From: Hugh Mahoney <hm@psbuk.com>
Sent: Fri, 4 Sep 2015 11:37:06 +0000
To: Jonathon Earl <JonathonEarl@jswright.co.uk>
Cc: David Harrison <David.Harrison@psbuk.com>; "David Bradbury (DavidBradbury@jswright.co.uk)" <DavidBradbury@jswright.co.uk>; David Peacock <DavidPeacock@jswright.co.uk>
Subject: RE: Grenfell Tower - AOV
Attachments: Grenfell Tower Tech Sub Lobby Smoke Control Systems Rev 3.pdf

Hi Jonathon.

Please find attached copy of the approved technical submission for the smoke control system at the above project.
This document has been agreed between JS Wright and Building Control.

Please check with your David Bradbury regarding duplicate power supplies as he will have the up to date position on what has been agreed

If you require any further information please do not hesitate to contact me.

Regards
Hugh Mahoney
Commercial Manager

PSB UK Ltd
Witt House
Shelf Mills
Shelf
Halifax
HX3 7BJ
England

Tel
Fax
Mob [redacted]

From: David Peacock [mailto:DavidPeacock@jswright.co.uk]
Sent: 04 September 2015 12:06
To: Hugh Mahoney <hm@psbuk.com>
Cc: Jonathon Earl <JonathonEarl@jswright.co.uk>
Subject: FW: Grenfell Tower - AOV

Hugh,

Please see below can you please furnish the technical information that Jon requires please.

Kind regards,

David Peacock I.eng, FCIPHE, ACIBSE.
Project Manager.
London

Mob [redacted]

Tel: [redacted] | Fax: [redacted] | Email: DavidPeacock@jswright.co.uk | Web: www.jswright.co.uk

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Head Office - J S Wright & Co Ltd, The Atlas Building, 16 Portland Street, Aston, Birmingham, B6 5RX
London Office - J S Wright & Co Ltd, 1 Northumberland Avenue, London, WC2N 5BW Tel: [redacted]

From: Jonathon Earl
Sent: 04 September 2015 11:42
To: David Peacock
Subject: RE: Grenfell Tower - AOV

David
I am still not convinced we require the UPS, Please could you forward any details of the ventilation system particularly the motor and panel info and I will review.

Kind regards,

Jonathon Earl
Electrical Contracts Manager

London Office

Tel: [redacted] I Mob: [redacted] I Fax: [redacted] I Email: jonathonearl@jswright.co.uk I Web: www.jswright.co.uk

---

From: David Peacock
Sent: 04 September 2015 09:43
To: Jonathon Earl
Subject: FW: Grenfell Tower - AOV

Jon,

Please see below.

Kind regards,

David Peacock I.eng, FCIPHE, ACIBSE.
Project Manager.
London

Mob [redacted]

Tel: [redacted] I Fax: [redacted] I Email: DavidPeacock@jswright.co.uk I Web: www.jswright.co.uk

From: Andrew Bridges [mailto[redacted]
Sent: 04 September 2015 08:14
To: M.Smith@maxfordham.com; David Peacock; David Peacock; 'Simon Lawrence'
Cc: 'Dan Moodie'; d.campbell@maxfordham.com
Subject: RE: Grenfell Tower - AOV

Morning Matt,

To bring you up to speed with the existing secondary supply, after further investigation we have established that this supply is only 20A per phase and served by a
2.5mm H MICC cable. This appears to supply a smaller pressurisation system as opposed to the original smoke vent system which I think is backed up by the previously referenced battery bank located in the basement plant area.

The upshot is that the new system requires supplies to 2 no. 32A TP&N panels so the existing backup supply is not going to be anywhere near sufficient. I have traced the 20A supply back to its' origin in Testerton Walk; this is derived from a 100A TP&N Landlords panel so taking into account the existing Landlords loads up-rating the supply wouldn't be an option.

I am currently sizing a UPS system to utilise as the secondary supply and would appreciate any feedback you may be able to offer.
By all means give me a call to discuss.
Regards
Andy

Andy Bridges
R J ELECTRICS LTD 28 MANOR RD DAGENHAM ESSEX RM10 8AU
[redacted] E: andy@rjelectrics.co.uk

From: Andrew Bridges [mailto:[redacted]]
Sent: 06 August 2015 08:45
To: 'M.Smith@maxfordham.com'
Subject: RE: Grenfell Tower - AOV

Matt,

Thanks for that. I will look into it further, it seems I was looking at an older system which is still live!!

I will get back to you if I need anything further

Regards
Andy

Andy Bridges
R J ELECTRICS LTD 28 MANOR RD DAGENHAM ESSEX RM10 8AU
[redacted] E: andy@rjelectrics.co.uk

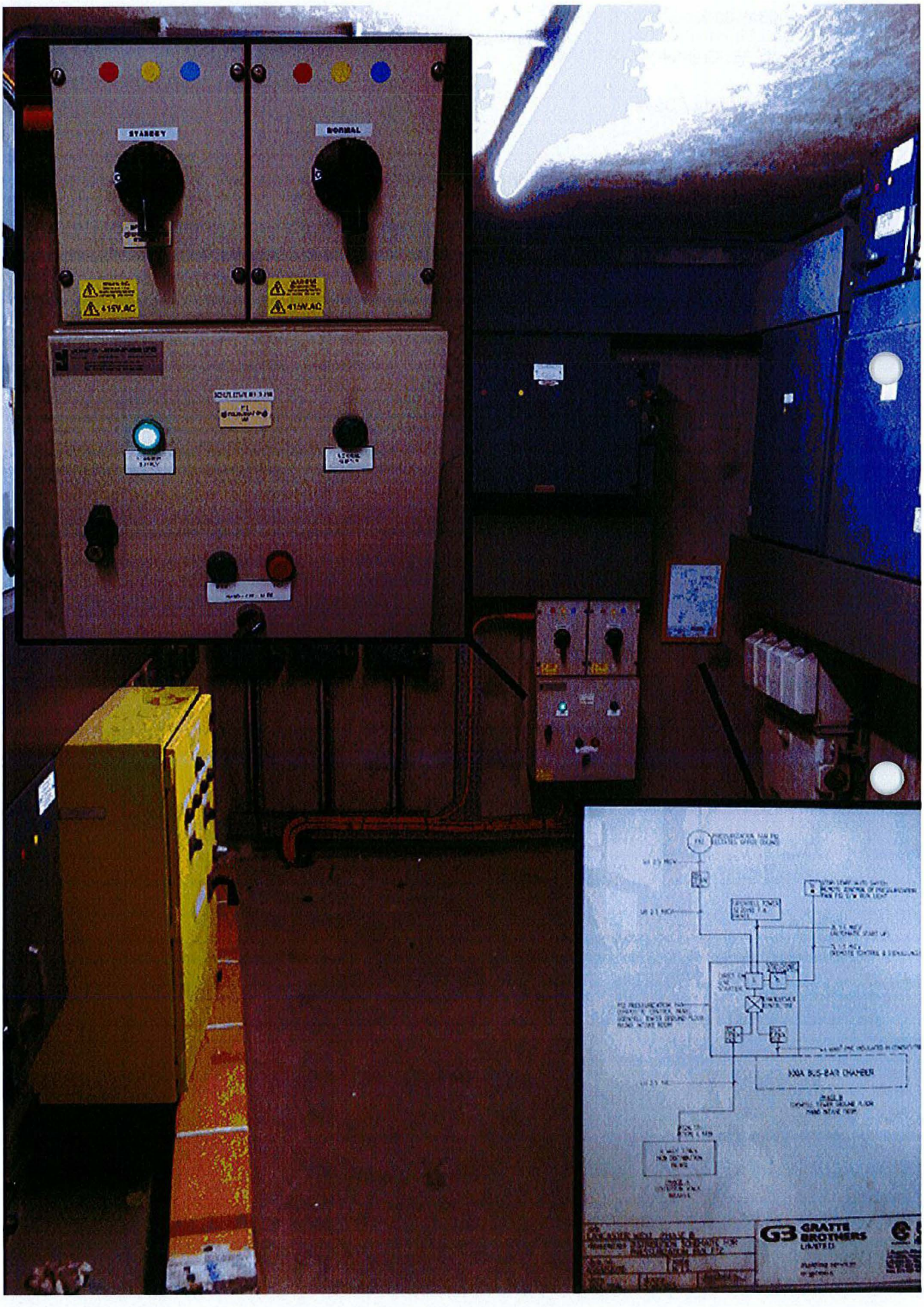
From: M.Smith@maxfordham.com [mailto:M.Smith@maxfordham.com]
Sent: 05 August 2015 15:43

