

Testing and Commissioning Checklist for Staircase Pressurization System

Reference

Address: FSD Ref.:
 FP 19/20/43/47/78*.....

FSD Acceptance Letter/Approval Date:

FSI Working Drawing Ref. :

Approved Building Plan Ref.: Dated:

Section I – General items for all staircase pressurization systems installed in the building

1.1 Measuring and testing instrument / equipment calibration

Measuring instrument used for testing purpose shall be provided in duplicate and calibrated in the past 3 months.

	<u>Type</u>	<u>Model No.</u>	<u>Serial No.</u>	<u>Calibration Cert. No.</u>	<u>Remarks</u>
a.					
b.					
c.					
d.					
e.					
f.					
g.					
h.					
i.					
j.					

1.2 Documentation

		Yes	No	Remarks
a.	Equipment list of staircase pressurization system c/w related test report is attached.	[ ]	[ ]	.....
b.	Equipment list of builder's work (such as doorset, door closer & etc.) c/w related test report is attached.	[ ]	[ ]	.....
c.	Certifying the building air tightness condition during the testing is equivalent to the occupation condition.	[ ]	[ ]	.....

1.3 Staircase pressurization working drawings against building plans

		Yes	No	N/A	Remarks
a.	Classifications of pressurized spaces for means of escape / firefighting & rescue tally with approved building plans.	[ ]	[ ]	[ ]	.....
b.	Designations of staircase number and fireman's lift number, fire fighting access number tally with approved building plans.	[ ]	[ ]	[ ]	.....
c.	Locations of staircase pressurization plant rooms tally with approved building plans.	[ ]	[ ]	[ ]	.....
d.	Fire resistance rating of plant rooms is same as the pressurized space.	[ ]	[ ]	[ ]	.....
e.	Air intake positions tally with approved building plans.	[ ]	[ ]	[ ]	.....
f.	Discharge positions of over pressure relief tally with approved building plans.	[ ]	[ ]	[ ]	.....

*** Delete as appropriate**

Section II – For each staircase pressurization system only
(Separate copy of Section II should be attached to respective pressurization system)

2.1 Description

- a. Designation of pressurized staircase
 (The designation should be the same as building plan & FSI drawing & test report.)
- b. Pressurized space :- (Please tick as appropriate)
- Escape staircase; or ☐
 - Fire fighting staircase ☐
- c. Equipment to be provided :-
- Single fan with motor; or ☐
 - Duplicate fans complete with motors; or ☐
 - Single fan with duplicate motors ☐
- d. Design air velocity passes through the door between pressurized space and accommodation area m/s
- e. Design differential pressure between the pressurized space and accommodation Pa
- f. Design door opening force N ($\leq 100\text{N}$)

2.2 Test report

(All systems should be tested and endorsed by registered professional engineer before final test with Fire Services Inspecting Officer.)

	Appendix	Remarks
a. Pressure test report of all ductwork (including builder's work, ducts, shafts or other construction)		
b. Air velocity measurement report		
c. Door opening force measurement report		
d. Differential pressure measurement report		
e. System performance test report		

2.3 Visual inspection

	Yes	No	N/A	Remarks
a. <u>Air intake</u> (Item a.1 to a.5 for air intake not located at roof floor)				
a.1 Notice in English & Chinese characters “Staircase pressurization intake for (pressurized space)” ((增壓空間)的樓梯增壓入風口) is provided.	☐	☐	☐	
a.2 Position of air intake is located away from any potential fire hazards (such as basement smoke vent).	☐	☐	☐	
a.3 Air duct is provided from the intake to the fan when air intake is distant from the fan.	☐	☐	☐	
a.4 A smoke detector of a type suitable for use in air duct / plenum is installed.	☐	☐	☐	
a.5 Pressurization system can be shut down when the duct type smoke detector is activated.	☐	☐	☐	
(Items a.6 to a.13 for air intake located at roof floor)				
a.6 Two air intakes, which spaced apart and facing different directions, are provided.	☐	☐	☐	

