provide early warning of potential threats to ensure staff and patient safety, operational continuity, and asset protection
- Eliminate threat and cost of nuisance alarms
- Benefit from lower installation and maintenance costs in high ceiling spaces and high security environments, combined with off-site control and remote verification
- Pinpoint the location of an event at the earliest opportunity

CONSEQUENCES

- Life safety risks, in particular that of immobile and frail patients
- Loss of expensive medical equipment, drugs and facilities
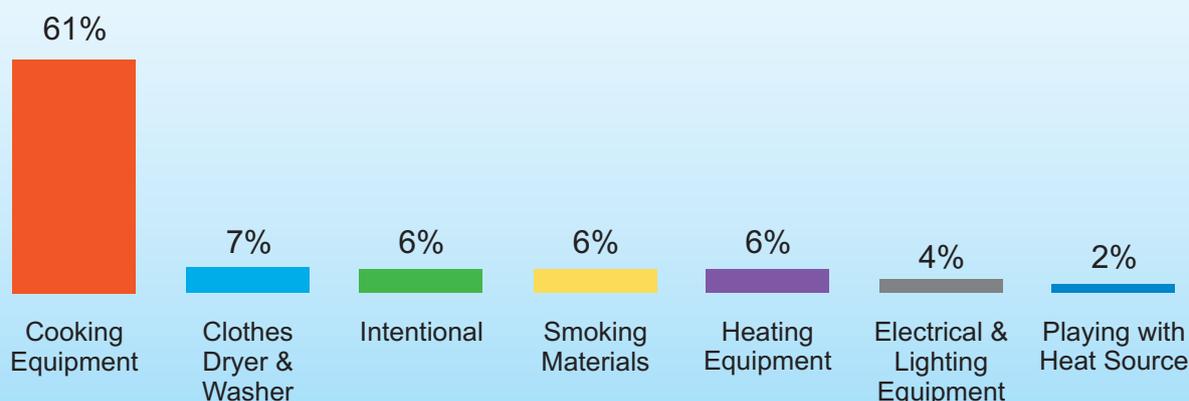- Service disruption and downtime causing immeasurable loss to the public community

RISKS

The risks of hidden, slow growth and fast growth fires is significant especially to evacuation procedure in hospitals due the differing number and characteristics of patients, staff availability and support of service areas, each with unique fire hazards. These include:

- Commercial kitchens
- Patient rooms
- Laboratories
- Plant rooms, mechanical rooms
- Lift shafts
- Rooms with restricted access housing specialised equipment (e.g. MRI, CAT scan, linear accelerators, etc.)
- Gas / chemical / radioactive material storage areas
- Laundry and Drying Equipments
- Retail outlets

Structure Fires in Health Care Facilities
By Leading Cause: 2006-2010*

Cause	Percentage
Cooking Equipment	61%
Clothes Dryer & Washer	7%
Intentional	6%
Smoking Materials	6%
Heating Equipment	6%
Electrical & Lighting Equipment	4%
Playing with Heat Source	2%

* Estimated average of 6,240 structure fires in or on health care properties
6 civilian deaths, 171 civilian injuries and $52.1m per year. According to NFPA 2012

Wards, Operating Theaters, Open Areas and Stair Case

The Challenge – Healthcare facilities are compiled of multiple different environments that require standard smoke detection while maintaining business continuity. Challenge includes wards and operation theaters where evacuation is a challenge and business continuity is paramount. Open areas and others where roof spaces and ducts contains large amount of electrical cables, lighting, power, heating and cooling equipment are concealed.

The Solution – The early warning fire detection capability and addressable features of the VEA detector will pinpoint with accuracy the fire source, provide the earliest possible warning and allow time for intervention and control to minimise or eliminate the need for evacuation.

If fire conditions become threatening, the VEA addressable fire detection system can provide information not only to assist "defending-in-place" practices by providing information of hazardous conditions to staff when moving patients to protected areas or through egress paths (corridors, stairways, etc.) but also to fire fighters in pinpointing the source of the fire.

