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Protecting Harsh Environments

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What is a Harsh Environment? A detection equipment perspective

Ambient conditions well outside of the generally tested electronic product operational parameters

- Dust and other airborne pollutants
- High humidity
- Extreme temperatures
- Corrosive chemical vapours
- Mechanical stresses

These factors are detrimental to the lifespan and functionality of standard fire detectors

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Detection Challenges to early and reliable detection

Factors affecting the ability to detect fires early and may lead to frequent false alarms

- Dust and other pollutants conceal smoke
- Forced ventilation dilutes smoke
- Airborne pollutants cause false alarms
- Extreme temperatures and temperature swings make heat detection difficult
- Need for regular maintenance of detection equipment

Standard detectors will not work: Special fire detection is required

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Harsh can be hazardous

Many harsh environments can also be ‘Hazard’ classified, due to:

- Combustible airborne dust and particles
- Combustible or explosive vapours
- Large quantities of highly flammable contents

Hazardous areas require extra precautions to prevent ignition sources from machinery, including fire detection equipment

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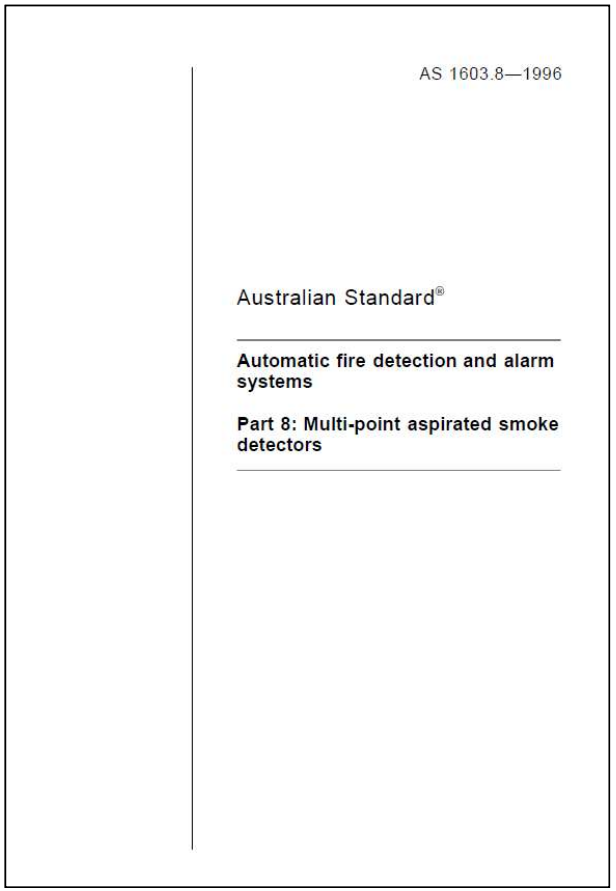
Codes and standards

Performance based design

- Harsh environment applications are not always fully covered under the relevant codes eg: AS1670.1
- Performance based design may be required
- Plan and design for the desired outcome, not simply compliance !

Product limitations

- Not all detection technologies are suitable for every harsh environment
- Match the detection technology to the application
- Stated product life may not be achieved
- Maintenance requirements (AS1851) unlikely to be sufficient
- Product limitations may change based on the environment/application eg: Class C ASD


AS 1603.8—1996

Australian Standard®

Automatic fire detection and alarm systems

Part 8: Multi-point aspirated smoke detectors

Harsh Environment examples

Dusty

- **Examples:**
  - **Wood product manufacturing,**
  - **Coal storage**
  - **Mining applications**

- **Common misconception** – dust causes nuisance alarms
  - Dust has a different particle size and reflectivity vs smoke particles. The correct detection technology will take this into consideration

