Smoke Ventilation Technical Proposal

For

Stair De-Pressurisation Systems

at

Grenfell Tower, Regeneration Project

Revision History

Rev	Details	Author	Date	Appr
0	Issued for Comment		22/04/2014	HMM

1. Introduction

Having identified possible problems with the proposed push pull system leading to excessive pressure drop, due to the high induct velocity within the existing builderswork shafts, an alternative smoke control design solution is required.

After discussions this report provides an alternative approach to designing a lobby smoke control system.

These proposals will have to be firmed up and then submitted to the Building Control Authority for discussion and agreement as an acceptable alternative to originally proposed the push pull system.

The proposal is to design a de-presurisation system which will protect the stairwell by providing an airflow from the stairwell into the lobby when the stairwell / lobby door is open.

The velocity across the open stairwell to lobby door should be sufficient to meet the requirements for a Class B system as outlined within BSEN12101-6 Smoke and heat control-systems Part 6: Specification for pressure differential systems — Kits

It is proposed to use all four of the builderswork shafts as part of the smoke control system, (mechanical extract) which will result in an much reduced average in-duct velocity of 5.0m/s

2.0 System Requirements to BSEN 12101-6:

2.1 Airflow through an Open Door

$Q_{DO} = A_{door} X v$

where; Q_{DO} =Volume flow through open door (single leaf)
A_{door} =Area of the open door (1.60m^2)
v = Velocity of air flowing through the open door

Q_{DO}= 1.6 x 2.0

Q_{DO} = 3.2 m^3/s

Add 50% for unforeseen losses (this will cover unidentified fabric losses and closed motorised damper leakage as per BSEN12101-6.)

Q_{DO} = 4.8 m^3/s

2.2 Fabric Losses

There will also be the possibility of fabric losses, when the door is open, however with the addition of 50% for unidentified losses this addition will cover the small amount of leakage through the fabric of the building.

2.3 Area of Pressure Relief

A pressure relief damper will not be required as the fans are invertor driven to stop excessive pressure differential being created across a closed door resulting in 100N opening force being exceeded.
Pressure switches will be located at each level to measure the pressure differential between the ventilated lobby and the stairwell. The sensors will provide a signal to the controls system so that when the door are closed the fans will operate at low speed and when the doors are open the fans will operate at high speed.
These two set points will ensure that:

- When the doors are closed the opening force on the door will not exceed 100N
- When the door is open a volume of air will be drawn across the open door to provide an average velocity of 2.0m/s across the open door

2.4 Egress Path

As the system is controlled with inverter speed drives an egress path will not be required.

3.0 Smoke Control System Components

3.1 Smoke Control

- Run and Standby smoke extract fan set rated at 300^{O}C for 2 hours and type tested to BSEN12101-3
- Stairwell ventilator mounted to roof over stairwell with a measured free area of 1.0m^2 and type tested to BSEN 12101-2
- Motorised wall mounted dampers sized to fit existing openings and type tested to BS1366. (existing grilles to be re-used) (four per ventilated lobbies)
- Pressure sensors (one per ventilated lobby)
- Smoke detectors
- Override switches (one per ventilated lobby and two in the stairwell)
- PLC Controls
- Fan shut off dampers.
- Galvanised ductwork connecting builderswork risers to fan set
- Galvanised ductwork to connect existing fresh air duct to extract riser.

3.2 Environmental System

If the lobby smoke control system is to also be used for environmental ventilation then additional components will be required in addition to the above equipment.

- Supply fan
- Motorised by pass damper arrangements
- Thermostats
- Control system upgrade to accommodate environmental requirements