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Technology Advances in Aspiration Smoke Detection For a Performance-Based Design

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Agenda

What you need to know

- Industry growth and evolving Legislation (CPR)
- Detector classes A, B, C
- EN54-20 software

Challenges

- Early warning and false alarm prevention
- Advancement in detection methods
- Connectivity
- Case studies

Choice of ASD

- Application
- Risk and sampling methods
- Codes of Practice

Legislation

EN54-20 – Legislative Change in Europe

- In 2009 EU produced EN standard for ASDs - EN54-20 - falls under Construction Product Directive (CPD) legislation
- In 2013 CPD becomes regulation (CPR), there will be no opt out
- EN54-20 ASDs must have legislative **CE approval**

Industry impact

Before EN54-20

- Only 1 sensitivity class of ASD (Class C = to point detector)
- Class C sensitivity determined by same test fires as point detectors

Now

- EN54-20 standard has introduced 2 new sensitivity classes determined by new test fires (reduced fuel and increased smoke dilution)
- Benefit to industry - earliest warning for mission critical applications

EN54-20 Sensitivity Levels

Class A – Very High Sensitivity 0.05dB/m

Sample point coverage 25^{m2}

- Very early warning of a potential fire
- For high risk, high value areas to minimise downtime

Class B – Enhanced Sensitivity 0.15dB/m

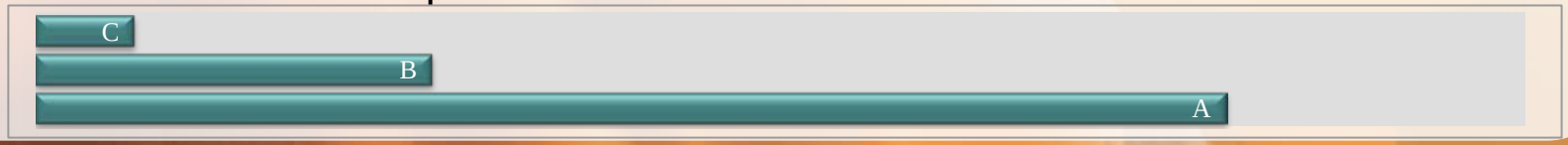
Sample point coverage 50^{m2}

- Early warning of a fire
- When additional confidence or other factors exist

Class C - Normal Sensitivity 2dB/m

Sample point coverage 100^{m2}

- Standard sensitivity equivalent to EN54-7
- An alternative to point detectors



Compliance: Prescriptive or Performance?

Performance Based Design

In all Class A & B systems a performance test must be completed

E.g. transport time

- Class A – typical 60 seconds
- Class B – typical 90 seconds
- Class C – typical 120 seconds

EN54-20 Flow requirements

- Now flow alarm is to be generated where there is a 20% increase or decrease in air flow
- Some ASD manufacturers now incorporate flow pendulum bar graphs within their devices

Software Design Tools & EN54-20

NEW

- From 2013 EN54-20 ASD manufacturers must incorporate software that will produce pipe layouts applicable to ASD detector class

- The software cannot be interchangeable with other ASD manufacturers

- Manufacturers have now developed all in one tools for configuration, design and monitoring

WAGNER®
PipeXpress

Software Design Tools

ASD software varies in terms of pipe design capabilities

New technology is available, enabling…

- Pipe network designs in 3D
- Pipe network assessment - ability to tackle obstacles
- Remote monitoring of devices
- EN54 compliance

Make sure your ASD is supported by software adhering to EN54-20

ASD System Challenges

- Detecting incipient smoke
- Prone to false alarms, particularly in dusty environments
- No integration with IT infrastructure
- Not all ASD software provides the same pipe design capabilities
- Most ASDs are not fully integrated with the rest of the intelligent fire system

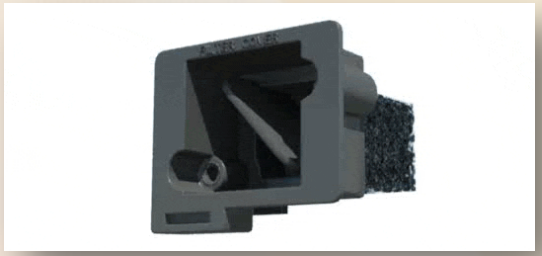
Technology to Prevent False Alarms

Contaminated air sample - #1 cause of nuisance alarms

- Multi-stage filtering prevents dust and nuisance alarms
- Adopting advanced technologies from other industries
  - Replaceable filters are now standard - used as additional defence
  - NEW, more efficient filtration to remove particles larger than 30 microns – no maintenance required