		Yes	No	N/A	Remarks
a.7	Each intake is capable of providing the full air requirements of the system.	[ ]	[ ]	[ ]	.....
a.8	Independently operated smoke control damper with duct type smoke detector is provided at each intake.	[ ]	[ ]	[ ]	.....
a.9	An override switch to reopen the closed damper and to close the open damper is provided.	[ ]	[ ]	[ ]	.....
a.10	No smoke discharge within 5 m of any direction of air intake.	[ ]	[ ]	[ ]	.....
a.11	Notice in Chinese & English characters “Staircase pressurization intake for (pressurization space)” (樓梯增壓入風口) is provided.	[ ]	[ ]	[ ]	.....
a.12	Air duct is provided from the intake to the fan when air intake is distant from the fan.	[ ]	[ ]	[ ]	.....
a.13	Smoke control damper properly actuated when duct type smoke detector activated.	[ ]	[ ]	[ ]	.....
b.	<u>Plant room</u>				
b.1	No other service inside the plant room.	[ ]	[ ]	[ ]	.....
b.2	Minimum fire resistance rating for the enclosure of the pressurization plant is equal to or greater than the pressurized space served (FRR of enclosure is hrs.)	[ ]	[ ]	[ ]	.....
b.3	When plant room served more than one pressurization system, separate fire rated enclosure is provided to each pressurization system in order to maintain fire compartmentation between different pressurized spaces.	[ ]	[ ]	[ ]	.....
b.4	When fan room is used as an air plenum, all control panels should be located outside the fan room, or protected by fire resistant enclosure(s).	[ ]	[ ]	[ ]	.....
c.	<u>Air injection point & associated ductwork</u>				
c.1	Multiple injection points are provided when the pressurized staircase exceeds 11m.	[ ]	[ ]	[ ]	.....
c.2	Vertical distance between injection points is not greater than 12 m or three storeys.	[ ]	[ ]	[ ]	.....
c.3	Volume control dampers of air injection points are properly secured.	[ ]	[ ]	[ ]	.....
c.4	Injection duct work passing through other fire compartment is constructed to have the same FRR required for either the pressurized space or the compartment through it passes, whichever is the greater.	[ ]	[ ]	[ ]	.....
c.5	An injection point of a single injection point system is away from the final exit door.	[ ]	[ ]	[ ]	.....
c.6	Ductwork construction is complied with or not less than DW144 standard.	[ ]	[ ]	[ ]	.....
c.7	Aluminium sheet and aluminium pop rivet shall not be provided in flat oval duct longer than 1 m.	[ ]	[ ]	[ ]	.....
d.	<u>Air release system</u>				
d.1	Spread of smoke between different fire compartments does not likely happen in both normal operation and fail safe mode.	[ ]	[ ]	[ ]	.....
d.2	When the operation of air release system is automatic, it is actuated by the same detector / device that actuates the rest of the pressurization system.	[ ]	[ ]	[ ]	.....

		Yes	No	N/A	Remarks
d.3	When the accommodation space is partitioned or compartmented into offices or similar unit, the air relief vent is provided at:-				-----
	i. Between the door into pressurized space and the start of the partitioning;	[]	[]	[]	
	or				
	ii. On each offices & units, the size of each air relief vent is capable of discharging the total air flow from pressurized space.	[]	[]	[]	
d.4	Air release vent is located at or immediately below ceiling level	[]	[]	[]	-----
	Type of air release system				
	- Vertical shaft (go to d5 – d6);	[]	or		
	- Special vents at the building periphery (go to d7 – d9);	[]	or		
	- Mechanical air release (go to d10 – d12).	[]			
d.5	Top vent is provided at the vertical shaft.	[]	[]	[]	-----
d.6	When the shaft is designed for dual propose, automatic control fire & smoke damper is provided at each branch duct.	[]	[]	[]	-----
d.7	Special vents for external vent are provided on at least two sides of the sealed building.	[]	[]	[]	-----
d.8	Fail safe protection is provided to the ventilator.	[]	[]	[]	-----
d.9	Components of ventilator are compliant with BS7346-1/ BS7346-2.	[]	[]	[]	-----
d.10	Extraction flow rate is greater than the total pressurized air flow rate of all served staircase pressurization systems.	[]	[]	[]	-----
d.11	Extraction system including ductwork is capable of working at the appropriate temperature and period of time (250°C for 1 hour for building with sprinkler system, 600°C for 2 hour for building without sprinkler system).	[]	[]	[]	-----
d.12	The following items should be complied with, when the central exhaust system also serves for mechanical air release:-				
	i. Component & ductwork of central exhaust system is capable of working at the appropriate temperature and period of time (250°C for 1 hour for building with sprinkler system, 600°C for 2 hour for building without sprinkler system);	[]	[]	[]	
	and				-----
	ii. When the related pressurization system is actuated, function of VAC control system and VAC manual override switch for shutting down the central exhaust system is ignored;				
	and	[]	[]	[]	-----
	iii. For pressurization system for fire fighting, the local motorized smoke damper in fire floor is opened and dampers for other compartments / units is closed;				
	or				
	For pressurization system for escape, the local motorized smoke damper in fire floor and two above floor should be opened and dampers for other compartments / units are closed.	[]	[]	[]	-----

