FAAST FLEX™ HMP HASLAR PRISON CASE STUDY

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Preface

This document details the installation of the FAAST FLEX detector in a non-active prison cell at HMP Hasler in UK prison in August 2021. Presented in this document are descriptions of the customer problem, the solution, installation and detection performances.

Related Product

FAAST FLEX Model FLX-020.

Contents

1 Introduction

Aspirating Smoke Detection (ASD) technology is the ideal solution for custodial applications, offering wide-reaching benefits that overcome the numerous application challenges. The requirement to install a highly effective vandal-proof, discrete smoke detection, whilst providing nuisance alarm immunity to tobacco smoke and stable air flow performance, means that traditional point (spot) detection is simply unsuitable for these applications.

This guide is designed to provide information on using FAAST FLEX to meet custodial regulatory compliance and how to design it effectively to ensure accurate, reliable smoke detection and the highest level of system stability.

2 Challenges

Research shows that fires occur frequently in locked cells within correctional facilities. As a result, it is important that any fire incidents in prison cells are detected as quickly as possible thus facilitating timely, orderly and safe evacuation of inmates. Building codes also require smoke detection inside locked cells which in turn presents specific challenges for fire detection.

- Vandalism – detectors that are visible and accessible invite vandalism and tampering by inmates.
- Maintenance – accessing secure and restricted areas to test and maintain detectors is costly and challenging.
- Nuisance alarms – Correctional facility officers frequently encounter nuisance alarms (particularly with 'in-cell' detectors), usually caused by inmates, but may also be caused by dust, dirt or other airborne contaminants in the air affecting detector reliability and performance.

Whatever the cause, nuisance alarms result in:

- Downtime and operations disruption while guards/staff investigate the cause of the alarm. Significant costs involved as detectors must be examined and replaced should they be damaged, including costs associated with restoring the system to proper operation.
- Increased risk to inmates and staff as the fire alarm system could be out of service for minutes, hours or even days depending on the extent of damage. Some systems in remote locations could be out of service for extended periods whilst awaiting replacement parts and/or service technician attendance.

3 Solution

FAAST FLEX is the latest addition to the world's leading Xtralis Aspirating Smoke Detection (ASD) portfolio. It targets enhanced and standard sensitivity applications offering key ASD advantages including multi-hole and cumulative sampling, remote detection, and centralised test and maintenance. FAAST FLEX combines effective and reliable smoke detection with ease of design, installation, commissioning, and maintenance and improved user experience.

Vandal Proof

FAAST FLEX, being an ASD solution, can be installed in secure areas where inmates have no access, mitigating security concerns. In addition, since the detector can be managed with Bluetooth connectivity, it can be locked away, making the solution tamper-proof.

Exhaust Management

FAAST FLEX combines an unobtrusive sampling pipework arrangement which is required to protect the cell. Air is drawn into the FAAST FLEX through a network of air sampling pipes by speed adjustable aspirator. Each pipe inlet has an airflow sensor that monitors airflow changes in the pipe. Inside the FAAST FLEX, a sample of air is filtered and passed into the detection chamber and analysed for the presence of very small amounts of smoke. Air is exhausted from the FAAST FLEX and may be vented back into the protected zone.

Nuisance Events

FAAST FLEX uses a high-performance detection sensor to accurately detect smoke. It also uses Ultrasonic flow sensing technology for accurate and reliable flow detection.

4 Installation details

A FAAST FLEX dual chamber detector has been selected and approved to perform a series of fire tests in a non-active prison cell at HMP Hasler facility in the UK. The purpose of the field trial was to investigate the smoke detection performance of FAAST FLEX based on common fire scenarios found in a prison environment.

The FAAST FLEX detector was mounted outside two prison cells. A cell's dimensions are 3.5m(L) x 2.5m(W) x 2.7m(H), with each cell being monitored by a single channel. Each channel's sampling pipe was installed with stainless steel temper-proof sampling points.