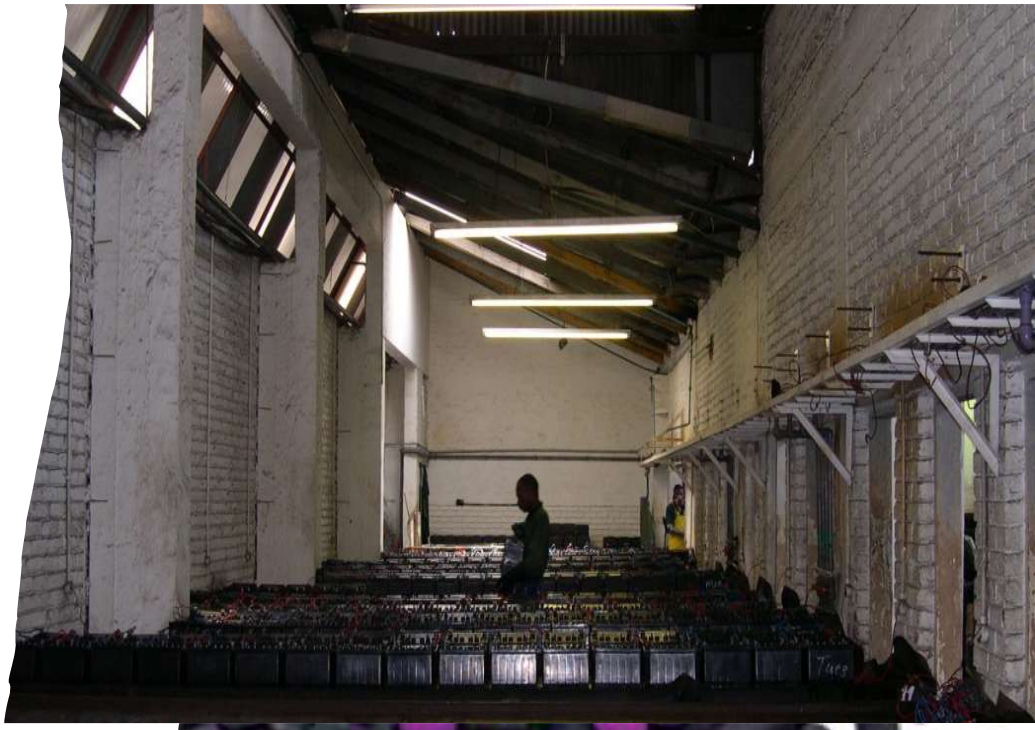
- Best solution – ASD with blowback and filtration
- Alternative – Linear heat or industrial beams
- **Avoid** – point type detection

Corrosive

- **Examples:**
  - **Indoor swimming pools (salt/chlorine)**
  - **Refrigeration plants (ammonia)**
  - **Battery storage or manufacturing (HCL)**

- **Common misconception** – corrosive atmosphere will cause detectors to fail
  - Choosing the correct detection technology and adapting it to this environment provides a reliable solution

- Best solution – ASD with blowback and chemical filtration (activated aluminium and charcoal compound suitable for the corrosive chemicals present
  - Alternative – Linear heat or industrial beams
  - **Avoid** – point type detection