To: [redacted]
Cc: 'David Bradbury'; 'Daniel Moodie'; hm@psbuk.com; d.campbell@maxfordham.com
Subject: RE: Grenfell Tower - AOV

Afternoon Andy / Dave

1) This would also be my interpretation of BS9999.

2) This was picked up in our survey. Please see annotated image below of the switch room at Grenfell and attached image files:


STANDBY
NORMAL
415V.AC
415V.AC
G3 GRATTE BROTHERS LIMITED

3) Hopefully this point is covered by the above.

Please note that I'll be away tomorrow and Friday so if you'd like to discuss further this week please get in touch today.

Kind regards,

Matt

MAX FORDHAM
42-43 Gloucester Crescent
London
NW1 7PE
T [redacted]
F
maxfordham.com

From: Andrew Bridges <[redacted]
To: 'David Bradbury' <DavidBradbury@jswright.co.uk>, <M.Smith@maxfordham.com>
Cc: 'Daniel Moodie' <dm@rjelectrics.co.uk>, <hm@psbuk.com>
Date: 04/08/2015 17:52
Subject: RE: Grenfell Tower - AOV

Matt/ Dave,
Re: Auto changeover units - a couple of issues:

1) My interpretation of the latest PSB schematic effectively indicates 2 separate systems, one in the roof top plant area and 1 at ground floor level. I have had a chat with Hugh at PSB and he has confirmed that each of the main panels is going to require a main changeover unit, sited locally to the panel.

This is going to require dual fire rated feeds from the main and secondary intakes at basement level. An installation of this extent wasn't included in our original tender,

I'm currently re-costing to PSB's latest schematic at which time I shall break down costs to indicate how much the main feeds are coming to.

2) With regard to secondary supply into the building, the Fordham tender drawings indicate an existing supply from Testerton Walk - Intake 6:

- Matt, can you confirm that Fordham's actually picked this up in their survey, I have been looking into this in more detail today, I couldn't locate the secondary supply, but also found a large battery inverter bank that appears to be providing the secondary supply for the existing smoke vent system. Can you shed any light on this?
- Notwithstanding the above, the supply indicated from Testerton Walk appears to be single phase only, as is the existing inverter system. As you are aware the new PSB smoke vent system is based on a 400V 3-phase system. Therefore it's unlikely either of the existing secondary supply options are going to be suitable.

3) Assuming the above information is accurate we are going to have to consider alternative secondary supply sources.

- Secondary supply from neighbouring building - this will need extensive surveying, but on initial inspection there doesn't seem to be any obvious options.
- Standby generator unit - probably not workable at this stage when taking into account the space required and venting and exhaust issues.
- Dedicated UPS system - probably the most viable option for us, but we may require two small systems given the distance between the 2 panels.

Matt, can you get back to me with your thoughts? By all means give me a call to discuss.

Regards
Andy Bridges

Andy Bridges
R J ELECTRICS LTD [redacted]
T: [redacted] D: [redacted] F: [redacted] M: [redacted] E: andrew.bridges@btconnect.com E: rje@rjelectrics.co.uk

From: David Bradbury [mailto:DavidBradbury@jswright.co.uk]
Sent: 03 August 2015 09:46
To: 'Daniel Moodie'; [redacted]
Subject: FW: Grenfell Tower - AOV

Dan / Andy,

Could you confirm the following from Matt is correct please:

- The auto-changeover for the power supply is not included in PSB's schematic. Can you confirm that this is being picked up by RJE?

Kind regards,

Dave Bradbury
Design Manager

Head Office

Tel: [redacted] | Fax: [redacted] | Mob: [redacted] | Email: davidbradbury@jswright.co.uk | Web: www.jswright.co.uk

From: Hugh Mahoney [mailto:hm@psbuk.com]
Sent: 02 August 2015 19:21
To: David Bradbury <DavidBradbury@jswright.co.uk>
Subject: RE: FW: Grenfell Tower - AOV

Hi David,
Please see below for my answers to the points raised by the consultant engineer

Hugh Mahoney
Commercial Manager

PSB UK Ltd
Witt House
Shelf Mills
Shelf
Halifax
HX3 7BJ
England

Tel
Fax
Mob: [redacted]

From: David Bradbury [mailto:DavidBradbury@jswright.co.uk]
Sent: 16 July 2015 12:40
To: Hugh Mahoney <hm@psbuk.com>
Cc: David Peacock <DavidPeacock@jswright.co.uk>
Subject: FW: FW: Grenfell Tower - AOV

Hugh,

Would you be able to answer the questions below from the consultant for me please.

Kind regards,

Dave Bradbury
Design Manager
Head Office

Tel: [redacted] | Fax: [redacted] | Mob: [redacted] | Email: davidbradbury@jswright.co.uk | Web: www.jswright.co.uk

From: M.Smith@maxfordham.com[mailto:M.Smith@maxfordham.com]
Sent: 16 July 2015 11:40
To: David Bradbury
Cc: d.campbell@maxfordham.com; 'Claire Williams '; Nick Valente (nick.valente@uk.arteliagroup.com); Neil Reed

Subject: Re: FW: Grenfell Tower - AOV

Morning Dave

Thanks for sending this through.