Technology impact

- Reduction in nuisance alarms
- Extended component lifetime
- Reduced cost of maintenance



Specify devices with advanced filtration to reduce false alarms

Advanced Detection Methods

Multi-criteria detection

- Most ASDs use infra-red laser
- New multi-criteria smoke detection improves sensitivity(0.0015 %/m obs.) and decision making

Dual optics

- Blue LED - widest ranges of fire types
- Red IR - detects dust based on particle size, colour and signature
- Multi angle detection

Acclimate mode

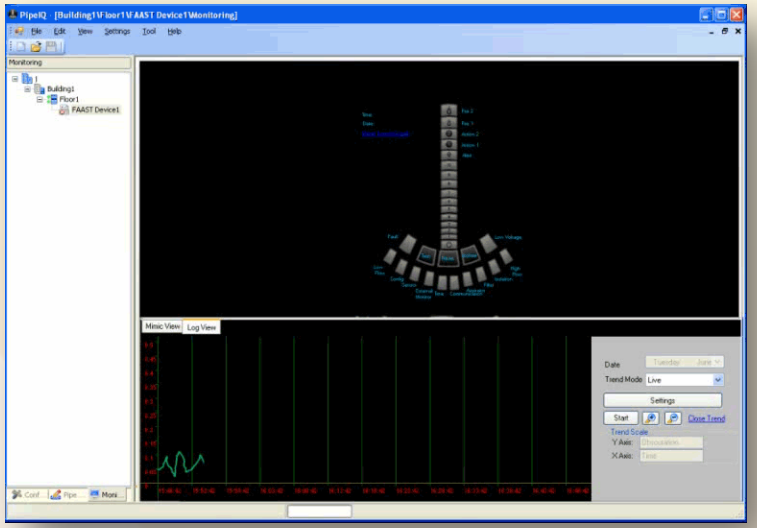
- Unique detector drift compensation settings

Choose technology that achieves earliest warning with no false alarms

Integrated Communications

100% uptime is vital for mission critical Class A applications

- Devices that sit on the loop are industry standard
- NEW IP enabled devices are now available with integrated internet



Technology impact

- Accessing local networking capability
- Communication via e-mail – alarms or faults
- Remote monitoring
- Proactive management of IT infrastructure

Loop integration

- Reduces costs for the channel / end user
- Improves communications strategy and reporting

GlobalLoop

Choose IP connectivity for real-time communication of potential danger

Application Case Studies

Real examples of where new aspiration technologies have made a difference

Cocoa plant & pharmaceutical manufacturer

- Addressing high dust levels
- Large food / agricultural site & European pharmaceutical business

Data centre

- Addressing remote connectivity requirements
- Major US data centre

Warehouse

- Addressing accessibility, racking & high fire loads
- Commercial warehouse in Holland

Choice of ASD by Application

Applications

1. Mission Critical (Class A)

Server rooms, IT Telecoms

2. Large public spaces (Class B)

Airports, stadiums, warehouses

3. Restricted Access (Class C)

Voids, lift shafts, prisons

4. Extreme Environments (B&C)

Cold storage, industrial sites

5. Discrete Detection (Class C)

Historic buildings, museums

Challenges

1. Where early detection, unaffected by high air speed is required.
2. Where evacuation, access and maintenance is difficult. Potential of smoke stratification is high.
3. Where centrally maintained tamper proof devices with central maintenance are required.
4. In high air flow and continuous extreme environments causing failure or nuisance alarms.
5. Where discrete monitoring, rapid response is required.

Choice of ASD by Sampling Method

Primary Sampling

- **Class A** detection for areas where smoke is likely to travel

Secondary Sampling

- Air sampling holes sited and spaced like point detectors

Localised Sampling

- **Class A** detection for specific equipment in open small areas
- Remember: Other areas still need fire detection

In-cabinet Sampling

- **Class A** detection in specific self contained IT cabinets.