	Yes	No	N/A	Remarks
e. <u>Over pressure relief system</u>				
Type of over pressure relief system				
- Automatic opening of the external exit doors on operation of the fan (go to e1 – e2);	[]	or		
- Barometric pressure relief vents / damper (go to e3 – e5);	[]	or		
- Mechanical exhaust (go to e6 – e7).	[]			
e.1 Door lock, latch, bolt, push bar & etc. are not provided at the external exit doors	[]	[]	[]	
e.2 Warning label: “Over pressure relief door. Do not obstruct” (超壓時放壓門，不要阻塞) is provided in English and Chinese characters at the external exit doors	[]	[]	[]	
e.3 Wire mesh is provided at the external opening of relief vent / damper.	[]	[]	[]	
e.4 Relief vent / duct passed through other fire compartment is enclosed by fire rated material; the FRR should be same of pressurized space or the compartment through it passes, whichever is greater.	[]	[]	[]	
e.5 Free area of relief vent / damper “A _x ” ≥ 16 m ² x (total required airflow (m ³ /s) through the open doors – air supply satisfying the pressure differential requirement (m ³ /s) in pressurized space) <i>*See equation (24) of section 14 of BS 5588: Part 4: 1988*</i>	[]	[]	[]	
e.6 Fan can be activated by differential pressure sensor	[]	[]	[]	
e.7 Fan directly discharges to external or the discharge ductwork is constructed with fire rated material when passing through other fire compartment. The FRR of ductwork should be same as that of pressurized space or fire compartment passed, whichever is greater.	[]	[]	[]	
f. <u>Electrical & control</u>				
f.1 Electrical supplies for all equipment (such as fans, air relief damper, over pressure device, controller, supervisory panel & etc.) are fed from the same essential source.	[]	[]	[]	
f.2 Requirement of main switchboard and/or local control panel :-				
- Construction is complied with BS 5486 from not less than 2 mm panel steel and is installed in a room having hour FRR (including self-closing doors) without other equipment installed therein; or	[]	[]	[]	
- All controls, starters, relays, etc. shall be suitable for continuous operation at 250°C for not less than 1 hour.	[]	[]	[]	
f.3 Requirement of power supply cable for pressurized system, controller, pressure sensor & etc.:-				
- BS 6387 Cat. CWZ ; or	[]			
- BS 6207 or BS EN 60702; or	[]			
- Other international standards acceptable to the Director of Fire Services; or	[]			
- Specification complying with criteria for exemption in Appendix 6 of FSD COP for Inspection, Testing and Maintenance of Installations and Equipment. (Items)	[]			
f.4 Separate pressure differential system is provided for each pressurized system.	[]	[]	[]	
f.5 End of pressure sensing tube is properly terminated at the pressurized space and accommodation.	[]	[]	[]	
f.6 End of sensing tube is mechanically protected.	[]	[]	[]	