A few comments;

- Is the proximity of the low-level point of discharge to the flats at Walkway +1 acceptable? I had previously assumed that all smoke discharge was to be at roof level. This is outside my area of expertise however so it may be correct.
The smoke discharge from a smoke control system can be at any level and it should discharge where it does not affect the point of exit or can be drawn back into the building. This system will not be extracting smoke during the evacuation phase as air will be drawn through the open stairwell door and it will pull in clean air from the stairwell. During firefighting operations air will again be pulled in from the stairwell. Should a window, in the fire affected flat, break then some smoke may be extracted during firefighting operations. i.e. the flat door is open and the stairwell door is open.
- The auto-changeover for the power supply is not included in PSB's schematic. Can you confirm that this is being picked up by RJE?
David you will have to answer this point
- The environmental fans on the cause & effect document are down as 100%. Can you provide a narrative for how these are controlled? I.e. is the fan speed controlled? What are the temperature set points? Are the dampers either fully open or fully closed?
David you will have to answer what the temperature set point is. With regard to the dampers all lobby dampers will be fully open
- Can you also confirm that the phasing of switch over from environmental control to fire condition will be such that the damper on the environmental supply fan will be fully closed prior to the smoke extract fan coming on line?
There will be an initial time delay to the smoke extract fans starting (90 seconds) as all dampers will close and then the dampers on the fire floor will open. Once an alarm signal is received the main environmental fan damper will close and both the main smoke extract fan dampers will open.

Kind regards,

Matt

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42-43 Gloucester Crescent
London

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maxfordham.com

From: David Bradbury <DavidBradbury@jswright.co.uk>
To: "'M.Smith@maxfordham.com'" <M.Smith@maxfordham.com>
Date: 16/07/2015 10:18
Subject: FW: Grenfell Tower - AOV

Matt, FYI. Latest AOV drawings, I've asked them to change the schematic to incorporate the ground floor as well.

Kind regards,

Dave Bradbury
Design Manager
Head Office

Tel: [redacted] Fax: [redacted] Mob: [redacted] Email: davidbradbury@jswright.co.uk Web: www.jswright.co.uk

From: Richard Yeadon [mailto:ry@psbuk.com]
Sent: 15 July 2015 16:41
To: David Peacock
Cc: David Bradbury; Richard Midgley; Tim Haigh; Hugh Mahoney
Subject: RE: Grenfell Tower - AOV

Dave,

Please find attached the following revised drawings and cause and effect for Grenfell Tower:-

E75015-800 Rev C
P75015-140 Rev B
75015-C & E Rev 02

Best Regards

Richard Yeadon
Senior Design Engineer - PSB UK Ltd

Witt & Son UK Holdings
Fan Systems Group
PSB UK
Witt & Son UK
Witt House

Shelf Mills
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Halifax
HX3 7BJ

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Smoke Ventilation Technical submission

For

Lobby Smoke Control Systems

at

Grenfell Tower Apartments, London

Revision History

Rev	Details	Author	Date	Appr
0	Issued for Approval	HMM	12/11/2014	HMM
1	Incorporation of Phase 2 details	HMM	1/12/2014	HMM
2	Item Fan Cables to FP600	HMM	14/04/2015	HMM
2	Item 2.2 change to Natural air inlet Ventilator	HMM	14/04/2015	HMM
2	Item 3.1 Fan selection changed	HMM	14/04/2015	HMM
3	Paragraph removed from 1.1.2	HMM	12/06/2015	HMM

Technical Specification for PSB Lobby Smoke Control

Relation : J S Wright & Co Limited
Date : 12th June 2015
Reference : PSBUK1143-12 rev 3
Project : Grenfell Tower Appertments

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Technical Specification for PSB Lobby Smoke Control

Relation : J S Wright & Co Limited
Date : 12th June 2015
Reference : PSBUK1143-12 rev 3
Project : Grenfell Tower Appertments

1.0 Lobby Smoke Control Systems

1.1 Base Documents

This Technical Submission is based in part upon the following documentation:

- Drawing Numbers
    1. 1279 (04) 101 Revision 05, 1279 (04) 102 Revision 05, 1279 (04) 103 Revision 05, 1279 (04) 105 Revision 01, 11279(08)100, Revision 01 279(08)101Revision 01
- Specification
    1. Max Fordham Employers Requirements for MEP Services Document J4350 dated 16th October 2013.
    2. Max Fordham Grenfell Tower Smoke Ventilation Analysis Rev A dated 6th May 2014

1.1.1 Description of the Project

The building is an existing tower block with 20 storeys of residential accommodation on top of a podium containing new residential accommodation, offices, a nursery and a boxing club.
The general scope of the project is:

- Recladding of the façade
- Reconfiguration of the podium levels to provide additional residential accommodation
- Relocation and refurbishment of the nursery
- Relocation and refurbishment of the boxing club
- Provision of new office space and meeting rooms
- Modifications to the MEP systems.

It is noted that a key factor for this for this project is that the tenants will remain in occupation throughout the installation and it is essential for all basic services to remain functional at all times apart from pre-agreed interruptions.

1.1.2 Smoke Control Proposals

The Final smoke control system has been designed to provide the existing stairwell with protection from the ingress of smoke, from a fire within a dwelling, by means of a mechanical extract system. The system has been designed to provide an average open door velocity, across an open lobby/stairwell door of 2.0m/s. This velocity is in accordance with the recommendation for a Class B pressure differential system as defined in Code of Practice BSEN12101 Part 6: Specification for pressure differential systems — Kits. (BSEN12101-6)

The smoke control measures in the lobby areas will be implemented in two phases. Phase 1 will be to re-instate the natural smoke ventilation system consisting, of two natural smoke extract shafts and two natural air inlet shafts, with new motorised dampers in each lobby complete with a Programmable Logic Control System (PLC)

The PLC control system will have links to the new fire alarm system to provide an initiating signal (one signal per floor). Once a signal is received all the dampers (extract and inlet air) in the smoke affected lobby will open and all dampers on other floors are to remain closed.

Technical Specification for PSB Lobby Smoke Control

Relation : J S Wright & Co Limited
Date : 12th June 2015
Reference : PSBUK1143-12 rev 3
Project : Grenfell Tower Appertments

A human Mechanical Interface Panel (HMI) will be located within the entrance area to provide the fire and rescue service with a central override facility to close all dampers in a single operation.

Each ventilated lobby will be provided with a key override, switch located within the stairwell, at each storey level providing the Fire and Rescue service with a local override facility to open the dampers on any one floor.

Once one switch has been activated to open the dampers on a given floor then all other floor switches will be locked out. Once the activated switch is returned to its original position another floor can be activated.

Phase 2 will include ductwork alterations to connect all the existing supply air and smoke extract ducts into one extract section into which will be incorporate a pair of smoke extract fans mounted, in series, to provide a duty and standby mechanical smoke extract facility.

