xtralis®

VESDA-E

CLEAN ROOMS

PROTECTING HIGH VALUE ASSETS AND PRODUCTION

- **SEMICONDUCTOR/WAFER FABS**
- **ELECTRONIC DEVICE MANUFACTURING**
- **RESEARCH AND DEVELOPMENT FACILITIES**
- **PROCESS, ASSEMBLY AND INSPECTION AREAS**

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FIRE SAFETY CONSIDERATIONS IN CLEAN ROOMS

FIRE RISKS AND CHALLENGES OF FIRE DETECTION

Major fire risks and detection challenges within Clean Rooms arise as a result of the following:

- Faults in utility and process tool equipment
- Electrical faults in electrical and electronic equipment
- Presence of large amounts of flammable and explosive materials
- Rapid fire spread as a result of high air circulation used to filter out pollutants
- High air change rates, HEPA filtration of air and introduction of clean (make up) air will heavily dilute smoke in Clean Rooms making it difficult for traditional detection systems to respond
- Processes that occur at elevated temperatures posing a fire risk

HIGH COST OF CONTAMINATION AND LOST PRODUCTION

The damage from a fire in a Clean Room can be thermal (flame/heat) and non-thermal (smoke contamination and corrosion).
Non-thermal damages can be far greater than thermal damages and can result in protracted loss of production from the recovery of contaminated sensitive equipment and tools and follow-up decontamination activities.

Example

A fire broke out at a Renesas Electronics Corporation semiconductor factory on March 19, 2021. The area burned 600 sq m (6,460 sq ft), around five percent of the entire cleanroom. Renesas lost about 17 billion yen ($156m) a month due to reduced production.
The facility helped supply the automotive market, which had already expected to produce 1.5 million fewer vehicles due to the ongoing semiconductor shortage.

WHY SPOT-TYPE SMOKE DETECTORS DON'T WORK IN CLEAN ROOMS

Unable for very early fire detection

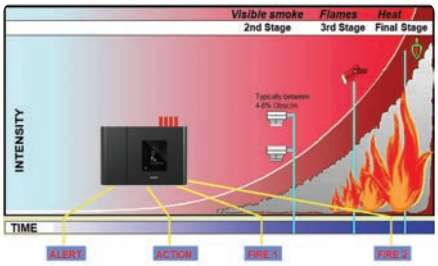
High air change rates which translate to high air velocities, HEPA filtration of the air, and introduction of clean (make up) air will heavily dilute smoke in these spaces. Spot detectors lack the sensitivity required to detect small concentrations of smoke to provide very early fire detection.

REDUCING FIRE RISK WITH VERY EARLY WARNING SMOKE DETECTION

A key component in an effective fire protection system for a Clean Room is very early smoke detection. Detecting smoke as early as possible allows time to investigate and respond to a threat, minimize thermal damage, and take actions to prevent irreversible damage from smoke contamination of process tools or manufactured products.

VESDA-E aspirating smoke detectors can detect fires very early at the incipient (smouldering) stage to minimize the risk and their sampling technology can combat detection difficulties caused by high air movements.

With the strategic placement of sampling holes within the protected area, the response of VESDA-E detectors is enhanced by enabling smoke laden air to enter different sampling holes and aggregate at the detector for analysis (cumulative sampling). This is particularly beneficial for detecting smoke that is heavily diluted in high airflow conditions within Clean Rooms.



Fire Growth Curve
The progression of fire growth over time.
A VESDA-E system detects a fire at the incipient stage, avoiding damage and lost production.

Regulatory Information

"2.3.4.9 Provide an FM Approved very early warning fire detection system (VEWFD) capable of detection at a minimum sensitivity of 0.2% per ft (0.06% per m) within the cleanroom makeup and return air paths.

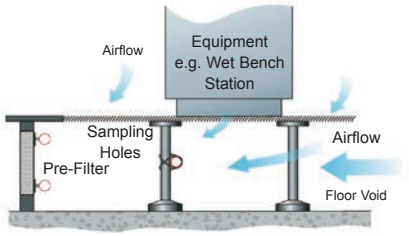
2.4.4.1 Install very early warning fire detection system (VEWFD) in stockers that store high-value or critical masks/reticles.

2.4.6.1.3 Provide very early warning fire detection (VEWFD) in the exhaust ducting connected to the tool or the E-beam chamber."

