INFORMATION PAPER IP 15/12 Part 2

SMOKE DETECTION IN HIGH CEILING SPACES

Part 2: Fire tests and conclusions

Raman Chagger

Specifying suitable smoke detection in high ceiling spaces such as atria, warehouses and entertainment venues is very complicated, and the criteria for assessing the performance of aspirating and optical smoke detectors are not fully understood. Research by BRE Trust and the Fire Industry Association (FIA), using computer modelling and full-scale tests, has provided valuable data that have enabled guidance to be revised. This Information Paper outlines the programme of research and summarises the conclusions.

The research was conducted in three phases: a literature review, computational fluid dynamic (CFD) modelling and fire tests conducted in a 43.5 m high hangar. Part 1 of this Information Paper covered the literature review and CFD modelling. Part 2 covers the fire tests and conclusions.

This Information Paper is aimed at manufacturers and installers of smoke detectors, building designers and regulators, who should find it valuable in gaining a full understanding of the main factors influencing smoke detection in such applications.

Figure 1: Smoke from the potassium chlorate/lactose performance test fire under way in 43.5 m high hangar

1 INTRODUCTION

To assess the capabilities and limitations of aspirating and optical beam smoke detectors installed in high ceiling spaces, BRE Trust and the FIA jointly funded a programme of research. As part of this, a full-scale fire test programme was carried out to determine the response characteristics of aspirating and optical beam smoke detectors approved by BS EN 54-12:2002[1] in a high ceiling space and exposed to a broad range of smoke types. The fire tests were conducted in an aircraft hangar that was 64 m long, 40 m wide and 41–43.5 m high. For all the tests, the fire was located halfway along the length and a quarter of the way across the width (Figure 2).

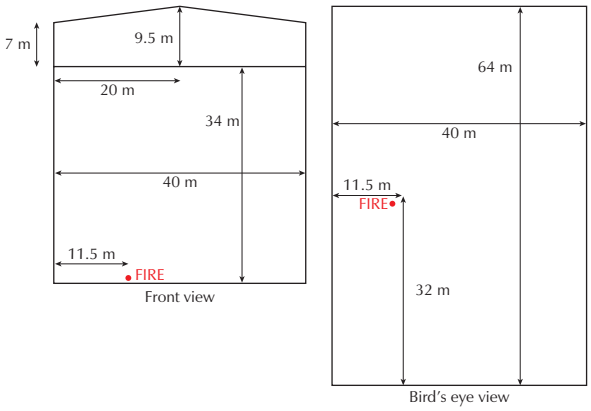

Figure 2: Hangar layout with dimensions