The control system will also have pressure sensors added into each ventilated lobby to control the speed of the fans to ensure that when the doors on the escape route are closed that the opening force on the door does not exceed 100N as detailed IN BSEN12101-6

- **Phase 1 Natural Smoke**
  The existing fresh air and extract shafts are to be retained and converted to provide a natural low level air inlet and high level natural smoke extract.
  Both the inlet air and smoke extract shafts will utilise the existing dual openings at each storey level. i.e. there will be two high level smoke extract ventilator openings and two low level fresh air ventilators, opening into the respective shafts.
  Each of the four openings will be provided with a motorised damper grille assembly utilising a new damper unit and re-using the existing steel grille.
  Each lobby will have a smoke detector linked back to the control system to provide an automatic initiating signal.
  When smoke is detected within a lobby area only the ventilators within the lobby area are to operate and the ventilators on the other storey levels are all to remain closed.
  Each lobby will have a local key operated two position fire override switch (auto/open) this will be mounted within the stairwell at each storey landing.
  The system will have a PLC driven central control system with an individual control outstation module located at each storey level. All control and power cabling will be taken to and from the outstation to the smoke control system components on the individual floor.
  A data and power cable will be daisy chain linked throughout the height of the building to link all the control modules to form an integrated system.
  An HMI override panel will be installed in a position agreed with the approving authority which will enable the Fire and Rescue service to turn the system off. Once the system has been turned off the individual floor override switches can be used to open the dampers on any one floor. Once the key switch has been activated on one floor it will not be possible to open the dampers on another floor until the first activated switch is returned to the auto position i.e. once one floor is activated all other floors are locked out and all other dampers will remain closed.
  All cables are to be run in fire rated cables.

A battery backup module will provide 72 hours secondary power supply to the system.
The existing smoke extract fans are to be removed and a new section of ductwork installed.
The existing fresh air shaft is to be extended through the plant room to an external wall and an automatic opening smoke ventilator will be fitted as a weathered discharge.
On completion of all works the system will be fully tested, commissioned and left in standby auto-position, ready for operation.

2. Phase 2 Mechanical Smoke Extract

At a pre-determined date phase two will be implemented to convert the system into a fully mechanical extract system with a new smoke extract run and standby fan set and fan starter panel with inverter drives to vary the speed of the extract fans. Pressure sensors will be fitted on each storey level to measure the pressure differential across the stair/lobby door. The system will be designed to provide low speed trickle ventilation when the lobby doors are closed and to provide high speed ventilation when the door is open.
The speed of the fans will be varied in accordance with the pressure readings so that the opening force on the closed lobby door does not exceed 100N and when the door is open air will be drawn through the open door at an average rate of 2.0m/s to provide smoke control protection of the stairwell.
A by-pass damper arrangement to allow a separate environmental fan system to be linked to the smoke shafts to provided day to day ventilation of the lobbies.
The method for testing the open door velocity and the opening forces on the door will be as detailed in BSEN12101-6 code of practice for pressure differential systems.
The new mechanical system will incorporate the phase 1 dampers and controls and the PLC control will be re-programmed to work as an integrated part of the mechanical system.
All of the works associated with the mechanical system will be completed, tested and proven prior to the final link being made to the natural smoke shaft so that the building is left unprotected for the minimum time period.
Once the final link has been made the fully integrated system will be commissioned, including re-testing of the original damper assemblies.
It should be noted that the mechanical systems will operate as follows:

- Smoke Extract mode: the by-pass damper assembly will shut off the connection to the environmental fan system and all four dampers in the lobby open, to extract air from the lobby through all four openings. Make up air will be provided via the open lobby door.
- Environmental Mode: the by-pass damper assembly will open and shut off the smoke extract fan set and isolate the two shafts. One shaft will act as an environmental extract shaft and the other will act as a fresh air make up shaft.

The newly installed vertical fresh air make up inlet ventilator within the plant room wall will be removed and the ductwork opening blanked off. The existing fresh air riser and smoke extract builderswork risers will be connected together using galvanised smoke ductwork and fed to a single extract fan set as described above. i.e. all four existing builderswork shafts will all be used as part of the smoke control extraction system.

A separate technical submission will be provided for phase 2 environmental systems which are linked to the smoke control system.

2.0 Phase 1 Equipment and Controls

2.1 Automatic Lobby Ventilators

Product: Gilberts Series 54 Damper

Location: Existing Lobbies

QTY	CODE	CONSTRUCTION	FLANGE LENGTH	FLANGE WIDTH	OPENING LENGTH	OPENING WIDTH	FLANGE TYPE	CONTROLS	
80	SSE	GALVANISED STEEL	637	337	600MM (L)	300MM (W)	SELF	24V	

Damper

Type:	SSE 300 X 600
Number of Blades:	N/A
Construction of Blades:	Galvanisd steel
Opening Height:	600
Opening width:	300
Flange length:	637
Flange width:	337
Flange Type:	Self
Base Type:	N/A
Controls:	MS Control 24v

Grille	Existing
Type	Punched
Construction	Steel

Colour:	Existing
Certification:	Damper section tested to EN1366 Pt2 Fire resistance test for service

installtions Part 2 Fire Dampers	

Note: the damper motor is accessed for maintenance by removing the grille.

2.2 Natural Air Inlet Ventilator

Product: Existing Penthouse Louvre.

Location: Roof Opening Over Stairwell.
The existing penthouse louvre is to be checked to ensure it has a minimum measured free area of 1.0m² and if area requirement is met the unit is to be retained. Retained.

Should the existing unit not have sufficient free area it is to be replaced with a new unit with a minimum free area of 1.0m².

2.3 Control System

2.3.1 Control System Philosophy Statement

The control system will be an intelligent PLC based modular control system using a network for operation of filed hardware and Ethernet communications network for the HMI user interfaces.
The control system will consist of the following components:

- Master smoke control panel with PLC
- HMI override panel
- Outstation module panels (one per ventilated lobby)
- Smoke detector (one per ventilated lobby)
- Override switch, configured auto/open (one per ventilated lobby, located within the stairwell)

The control philosophy is as follows:-
Upon smoke being detected in any of a firefighting lobby the following events shall occur:-

- The AOV's into the natural extract shafts serving the lobby in which the smoke was detected shall open.
- The AOV's into the natural air supply shafts serving the lobby in which the smoke was detected shall open.
- The wall mounted fresh air damper in the external wall opens.
- All other floors will be electrically isolated to prevent them from being opened to maintain separation and smoke contamination of the other floors.
- In the event of failure of the primary supply the battery backup panel will provide a power secondary supply.
- Indication on the mimic repeater panel and main control panels shall indicate the core & floor on which the alarm has been triggered.
- If the HMI override is activated i.e. shut system down all open dampers will close. The dampers on any given floor can be then opened using the local key override switch. Once a single switch has been turned to open all other switches, on the other floors, will be locked out.
- The above sequence shall also be executed if the manual overrides are operated on any level or by the master control panel.

Upon reset of the fire alarm or by override selection:-

- The AOV's into the builders work extract shaft serving the lobby shall close automatically.
- The AOV's into the builders work inlet air shaft serving the lobby shall close automatically
- The status on the indication panels shall return to normal.