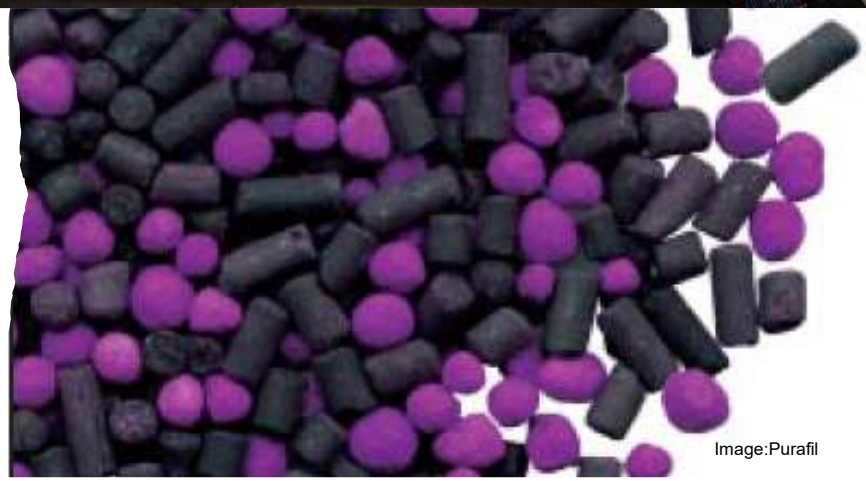


Image:Purafil

Wet

- **Examples:**
  - **Food processing/washdown**
  - **Vehicle maintenance facilities**
  - **Industrial processes**
  - **Steam**

- **Common misconception** – moisture will cause corrosion
  - Moisture can be extracted from sampled air, or high IP rated detectors can be utilised
  - Detections systems should be isolated during washdown

- Best solution – ASD with water trap
- Alternative – Linear heat or IP rated beam detection
  - **Avoid** – Standard point type detection

Hot or Cold

- **Examples:**
  - **Cold stores, coolrooms, blast chillers**
  - **Food manufacturing, abattoirs**
  - **Foundries**
  - **Product manufacturing**

- **Common misconception** – temperature doesn't affect detector performance
- Cold air affects the performance of smoke particles in the incipient stage. Higher sensitivity is often required even though this could be considered a Class C application.
- Best solution – ASD due to wide operating range and the ability to heat or cool sampled air
- Alternative – Linear heat or industrial beams
- **Avoid** – detectors outside of the approved operating temp range. Some ASD units cant function below 0 deg C

Recycling

- **Examples:**
- **Comingled waste processing**
- **Industrial recycling**
- **Paper records destruction**
- **Battery recycling**

- **Common misconception-Normal** smoke detection systems/sensitivity is sufficient for this environment
- Deep seated fires can't always be detected quickly
  - Deep seated fires can be detected using thermal imaging (thermography). Combined with ASD this provides reliable coincidence detection
  - High incidence of LiB related fire

- Best solution – Thermography and ASD
- Off-gas/VOC detection
  - Use VOC detection to increase sensitivity of the ASD system to trigger FIP

Alternative – Beams

Avoid – VSD

Airborne particulate

- **Examples:**
- **Textile manufacture/clothing**
- **Dry animal food production**
- **Tobacco processing**
- **Cotton processing**

Common misconception -particulate is all the same

- Particles have different properties compare to common dust.
- Standard ASD filters may not be suitable
- May cause filters to attenuate smoke particles – reduced detection capability
- There is little guidance from C&S re filter applications or performance parameters

- Best Solution:
- ASD with filter or linear heat
- Beam detection (if possible)
- Avoid- Any technology easily contaminated

Additional maintenance requirements

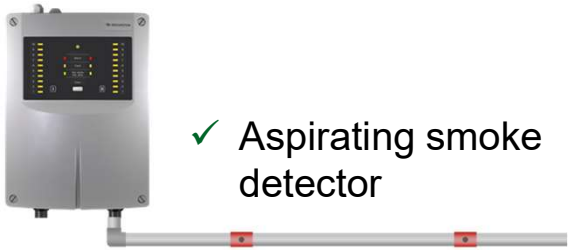
- **Common misconception** – Maintenance as required under C&S sufficient
- Maintenance type and frequency will be determined by the site conditions and detection technology
- Ensure the detection systems are best suited to the application
- Consider maintenance access- not always possible when facility operational
- Plan for the maintenance requirements during initial design phase
- Factor maintenance into choice of detection technology

Every harsh application needs a specific solution has it covered

✓ Beam smoke detectors

Large halls,
Recycling plants,
Animals sheds, …

Factories,
Warehouses,
Cold stores,
Sawmills, …



✓ Aspirating smoke detector

Belt conveyors,
Generators &
transformers, Food
processing plants, …

✓ Linear heat detectors

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Common Technologies – Beam Detection