During evacuation, the signal from VESDA systems can serve for the automatic release of fire doors or security doors along egress paths.

VEA centralized test and maintenance insure business continuity and ease of access during periodic maintenance.
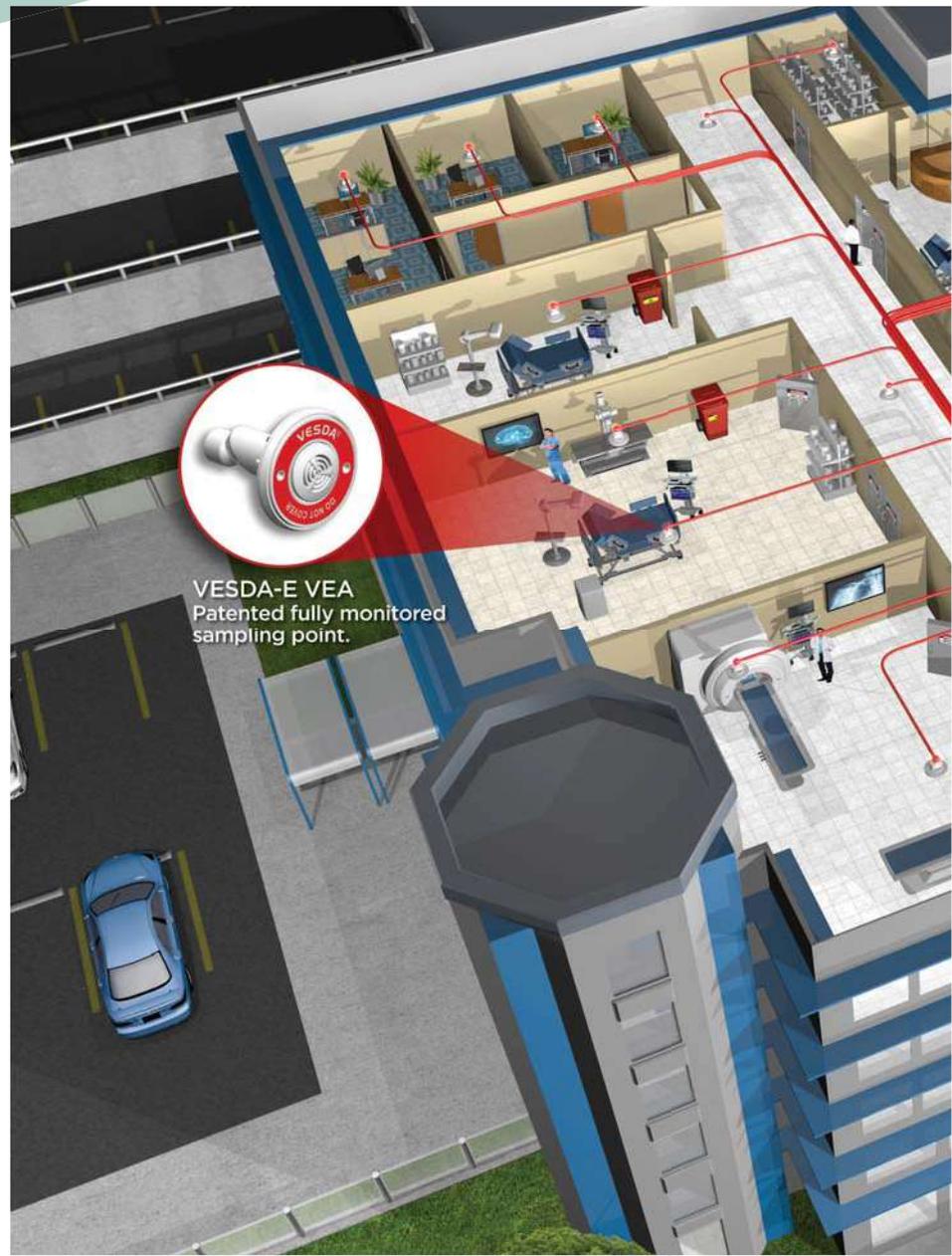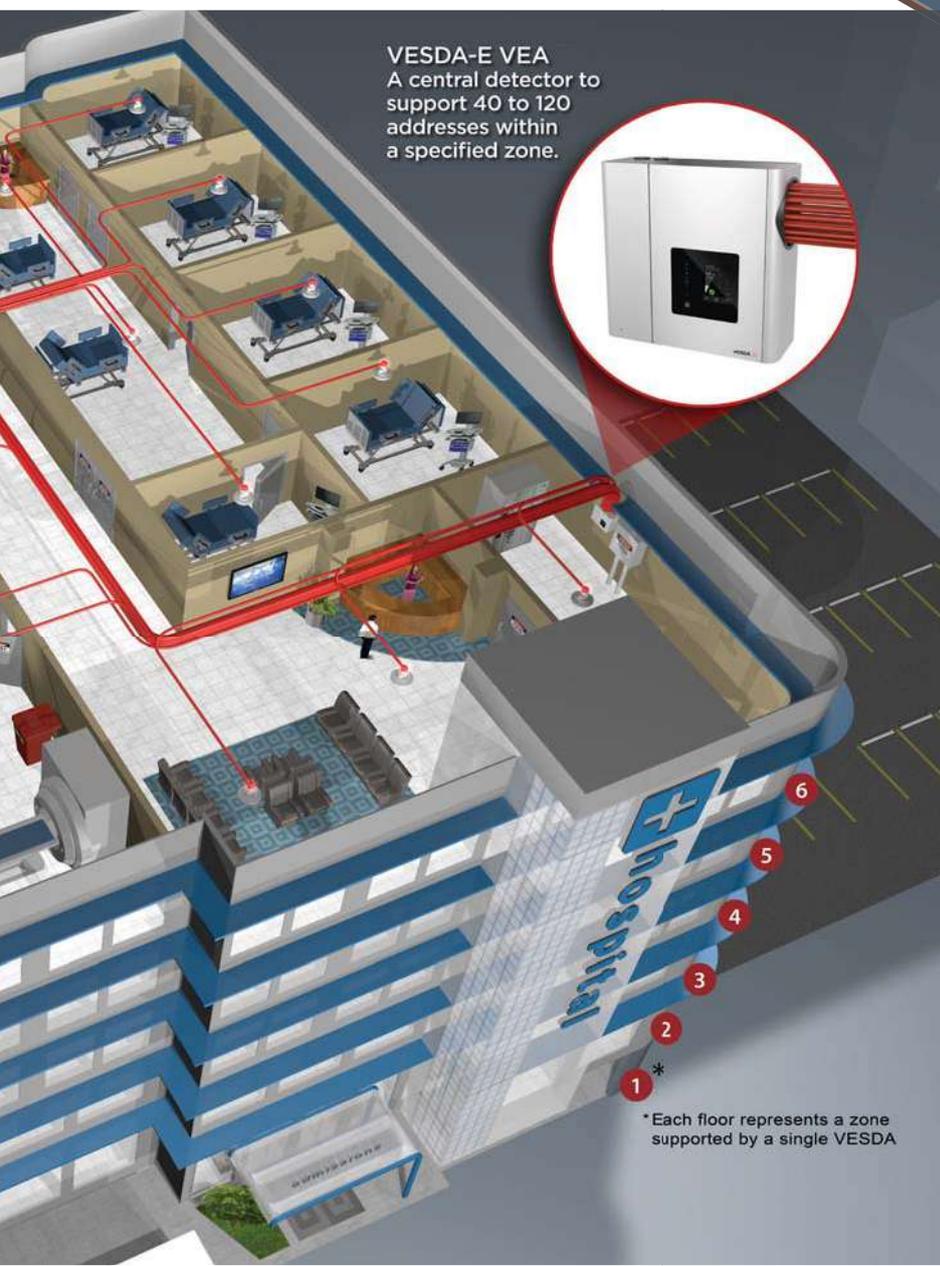

VESDA-E VEA
Patented fully monitored sampling point.