2.3.2 Activation Mechanism

The system is triggered by smoke detectors supplied and installed by PSB. Detection within the lobby shall be provided by ceiling mounted smoke detectors. Signals from the smoke detectors will be relayed direct to the relevant smoke control systems via the local floor outstation.

2.3.3 Control Panels

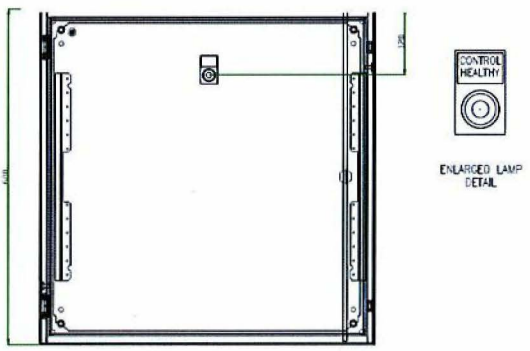
2.3.3.1 Master Smoke Control Panel

Product: PSB Right Choice Control panel size 600mm wide x 600mm high x 400mm deep

Location: Service Riser Level 1 Existing Lobby

QTY	CODE	CONSTRUCTION	HEIGHT	WIDTH	DEPTH			CONTROLS	
1	MCP	STEEL BOX	600	600	400			240VAC IN 24VDC OUT	

Type:	SMCP Master smoke control panel incorporating PLC Control system
Construction:	Steel cabinet
Height:	600
width:	600
Mounting Type:	Surface wall mounted



The master smoke control panel will be a steel wall mounted unit. The dimension of the panel will be 600mm High x 600mm Wide x 400 Deep with full PLC driven control system. The panel will be wall mounted in the electrical riser on the first floor.
The panel will have control interface wiring to the:

- Mimic HMI panel on the ground floor
- Outstation panels in electrical riser located in the lobby on each level served by the smoke control system.
- Battery backup panel one on every fifth floor

2.3.3.2 HMI Mimic Override Control Panel

Product: PSB Right Choice mimic HMI panels

Location: Local To Fire Alarm Panel (Final Location to be Agreed)

QTY	CODE	CONSTRUCTION	LENGTH	HEIGHT				CONTROLS	
1	MIMIC	PLASTIC BOX	400	300				24V	

Type:	HMI Mimic / Override panel
Construction:	Plastic cabinet with HMI Screen
width:	400
Height:	300
Mounting Type:	SURFACE

The smoke mimic control panel will be a HMI Touch screen and shall comprise of an operator dialogue terminal housed in a plastic wall mounted enclosure. The dimension of the repeater panel will be 400mm Wide x 300mm High x 150 Deep. User facilities will allow the operator to access system configuration, maintenance and testing functions and provide Fireman's override facilities through the menu driven touch screen control interface. The master mimic will communicate with each core master control panel over an Ethernet TCP/IP protocol displaying in full graphical representation status of each core with event recording accessed through the menu system.

Technical Specification for PSB Lobby Smoke Control

Relation : J S Wright & Co Limited
Date : 12th June 2015
Reference : PSBUK1143-12 rev 3
Project : Grenfell Tower Appertments

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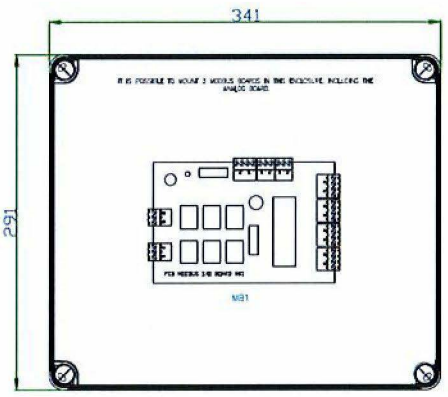
2.3.3.3 Outstation Modular Control Panel

Product: PSB Right Choice Outstation Panel

Location: Service Riser Existing Lobbies

QTY	CODE	CONSTRUCTION	LENGTH	HEIGHT				CONTROLS	
20	OUTSTATION	PLASTIC BOX	400	300				24V	

Type:	Otstation Control Module
Construction:	Plastic cabinet
width:	400
Height:	300
Mounting Type:	SURFACE



The outstation modular smoke control panel will be a steel wall mounted unit. The dimension of the panel will be 300mm High x 400mm Wide x 200 Deep. The panel will be wall mounted in the electrical riser in each of the ventilated lobbies.

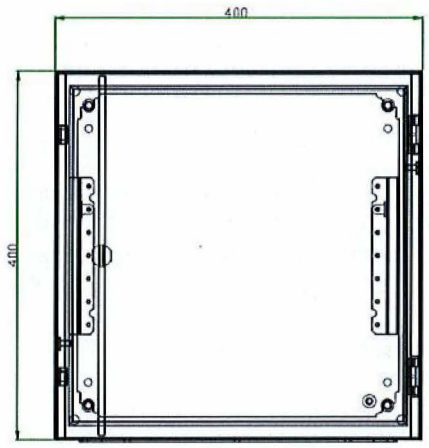
2.3.3.4 Modular Battery Backup Panel

Product: PSB Right Choice Battery Backup Panel

Location: Service Riser Existing Lobbies every 5th Floor

QTY	CODE	CONSTRUCTION	LENGTH	HEIGHT				CONTROLS	
5	BATTERY BACKUP MODULE	STEEL BOX	400	400				240VAC IN 24V DC OUT	

Type:	Otstation Control Module
Construction:	steel cabinet with H
width:	400
Height:	400
Mounting Type:	SURFACE



The battery backup smoke control panel will be a plastic wall mounted unit. The dimension of the panel will be 400mm High x 400mm Wide x 300 Deep. The panel will be wall mounted in the electrical riser on every fifth floor level within the ventilated lobbies.

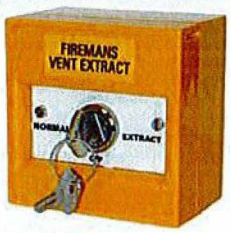
2.3.3.5 Floor Override Switches

Product: KAC Ltd Right Choice Control Override Switches

Location: Stairwell at each storey level served by the ventilation system

QTY	CODE	CONSTRUCTION						CONTROLS	
80	FOC FIRE OVERRIDE SWITCH	PLASTIC						VIA INTERFACE MODULE	

Type:	FOC
Construction :	Plastic
Mounting Flange Type:	Base fixing
Base Type:	Plastic
Colour:	Yellow



A Key operated fire override switch will be located within the stairwell for each ventilated lobby, local to the automatic lobby ventilator, these switches will be in a normal auto position allowing the ventilator to be opened when the system operates. Once the fire override switch on the mimic override panel has been activated the floor override switch will allow the fire and rescue service the facility to open the dampers.