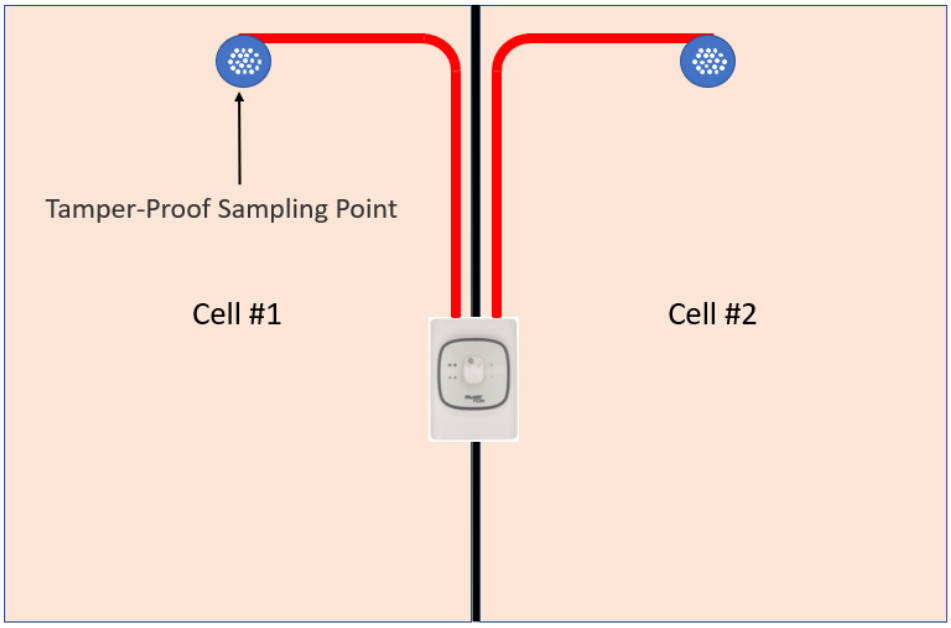

Figure 1: FAAST FLEX Installation Layout

5 Configurations

FAAST FLEX was configured via the ob-board DIP switches as follows:

- Alarm levels set to EN54-20 Class C
- Action Alarm: level 4 (0.33 % obs/m)
- Fire Alarm: level 5 (0.66 % obs/m)
- Aspirator Speed: 6
- Flowrate 40L/m
- Pipe length = 20m per channel

6 Performance

Three test scenarios performed to represent common fire risks found in prison applications. The smoke tests were performed within the cell whilst the cell door was shut and window open for ventilation:

Newspaper – Smouldering

Representing burning of newspaper and books which normally exist in a prison cell. There were 20 tabloid size sheets folded in half and placed in a metal tray positioned on the floor in the middle of the cell.

Newspaper – Flaming

There were 16 loose tabloid size sheets cut to 100mm diameter and placed in a metal tray positioned on the floor in the middle of the cell.

Cotton Towel – Smouldering

Representing the initial stage of burning clothes and beddings which is a challenging scenario for fire detection. A piece of cotton towel 300mm x 500mm x 450mm was folded and placed in a metal tray positioned on the floor in the middle of the cell. Remotely ignited with an electrical wire wrapped around the cotton towel to create a smouldering fire.

The test results are shown in Table 1 representing a single test per material.

Table 1: Smoke performance results

Material	Responded Time (second)		
	Action	Fire1	Target Response
Newspaper- Smouldering	136	140	515
Newspaper- Flaming	31	43	315
Cotton Towel - Smouldering	113	116	530

In all smoke tests, FAAST FLEX performed better than the target responses expected by the Ministry of Justice. The different test scenarios reflect common material found in prisons, with the above results exceeding expectations. The flaming newspaper test produced a faster response time than the smouldering newspaper. The results' variation can be attributed to how the material was packed into the smoke test canister. Finally, the cotton towel test produced a response time slightly faster than the smouldering newspaper test.

7 Summary

FAAST FLEX responded to all smoke tests for Class C fires where dense smoke, from cotton towel and newspaper, was produced. The difference in response time between Action and Fire1 was less than 15 seconds. FAAST FLEX's effective and reliable smoke detection performance, exceeded the expectations of the prison authority in addition to:

- Providing tamper-proof installation to deter vandalism
- Allowing the sampling pipe to be located behind vents, making it invisible to inmates
- Enabling sampling points installation where smoke is likely to travel
- Allowing a convenient and accessible detector mounting for ease of service and maintenance
- Reducing the total cost of ownership (TCO) in this challenging application

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