Duct Sampling

- Detection to trigger an air conditioning cut off system

FIA Aspirating Code of Practice

Table 2 – Sensitivity Classes vs. Detection Requirements

Class (EN 54-20)	Class A Very High Sensitivity	Class B Enhanced Sensitivity	Class C Normal Sensitivity
TF2x end-of-test condition	0.05dB/m	0.15dB/m	2dB/m
Description	Smoke is not visible due to low quantity of smoke and/or high dilution caused by air movement.	Smoke is visible but insufficient to be detected by point or beam technologies according to EN-54 Part 7 or 12	Smoke visible and sufficient to be detected by point or beam technologies according to EN-54 Part 7 or 12
ASD Sampling Type:			
Primary Detection: - sampling where smoke is likely to travel	Best	Appropriate (small areas only)	Not appropriate
Secondary Detection: - positioning sampling holes according to the codes for point detectors	For Early warning applications	For challenging applications	Appropriate
Localized Sampling: - custom protection of specific equipment	Appropriate for high risk	Appropriate for low risk	Not appropriate
In-cabinet Sampling: - Localized sampling:	Appropriate for high risk	Appropriate for low risk	Not appropriate
Duct Sampling: -	Appropriate for high risk	Appropriate for low risk	Not appropriate

Other Motivators (see Section 4.2)

- extreme environments
- restricted/difficult access
- exceptional ceiling height
- heat barriers
- aesthetics
- risk of mechanical damage
- anti-vandal systems
- hazardous environment

Using this table it is possible to define all ASD systems.

Key - shaded block indicates where prescriptive design may be used.

Table 3 – Recommended Ceiling Height Limits for ASD

Detector type	Generally applicable maximum ceiling height		10 % of ceiling height no greater than	
	General Limits	P + Rapid Attendance[1]	General Limits	P + Rapid Attendance[1]
Any ASD system approved to EN 54-20	10.5m	15m	12.5m	18m
ASD system with: at least 5 Class C holes or at least 2 Class B holes	15m	21m	18m	26m
ASD system with: at least 15 Class C holes or at least 5 Class B holes	25m	40m	28m	43m
ASD system with: at least 15 Class B holes	40m	40m	43m	43m

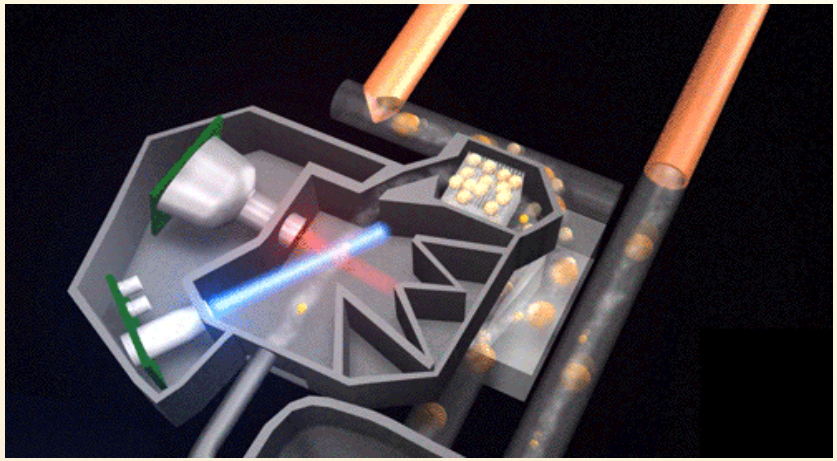
Spanish legislation

- For design, installation, commissioning and Maintenance, UNE 23007-14:2009. Equivalent structure to TS54-14 but CEA 4040 placement criteria
- Tecnifuego Aespi code of practice for design, installation, commissioning and maintenance of aspiration smoke detectors, Feb 2012. Non mandatory, Based on FIA code

Conclusion

The industry is evolving

- Legislation getting tougher – EN54-20 & other Codes of Practice
- Many solutions available using different technologies
- Importance of sensitivity classes



Choose a solution that addresses today's challenges

- Advanced filtration and dual optics to minimise false alarms
- EN54-20 compliant, feature rich software
- IP and loop connectivity

Specify the right solution for the right application and risk

Gracias por su atención
Thank you for your attention

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