Computer Rooms

The Challenge – Due to adaptation of electronics medical records and sophistic needs of other high value equipment healthcare facilities quite often have their own computer facilities need protection. The need to manage the computer room temperature utilizing A/C and ventilation systems increase the difficulty of smoke detection in high airflow environment. High condensation of electrical wire and cabinets makes it difficult to pinpoint the location of fire.


VESDA-E VEA
A central detector to support 40 to 120 addresses within a specified zone.

The Solution – VESDA helps Detect the earliest stages of fire despite the challenges of high airflow. Smoke in an air-conditioned room travels with the airflow to the return air vent, rather than to the ceiling. VESDA sampling pipe can be installed across the vent to detect smoke early. In small facilities one VESDA detector can be used to protect several areas e.g. ceiling, return air vent and under the floor.

VESDA-E VEA utilizes flexible microbore tubes branched into the equipment cabinet, allowing the earliest possible warning of smoke with pinpoint addressability to the cabinet.

With VESDA Analytics you will be able to identify the smoke particles and if it caused by wire particles allowing you to quickly identify the fire source.

*Each floor represents a zone supported by a single VESDA
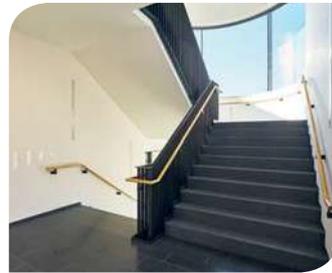
Car Parking
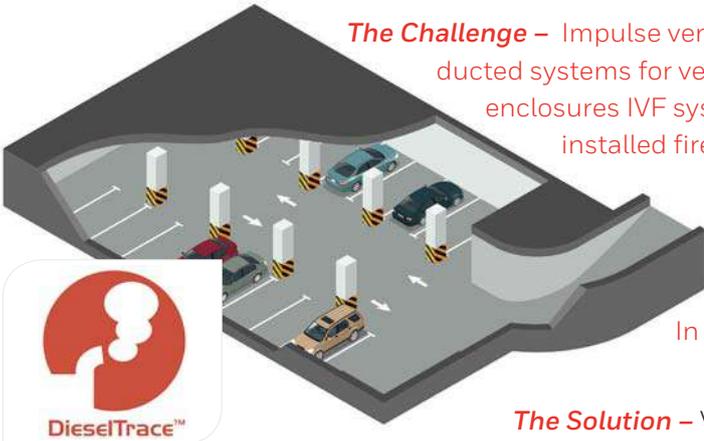
The Challenge – Impulse ventilation fan (IVF) systems are an alternative to traditional ducted systems for ventilating pollutants in enclosed car parks and other large enclosures IVF systems can adversely affect the operation/effectiveness of installed fire safety systems and have limitations as means of smoke control in car parks. In addition, car park layouts present further fire safety challenges since there is no physical separation between smoke and occupants' escape routes and no smoke reservoirs to contain the smoke. In closed parking, accumulation of diesel particles can be a major health hazard.

The Solution – VESDA can be configured in a way to control different IFV where it shut down certain fans to limit smoke spread while turning on others to pushing air outside the car park. Sampling pipes and points can be positioned in a way to optimize detection not possible with other traditional smoke detectors. VESDA-E DieselTrace can be used to trigger the HVAC system once a certain threshold of diesel particles is exceeded.

MRI Facilities

The Challenge – MRI (magnetic resonance imaging) facilities do not permit the installation of fire detection which contains metallic (ferromagnetic) components.

The Solution – VESDA VLF has been packaged with various MRI OEM as part of the solution as it can remotely protect high cost equipment and provide early warning of potential fire hazard due to the use of plastic or aspirating tubes or pipes.