Advantages:

- Industrial spec beams provide coverage with low installation cost
- Good for large open spaces or high bay facilities
- Good quality products can discriminate between dust, steam and smoke

- Disadvantages:
- Subject to misalignment due to building movement
- Often difficult to clean in high bay applications without specialized equipment
- Limited sensitivity range

Common Technologies-Linear Heat Detection (LHD)

Advantages:

- Useful in environments with high background smoke levels/process smoke
- Suitable for equipment protection (machinery, conveyors)
- Easy to maintain

Disadvantages

- Most LHD products don’t provide a location of the activation (some do)
- Some products need replacing after activation
- Contaminant buildup on cable casing may insulate and delay activation

Common Technologies: Aspirating Smoke Detection

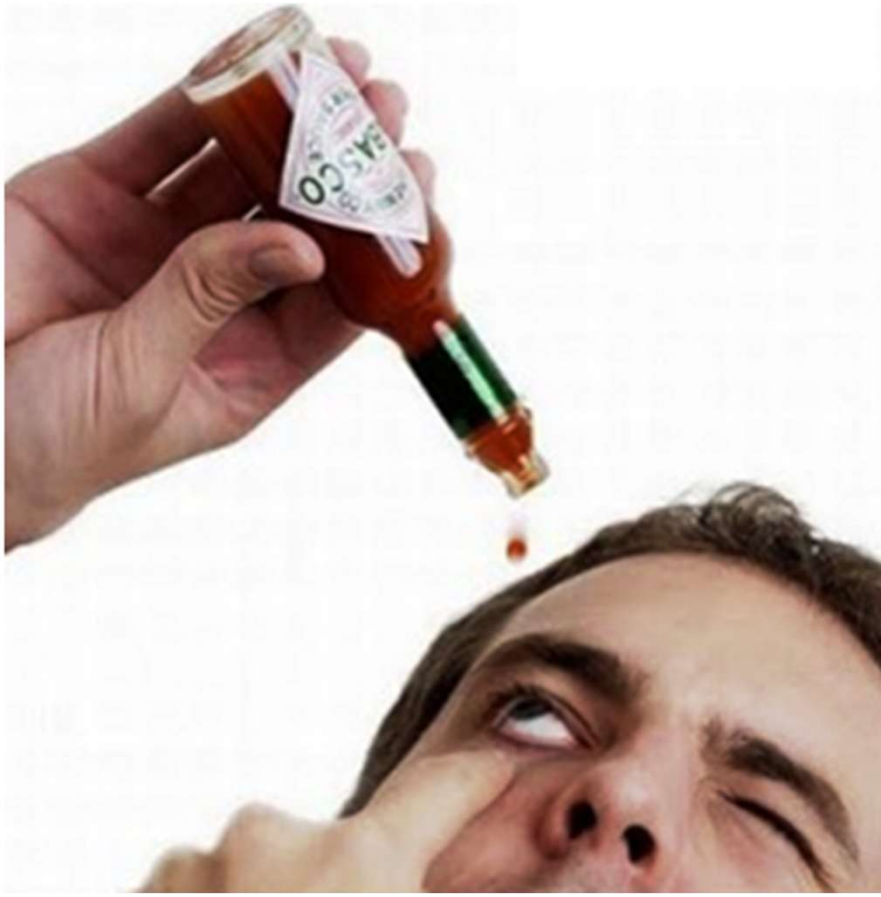
Advantages:

- Large area of coverage (up to 2000sqm/unit)
- Contaminant filtration, discrimination and rejection
- Ease of maintenance
- Wide sensitivity range (Class A,B,C)
- Suitable for a very wide range of applications

Disadvantages:

- False positives if not programmed correctly
- Pipes may require periodic flushing
- Higher cost of installation

Any Burning Questions ?



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