2.3.3.6 Smoke Detector Heads

Product: Apollo Right Choice smoke detector heads

Location: Existing Lobbies

QTY	CODE	CONSTRUCTION						CONTROLS	
20	XP95	PLASTIC						VIA INTERFACE MODULE	

Type:	Apollo Optical with relay base
Construction :	Plastic
Mounting Flange Type:	Base fixing
Base Type:	Plastic
Colour:	white

2.4 Power Supplies Electrical & Control Wiring

2.4.1: Power and Control

The master control panel incorporates a facility to connect the incoming 230v Ac incoming mains supply to power the smoke control systems. (Supplied and installed as part of the electrical contractors contract).
Should the mains power fail there is provision for 72 hour power supply via battery a battery backup system.

2.4.2: Power and Control cables

The electrical wiring for the system shall be provided in fireproof cable with a CWZ classification.

Power/Controls wiring	– FP200 Enhanced or equivalent.
ASI Network	– FP200 Enhanced or Equivalent.
Fan Cables	- FP600 Enhanced or equivalent.
COMMS	- Firetuf or Equivalent.

And installed in accordance with the Electrical Wiring Regulations and BS8519.

Technical Specification for PSB Lobby Smoke Control

Relation : J S Wright & Co Limited
Date : 12th June 2015
Reference : PSBUK1143-12 rev 3
Project : Grenfell Tower Appertments

3.0 Phase 2 Equipment and Controls

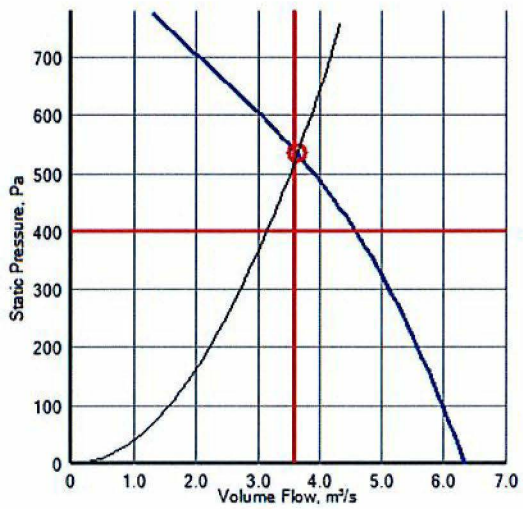
3.1. Run & Standby Extract Fan Arrangement

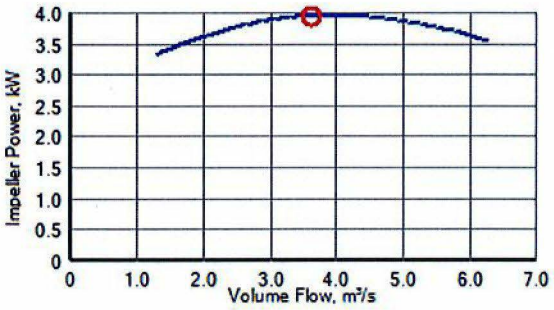
Product: **Elta Fan Type LCS063K2-A5/17RS**

Location: **Roof above Plant Room**

One set of smoke extract fans will be mounted in series on the roof of the plantroom and connect via ductwork to one of the two builders work shafts. Motorised shut off dampers will be installed in the ductwork to provide a positive shut off of the system. All dampers will be fitted 24v DC motors.
An additional fan set will be mounted on walkway level and connect to the other builderswork shaft via a run of galvanised ductwork . Motorised shut off dampers will be installed in the ductwork to provide a positive shut off of the system. All dampers will be fitted 24v DC motors.
All fans are tested to the latest internationally recognised standard IS05801 Part 1, installation category D for aerodynamic performance and BS848 Part 2 (1985) for acoustic performance. The adjustable pitch Aerofoil impeller gives the exact performance required, with a non overloading fan characteristic.
The impellers are all high pressure die cast to offer thin aerofoil sections for low generation of noise. The maximum pitch angles allow for speed control by frequency inverter. The motors are suitable for inverter speed control down to 20% of full speed. Fans are tested in compliance with high temperature test standard directive 89/106/EEC to EN 12101-3 and are rated to one off emergency operation at 300°C for 2 hour.

Fan Performance Data: **Elta Fan Type LCS063K2-A5/17RS**





Sound Data

Spectrum (Hz):	63	125	250	500	1K	2K	4K	8K	dBW	dB(A) @ 3m
Inlet (dB):	97	99	100	99	98	92	89	83	106	81
Outlet (dB):	93	97	99	97	98	94	92	85	105	81

Sound levels are quoted as in-duct values. dB(A) values are average spherical free-field for comparative use only.

PSB00000725_0028

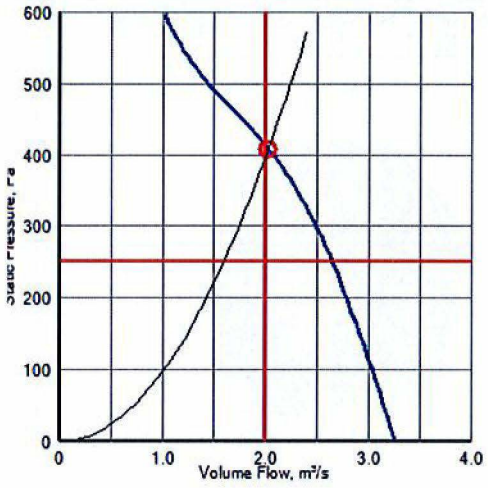
Technical Specification for PSB Lobby Smoke Control

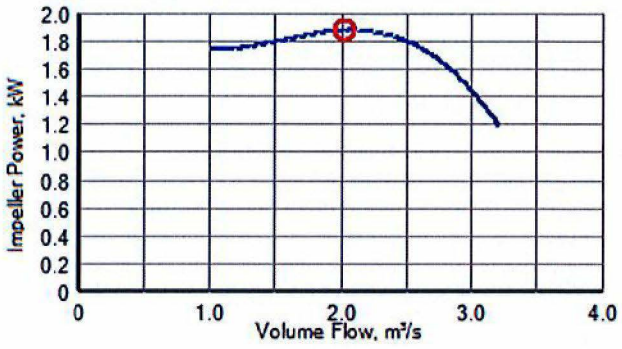
Relation : J S Wright & Co Limited
Date : 12th June 2015
Reference : PSBUK1143-12 rev 3
Project : Grenfell Tower Appertments

Product: **Elta Fan Type LCS063K2-A5/17RS**

Location: **Walkway Level**

Fan Performance Data: **Elta Fan Type LCS050J2-A6/17RS**





Sound Data

Spectrum (Hz):	63	125	250	500	1K	2K	4K	8K	dBW	dB(A) @ 3m
Inlet (dB):	79	81	84	97	94	89	82	78	100	77
Outlet (dB):	80	81	84	96	94	89	83	79	99	77

Sound levels are quoted as in-duct values. dB(A) values are average spherical free-field for comparative use only.