The early warning capability of a VESDA system will ensure fire is detected at the earliest possible stage for swift MRI system shutdown before the fire escalates to a point where quench is initiated which can result in several days downtime and extremely expensive to re-initiate operation.
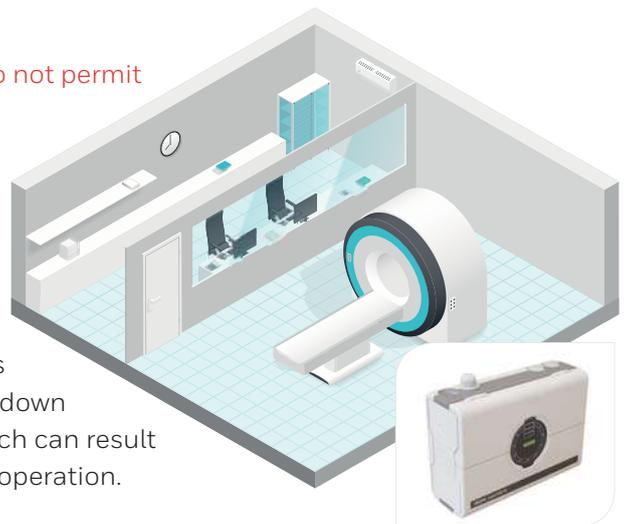
Laboratories, Nuclear Medicine and Sterilization Areas

The Challenge – Delicate laboratory equipment especially typically combine high-energy high-cost technology with hazardous chemical, radioactive or biological material. Cost of fire at these areas can be extremely toxic and equally costly and expensive.

The Solution – VESDA-E ASD provide active detection for mentioned areas for earliest detection possible for smouldering fires. Remote placement of central detector help avoiding the risk of contamination, catastrophic release of toxic materials and gases while providing remote indication of risk.

VESDA-E ECO StaX module can be integrated to ensure air quality is monitored for gas leaks and other threats.

Atria and Large Open Spaces

The Challenge – Lobbies and atria in Healthcare facilities present particular challenges for smoke detection. These architecturally impressive areas are often open with multi-level constructions dominated by large, glass windows and roofs. The aesthetics and construction of such areas do not allow for easy placement of traditional smoke detection or even wiring.


The Solution – Aspirating smoke detectors (ASDs) provide the fastest and most reliable detection but may not be cost-effective if very early warning is not the priority. OSID Detectors, an adequate common alternative and cost-effective solution for detecting smoke in atria. OSID utilizes battery-powered Emitters or wired that can be placed at different heights, adjusting easily to modern design of atria and lobbies requiring minimum wiring leaving the ceilings untouched. OSID use of dual light frequencies Ultraviolet (UV) and infrared (IR) wavelengths assist in the identification of real smoke compared to larger objects such as insects and dust, thus reducing false alarms. CMOS imaging chip and optical filtering, high-speed image acquisition and intelligent software algorithms enable the Imager to process the image and provide new levels in stability and sensitivity while providing greater immunity to high-level lighting variability, allowing OSID to provide extra stability in sunlit areas like atria.
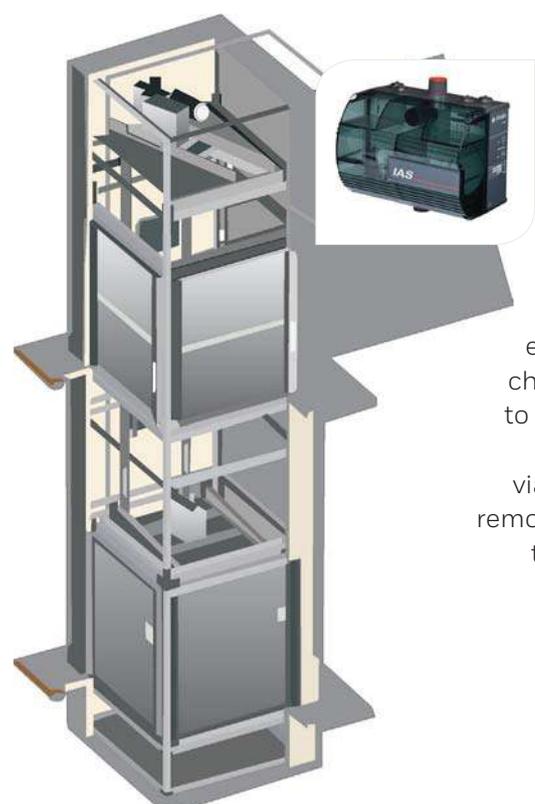
Elevator Lift Shafts