FM Global Data sheet, Semiconductor Fabrication Facilities released in July 2023

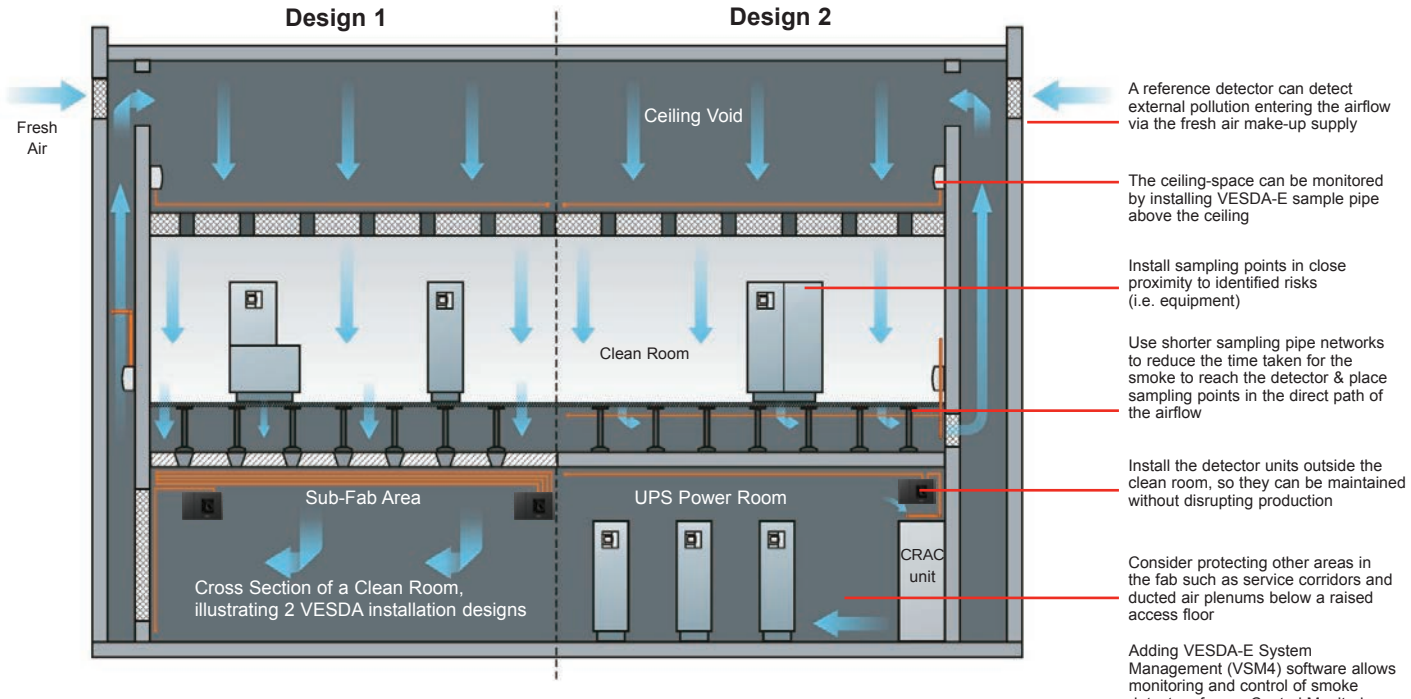
"11.2.5.1 Optical flame detectors that will respond to the flame signature of silane or high-sensitivity smoke detection shall be provided to detect a fire at potential leak points on the silane delivery system."

NFPA318 Standard for the Protection of Semiconductor Fabrication Facilities, 2022.



Sample pipe in the floor void beneath a raised access floor will capture smoke as it is carried by the airflow.

CLEAN ROOM VESDA-E SYSTEM INSTALLATIONS



WHY USE A VESDA-E SYSTEM?

When selecting an aspirating smoke detection system for a clean room, consider:

Look for	Why?	What VESDA-E offers
The best sensitivity	To achieve the earliest possible warning of a fire	VESDA-E can detect smoke at 0.001% obscuration per meter
A wide sensitivity range	So that detection levels can be set to suit the environment, avoiding false alarms	VESDA-E detectors have a sensitivity range of 0.001%–20% obscuration/m
A redundant peer-to-peer communications network	To give you flexibility in positioning and programming detectors and display modules	The VESDAnet communication network allows you complete installation flexibility
Multiple programmable alarm thresholds	So that the response can be appropriate for the stage of the fire, from 'Investigate' at the first alarm through to 'Activate de-smoke system' or 'Release suppression' at the fourth alarm level	VESDA-E has 4 programmable alarm levels
Event log and reporting	A forensic tool for investigating faults, alarms, user actions and smoke trends	Each VESDA/VESDA-E detector has an event log that stores the last 20,000 events
A wide product range	So that there's a product to suit any size area that you want to protect, from a large open manufacturing floor to within the confines of production equipment	VESDA-E has the widest product range on the market
Absolute calibration	Ensures repeatable and reliable detection of very slow growth incipient fires	VESDA-E is the only aspirating smoke detector with Absolute calibration
Monitoring of particles less than 10 microns diameter	Ensures that smouldering fires in a clean room are detected early	VESDA-E detectors can detect particles smaller than 0.1 microns
Monitoring and control of smoke detectors from a Central Monitoring Station or Emergency Control Room	Allows response to be controlled and monitored from a central point by trained operators	Using VESDA-E System Management (VSM4) software, every VESDA-E detector can be controlled and monitored remotely
An accredited global distribution and support network	So you get the right technical advice when you need it	All distributors of VESDA-E products are factory-accredited

XTRALIS' GLOBAL NETWORK OF OFFICES AND REPRESENTATIVES MEANS THAT HELP IS SOON AT HAND

SOME OF THE CLEAN ROOMS THAT ARE PROTECTED BY VESDA/VESDA-E

IBM	AU Optronics	Phillips	AT&T Microelectronics	Fujitsu
Intel	Texas Instruments	LG Electronics	Sony	Hyundai Semiconductors
Motorola	Seagate	Samsung Semiconductor	China Picture Tube (CPT)	TSMC
Komatsu	Peregrine Semiconductors	Honeywell Microswitch	Applied Materials Inc.	Chi Mei Operations (CMO)

APPROVALS

NEED MORE INFORMATION?

Visit www.xtralis.com to access information about the VESDA-E smoke detector product range and our Clean Room Design Guide.

ABOUT XTRALIS

Xtralis is a leading global provider of powerful solutions for very early & reliable detection of smoke, fire, and gas threats. Our technologies prevent disasters by giving users time to respond before life, critical infrastructure or business continuity is compromised.

We protect highly valuable and irreplaceable assets and infrastructure belonging to the world's top governments and businesses.

To learn more, please visit us at www.xtralis.com.