3.1. Run & Standby Extract Fan Arrangement (cont.)

Fan Performance Data: **Elta Fan Type LCS063K2-A5/17RS**

QTY	CODE	CONSTRUCTION	FLANGE LENGTH	FLANGE WIDTH	OPENING LENGTH	OPENING WIDTH	FLANGE TYPE	CONTROLS	WINDSHIELD
2	AS BELOW	STEEL/ALUMINIUM	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Description of product / remarks:

Fan Type	**LCS630K2-A5/17RS**
Fan diameter:	630mm
Electrical Supply:	380-420volts 50Hz 3 phase
Rated Motor Power:	4.0kW
Full Load Current:	10.21 A
Starting Current:	Invertor soft start
Start type:	Invertor
Absorbed Power:	4.47kW
Peak Power:	4.52 kW
Certification:	BSEN12101-3 specification For powered heat and Smoke exhuast ventilators

Fan Performance Data: **Elta Fan Type LCS050J2-A6/17RS**

QTY	CODE	CONSTRUCTION	FLANGE LENGTH	FLANGE WIDTH	OPENING LENGTH	OPENING WIDTH	FLANGE TYPE	CONTROLS	WINDSHIELD
2	AS BELOW	STEEL/ALUMINIUM	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Description of product / remarks:

Fan Type	**LCS050J2-A6/17RS**
Fan diameter:	500mm
Electrical Supply:	380-420volts 50Hz 3 phase
Rated Motor Power:	2.0 kW
Full Load Current:	6.43 A
Starting Current:	Invertor soft start
Start type:	Invertor
Absorbed Power:	2.20 kW
Peak Power:	2.64 kW
Certification:	BSEN12101-3 specification For powered heat and Smoke exhuast ventilators

Technical Specification for PSB Lobby Smoke Control

Relation : J S Wright & Co Limited
Date : 12th June 2015
Reference : PSBUK1143-12 rev 3
Project : Grenfell Tower Appertments

3.2 Automatic Lobby Ventilators

Product: Gilberts Series 54

Location: Lobbies to Ground Floor, Walkway & Walkway Mezzanine

QTY	CODE	CONSTRUCTION	FLANGE LENGTH	FLANGE WIDTH	OPENING LENGTH	OPENING WIDTH	FLANGE TYPE	CONTROLS	
6		GALVANISED STEEL	837	637	800MM (L)	600MM (W)	SELF	24V	

Damper

Type:	SSE 600 X 800
Number of Blades:	N/A
Construction of Blades:	Galvanisd steel(black)
Opening Height:	800
Opening width:	600
Flange length:	837
Flange width:	637
Flange Type:	Self
Base Type:	N/A
Controls:	MS Control 24v
Grille Type	Gilberts K15
Construction	Extruded Aluminium
Colour:	RAL9010
Certification:	Damper section tested to EN1366 Pt2 Fire resistance test for service installtions Part 2 Fire Dampers

3.3 Mechanical Control System

The mechanical fan set will be provided with a fan starter panel incorporating inverter speed drives to control the speed of the fans between low speed (all doors closed) and high speed (door on fire floor open). The open/closed door condition will be monitored by as pressure sensor (see details below) which will measure the pressure differential between the lobby and the stairwell. The system is designed to maintain -25Pa in the lobby with all doors closed and will maintain the fans at low speed setting. Once a door to the smoke affected lobby, and only the smoke affected lobby, the pressure differential will be lost and the fans will automatically ramp up to full speed to extract air from the lobby at a rate which will pride an average face velocity of 2m/s across the open lobby / stairwell door.

The master control panel will be provided with a primary and secondary power supply in accordance with BS8519 and the power supplies are to include an auto changeover panel and by pass switch arrangement with a single mains feed connection to the fan control panel.

The panel will be linked to the master PLC control panel via a data cable taken from the top floor outstation module in the service riser within the lobby area and will therefore seamlessly link into the existing natural smoke ventilation system installed in phase 1.

The pressure sensors will be fitted at each storey level and will monitor the pressure differential between the stairwell and lobby.

The pressure sensor will have a link to the control outstations fitted at each storey level and will link back to the master control panel via the data link between each outstation.

Once the system has been initiated by the smoke detection system only the smoke affected floor will operate and all floors will be linked out. Only the pressure sensor within the smoke affected lobby can operate the system.

As the smoke shafts are to be used to provide a route for fresh air and extract air for the environmental system a set of by-pass dampers will be incorporated into the ductwork system.

During normal environmental activities the system damper to the smoke ventilation fan set will be closed and the dampers to the environmental fan sets will be open.

On receipt of a fire alarm signal the environmental system dampers will close and the damper to the smoke ventilation system will open.

On receipt of a signal from the fire alarm system all environmental controls will be overridden by the smoke control system.

The mechanical system will operate as described above for the natural system as follows:

- On alarm signal all dampers in the smoke affected lobby open (four dampers per lobby on the existing twenty floors and two dampers on the ground floor, walkway and walkway mezzanine areas)
- All other floor are locked out
- Environmental controls are locked out
- By pass dampers to environmental systems close

3.3 Mechanical Control System (cont.)

- By pass damper to the smoke extract fan set opens
- Smoke Ventilator in the stairwell opens to provide make up air path
- Smoke Extract Fans are initiated.
- Pressure sensor in smoke affected lobby active to regulate fan speed
- HMI override available
- If HMI override activated the Fan system shuts down and all dampers and stairwell ventilator will close
- If floor Override switch, in the stairwell, is turned to the on position, (when the HMI override has been activated) then the dampers on that floor will open, the stairwell ventilator will open and the fans will be initiated. Note: the override switch can be used on any one floor once the HMI override is initiated. However only one floor at a time can be activated via the override switches located in the stairwell.

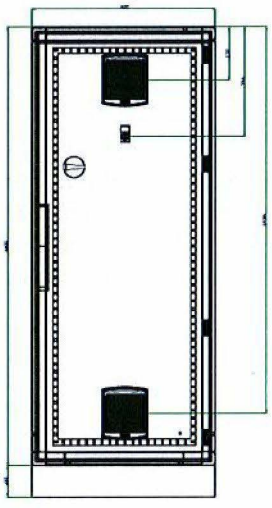
3.3.1 Fan Starter Control Panel

Product: PSB Right Choice Smart Control panel size 600mm wide x 1400mm high x 600mm deep

Location: Roof top plant room local to fan set

QTY	CODE	CONSTRUCTION	HEIGHT	WIDTH	DEPTH				
1	FSP	STEEL BOX	1400	600	600				

Type:	FSP Fan starter control panel incorporating inverter fan drives
Construction:	Steel cabinet
Height:	1400
width:	600
Mounting Type:	Surface wall mounted



The fan starter control panel will be a steel wall mounted. The dimension of the panel will be 600mm High x 1400mm Wide x 600 Deep with Macon MR5 invertor drives.
The panel will be provided with a 3 phase power supply (supplied and installed by others).