The Challenge – Elevators transport people throughout multi-level buildings. By virtue of their design, elevator shafts are a critical component of building infrastructure. Like chimneys, they allow air and smoke to be transported rapidly across multiple floors, accelerated by the elevator movement inside.

The Solution – ICAM IAS actively draws air through sampling holes in a network of pipes that are installed along the elevator shaft and in the elevator machine room. Powerful aspirator draws the air into a detection chamber to analyze it for the presence of smoke. It also can be connected to a building management system (BMS) via an existing fire alarm control panel (FACP) or operate independently to provide alarm information via a relay output for local action, i.e., open or close smoke vents or alert a remote control station. The ASD system is placed outside the machine room to ensure the detector is always accessible for testing and maintenance without the need to stop the elevator for access to the restricted area.

VESDA®
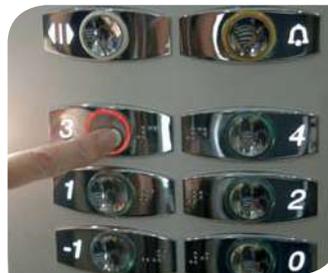
Smoke Control Systems

Smoke control systems in hospitals are designed to control the spread of smoke. These systems can consist of fixed or automatic ceiling barriers (curtains) to trap and hold smoke in reservoirs, exhaust systems to remove smoke, and air pressurization systems to prevent smoke entering egress paths or refuge areas.

VESDA systems designed either for open area or duct detection will ensure timely response to a fire event and provide the signal for initiation of smoke control systems and/or notification of hazardous conditions to occupants.

HVAC Systems

Heating, ventilation and air-conditioning (HVAC) systems in hospitals can facilitate the spread of smoke and fire beyond the room of fire origin to other compartments of the building.

VESDA detectors can be installed in the ductwork of HVAC systems or in open areas for the following reasons:

- In the event of fire, VESDA systems can provide the alarm signal for automatic or manual control of fire / smoke dampers for smoke extraction or zone pressurization.
- VESDA detectors can be applied for the protection against malfunctioning of HVAC fans, bearings, belts and filter fires.

For further information on VESDA system design guidelines for ducts, refer to the Ducts Application Note (Doc No. 10760)
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HVAC system + Smoke Extraction System			
HVAC System	Status	Smoke Extraction System	Status
Room supply duct damper	Close	Smoke extraction fan	On
Room return duct damper	Close	Room makeup air duct damper	Open
		Room extract duct damper	Open

HVAC system in smoke control operation	
HVAC System	Status
Room supply duct damper	Close
Room return duct damper	Open
HVAC return air damper	Close – *Prevent smoke from being pulled into supply duct*

MAJOR HEALTHCARE FACILITIES USING VESDA

- New Cross Hospital, UK
- Fujian People's Hospital, China
- Hillcrest Hospital, Australia
- St Rose Hospital, USA
- St Joseph Hospital, USA
- Wollongong Hospital, Australia
- Royal Melbourne Hospital, Australia
- St Vincents Hospital, Australia
- Hospital Virgen del Rocio, Spain
- Cedar Sinai Hospital, USA
- United Hospital, USA
- Bethany Healthcare, Canada

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