	Yes	No	N/A	
f.7 Label of “Sensing point of staircase pressurization system” (樓梯增壓系統感應點) is clearly indicated in English and Chinese characters.	[]	[]	[]	
f.8 Protection is provided along the sensing tube.	[]	[]	[]	
f.9 Power supplies for the differential pressure sensor, control, over pressure device, air release device are distributed from sub-circuit of staircase pressurization system.	[]	[]	[]	
f.10 Manual override switch provided on local fan control panel is locked in “Automatic control” position.	[]	[]	[]	
f.11 An indication signal is transmitted to supervisory control panel, when local fan control panel is in manual control mode.	[]	[]	[]	
g. <u>Construction work</u>				
g.1 Installations of door sets providing access to or from any pressurized space satisfy Building Authority’s requirements.	[]	[]	[]	
g.2 All doors, closers, hardware, etc. are capable of use in an atmosphere of 35°C & 100% R.H.	[]	[]	[]	
g.3 No supplementary gasket is provided to assist in preventing smoke leakage.	[]	[]	[]	
g.4 Door sets are installed in such a manner to be smoke leakage proof.	[]	[]	[]	
g.5 All joints between frames & building structure are provided with sealants in compliance with BS 476: Part 23.	[]	[]	[]	
g.6 Self-closing door closers are provided for all doors.	[]	[]	[]	
g.7 Finished sill under the closed doors is wear resistant.	[]	[]	[]	
h. <u>Functional test</u>				
h.1 Performance test is carried out and the result is satisfactory.	[]	[]	[]	
h.2 Measurement of door opening force is carried out and result is satisfactory.	[]	[]	[]	
h.3 Measurement of differential pressure across the pressurized space and accommodation is carried out and the result is satisfactory.	[]	[]	[]	
h.4 Measurement of pressurized air flow is carried out and the result is satisfactory.	[]	[]	[]	
h.5 Air intake fire/smoke damper is closed when the duct type smoke detector is activated;	[]	[]	[]	
or	[]	[]	[]	
Staircase pressurization system is shut down when the duct smoke detector at air intake is activated (for air intake only facing in one direction).	[]	[]	[]	
h.6 In order to prevent over pressure in pressurized space, fail safe protection for over pressure release is provided on conditions of :-				
- Failure of controller.	[]	[]	[]	
- Failure of pressure switch.	[]	[]	[]	
- Failure of wiring of pressure switch.	[]	[]	[]	
- Failure of actuator of by-pass damper.	[]	[]	[]	
- Failure of wiring of actuator (by-pass damper).	[]	[]	[]	
- Failure of over pressure exhaust fan.	[]	[]	[]	

	Yes	No	N/A	Remarks
h.7 Functional test of actuation				
- by building fire alarm system is in order. (Note: Manual fire alarm is not recommended for air relief system which is automatically controlled in the fire zones)	[]	[]	[]	
- by smoke detection system is in order.	[]	[]	[]	
- by sprinkler system is in order.	[]	[]	[]	
- by point type smoke detector mounted in the accommodation area adjacent to the doors (within 1 m) leading to the protected space at each storey served by the system is in order.	[]	[]	[]	
- by supervisory control panel when selected in manual mode is in order.	[]	[]	[]	
h.8 Functional test of response time				
The system is capable of achieving between 90% & 110% of the new volumetric requirements within 5 sec. of a door being opened or closed (for the over pressure release system by using variable supply fans or dampers).	[]	[]	[]	
h.9 Changeover from the duty equipment to the standby equipment is automatically operated when failure occurred in duty equipment.	[]	[]	[]	

Section III –For all staircase pressurization system installed in the building

- 3.1 The checklist is totally pages (including attached copies of Section II for each additional staircase pressurization system).
- 3.2 Attached number(s) of appendix.

Test conducted by:

Test certified by:

..... (Signature)

..... (Signature)

.....
Name of Works *Specialist/ Agent (in block letters)

.....
Full Name of Registered Professional Engineer
(in block letters)

.....
Company Chop

.....
Register Number of Engineer

Date

.....
Company Chop

Date

*** Delete as appropriate**

Endorsed by:

..... (Signature)

.....
Name of FSI Contractor's Representative (in block letters)

.....
Company Chop

.....(RC /)
Name of FSI Contractor (FSI Contractor Registration Number)