3.3.2 Pressure Sensor

Product: Control Pressure Transmitter

Location: Stairwell at every floor level piped into lobby

QTY	CODE	CONSTRUCTION						CONTROLS	
83	PA-DPS-8X	PLASTIC						VIA INTERFACE MODULE	

Type:	PA-DPS-8x Sontay Pressure sensor
Construction :	Plastic
Mounting Flange Type:	Base fixing
Base Type:	Plastic

A Pressure transmitter will be fitted within the stairwell, at high level on each storey level, and will measure the pressure differential between the stair and the smoke affected lobby. If the pre-set pressure differential is maintain the fan will run at low speed (doors closed) Should a lobby door open then pre-set pressure differential will not be able to be maintained and the fan will ramp up to full speed via inverter drive in the master control panel (open door condition) to extract a higher volumetric rate from the lobby.

3.4 By-pass Dampers

Product: BSB SC Series

Location: Walkway Environmental Fan Set and Plant Room Smoke Extract Fan Set

QTY	CODE	CONSTRUCTION	FLANGE LENGTH	FLANGE WIDTH	OPENING LENGTH	OPENING WIDTH	FLANGE TYPE	CONTROLS	
3		GALVANISED STEEL	TBA	TBA	TBA	TBA	TBA	24V	

Damper

Type:	SC TBA
Number of Blades:	TBA
Construction of Blades:	Galvanisd
Opening Height:	TBA
Opening width:	TBA
Flange length:	TBA
Flange width:	TBA
Flange Type:	Self
Base Type:	N/A
Controls:	MS Control 24v

The environmental fan sets and the smoke extract fan sets will each have a shut off/ bypass damper fitted to isolate the fan sets. The damper sizes will be provided once the final ductwork sizing and arrangement has been agreed.

4.0 Testing and Maintenance Schedule

4.1 Maintenance Statement

It is a requirement under the Regulatory Reform Order of 2005 that a person shall be responsible for the maintenance of the smoke control system and this has to be tested and maintained in accordance with the schedules contained in BS9999 as detailed below in the extracts for the mechanical smoke control system and associated smoke detection. It is also necessary to carry out maintenance in accordance with manufacturers recommendations for each component.

4.2 Testing and Maintenance Schedule From BS9999

BRITISH STANDARD BS 9999:2008

Annex V (normative) Routine inspection and maintenance of fire safety installations

V.1 General

NOTE Fire safety installations comprise the items and elements of which examples are listed in Annex J.

It is essential for the safety of the occupants of a building that fire safety equipment (including passive fire protection provisions) is inspected frequently. Although much of the inspection can be undertaken by suitably trained personnel, a formal agreement should be made with the installer or the installer's representative to provide the regular inspection and testing described in the relevant British Standards for individual fire safety installations. Unless temporary alternative fire safety systems can be put in place, it might be appropriate for certain of the inspections carried out at three-monthly or longer intervals to be done outside normal working hours.

V.2 Daily inspections

V.2.1 General

The checks described in **V.2.2** to **V.2.6** should be undertaken daily. For premises with defined opening times such as shops, theatres and cinemas, these checks should be undertaken prior to members of the public entering the building.

V.2.2 Fire detection and alarm systems

All fire detection and alarm systems should be inspected daily. In particular, it should be ensured that:

a) the control panel indicates normal operation or, if any fault is indicated, that it has been logged and the appropriate action(s) taken;

b) any fault recorded the previous day has received attention.

V.3 Weekly

V.3.1 General

In addition to the checks recommended in **V.2**, the checks described in **V.3.3** to **V.3.7** should be undertaken once a week.

V.3.2 Fire detection and alarm systems

All fire detection and alarm systems should be inspected weekly. In particular, it should be ensured that:

a) the control equipment is able to receive a fire signal and to initiate the evacuation procedure, recording which trigger device has been used, in accordance with BS 5839-1;

b) any standby batteries are in good condition and the fuel, oil and coolant levels of any standby
generators are correct, topping up as necessary;

c) the reserves of paper and ink or ribbon for any printer are adequate for two weeks' normal usage.

f) the mode monitoring system for stop valves in life safety installations is operating correctly;

g) there is continuity of connection between the alarm switch and the control unit and between the control unit and the fire and rescue service (usually via a remote manned centre) for automatically monitored connections;

h) trace heating systems provided to prevent freezing in the sprinkler system are functioning correctly.

V.3.5 Smoke control systems for means of escape

Actuation of the system should be simulated once a week. It should be ensured that any fans and powered exhaust ventilators operate correctly, smoke dampers close (or open in some systems), natural exhaust ventilators open, automatic smoke curtains move into position, etc.

V.4 Monthly

V.4.1 General

In addition to the checks recommended in **V.2** and **V.3**, the checks described in **V.4.2** to **V.4.9** should be undertaken once a month.

V.4.2 Fire detection and alarm systems

Any standby generator should be started up once a month by simulating failure of the normal power supply, and allowed to energize the system for at least 1 h, while the system is monitored for any malfunctioning caused by the use of the generator. After restoring the normal supply, the charging arrangements for the generator starting battery should be tested, and the appropriate action should be taken if they are found not to be functioning correctly. In addition, the oil and coolant levels should be topped up and the fuel tanks filled.

V.5 Three-monthly

In addition to the checks recommended in **V.2**, **V.3** and **V.4**, the actuation of all smoke control systems should be simulated once every three months. All zones should be

separately tested and it should be ensured that any fans and powered exhaust ventilators operate correctly, smoke dampers close (or open in some systems), etc.

V.6 Six-monthly

V.6.1 General

In addition to the checks recommended in **V.2**, **V.3**, **V.4** and **V.5**, the checks described in **V.6.2** and **V.6.3** should be undertaken once every six months. Arrangements should be made for six-monthly inspections and tests to be carried out by competent persons on the fire detection and alarm systems, the sprinkler systems, any extinguishing systems, the emergency and escape lighting systems and the fire-fighting lift, for any defects found to be logged and the necessary action taken, and for certificates of testing to be obtained.

V.7 Yearly

NOTE Attention is drawn to the testing and inspection requirements of BS 7671.

In addition to the checks recommended in **V.2**, **V.3**, **V.4**, **V.5** and **V.6**, arrangements should be made for annual inspections and tests of the following to be carried out by competent persons, for any defects to be logged and the necessary action taken, and for certificates of testing to be obtained:

a) fire detection and alarm systems;
b) self-contained luminaires with sealed batteries, if more than 3 years old;
c) sprinkler and drencher systems;
d) smoke ventilators and smoke control systems;
e) evacuation lifts;
f) fire-fighting lift installations;
g) fire hydrants;
h) fire mains;
i) portable fire extinguishers;
j) hose reels.

Stocks of foam concentrate or solution should be checked annually and replenished as necessary.

5.0 Appendices

5.1 Product data sheets

- Gilberts Series 54 Data Sheet
- Powrmatic OSR Data Sheet
- KAC Override Switch Data Sheet
- Apollo Smoke Detectors
- Pressure sensors
- Elta Smoke Extract Fans
- BSB Bypass dampers