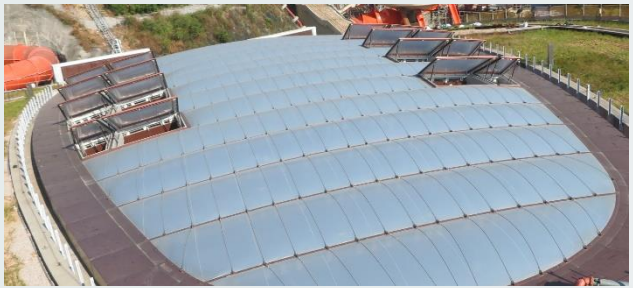
Submission of Smoke Control Systems & Acceptance Inspection of FSI

Licensing and Certification Command
Fire Service Installations Division
Engineer
Ir. CHAN Wai-lam

Submission of Smoke Control Systems

Submission on Smoke Control System

- Full detailed checking will be carried out on submissions of smoke control systems in accordance with FSD Circular Letter No.4/2008;
- Submission requirements are set out in FSD Circular Letter No. 4/1996.



Smoke Extraction System (Static / Dynamic)

Pressurization of Staircase

Ventilation / Air-conditioning Control

Design Workflow of Smoke Extraction Systems

- **Prescriptive Design**
  - Approved GBP → FSI Plan Submission → Installation and T&C → Acceptance Inspection
- **Fire Engineering Design**
  - Approved GBP & FER → FSI Plan Submission → Installation and T&C → Acceptance Inspection

GBP – General Building Plan ; **T&C** – Testing & Commissioning ; **FER** – Fire Engineering Report

Smoke Extraction Systems

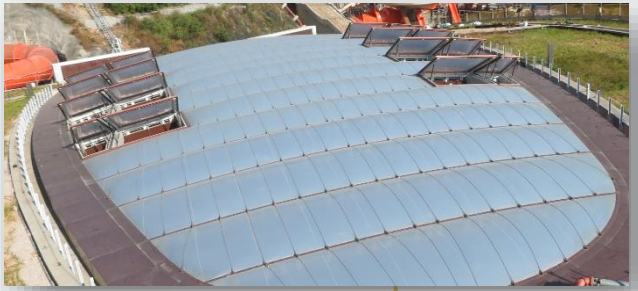
Technical Requirements:

- Section 5.23 of FSICoP
- Part IV of FSD Circular Letter No.4/1996
- Approved Fire Engineering Report

Point to note for plan submission

- Mode table shall include
  - Boundary fire scenario operation status
- Layout and schematic shall clearly indicate
  - Smoke zone
  - Fire compartmentation
- Maintain separation distance between
  - Smoke exhaust outlets
  - Other building openings
- Avoid pre-mature mixing of cool air with hot smoke

Dynamic SES



Static SES

Pressurization of Staircase

Technical Requirements:

- Section 5.21 of FSICoP
- BS5588-4:1998
- FSD Circular Letter No.2/2006

Point to note for plan submission

- Classification of system shall be clearly indicated
- Prevent over de-pressurization of accommodation with small area;
- Special consideration on simultaneous operation of smoke extraction system and staircase pressurization system
- Nos. of door in open door scenario shall be explicitly considered for Individual accommodation served by more than one door openings with the pressurized fireman's lift lobby or staircase

Ventilation/Air-conditioning Control System

Technical Requirements:

- Section 5.27 of FSICoP
- FSD Circular Letter No.1/2019

Point to note for plan submission

- Submission of FSI plans of A&A works with Form FSI/314A, existing tripping method shall be ascertained and ensure that Method “C” will not be utilized with other tripping methods
- layout and schematic shall clearly indicate
  - Fire compartmentation

Appendix IV – Checklists for Smoke Extraction System

SES Submission

	Item	✓/ ✗
1	Submission of SES drawings shall be accompanied by Form FSI/314 duly signed by AP and the appointed Fire Service Installation Consultant / Contractor certifying that the drawings are identical to the approved General Building Plan	
2	Two sets of FSI drawings as prepared according to Part I of FSD Circular Letter No. 4/96 (one set of drawings shall be colouared) and design reports shall be submitted	
3	GBP with FS Notes approved by FSD and compartmentation plans shall be enclosed to verify the actual extent of the system	
4	If the system is designed based on fire engineering approach, the approved FSAR shall be enclosed for reference	
5	The following drawings and documents shall be provided for assessment: - ➢ Design Report of the System ➢ Schematic Diagram ➢ Layout Plan ➢ Mode Table ➢ Elevation Plan showing the make-up inlet and smoked is charge outlet ➢ Design Details of Supervisory Control Panel ➢ Power Supply Schematic Diagram ➢ FSI layout of Fire Detection System and / or Sprinkler System	
6	All submissions are signed by a RPE under Cap 409 in Building Service, Fire or Mechanical Engineering for certifying the design is fully compliant with the statutory requirements	
7	The maximum velocity at smoke extraction outlet and make-up air intake shall comply with Clause B.11 under Section 5.23 of CoP	
8	Separate systems shall be provided for each fire compartment of atria or basement	
9	Shafts used for smoke extraction purpose shall contain no other services	
10	Discharge outlets for smoke shall be separated by not less than 5 m in any direction from all air inlets or other openings into any building	
11	No discharges shall be at a height above the surrounding horizontal surface of less than 3 m to the bottom of the outlet and where below 6 m shall not discharge downwards	
12	In all premises where sleeping normally occurs, all fans, motors, drives, starters, etc., shall be installed in duplicate with automatic changeover facilities	
13	In premises where dual purpose systems are utilized, duplicate plants as detailed in item 12 above shall be provided	
14	The following parts shall be included in the Design Report: - ➢ Description of building ➢ Design criteria of the system (i.e. Fire Engineering Approach or Prescriptive Approach) ➢ Description of system including means of extraction and make-up; arrangement of duty and stand-by plants; location of plant room etc ➢ Detail calculation of smoke extraction flow rate, make-up air flow rate and corresponding maximum velocity ➢ Control and actuation methodology of system ➢ Drawing list	
15	The followings shall be included in the Schematic Diagram: - ➢ Fan capacity, design flow rate and installation level of each smoke extraction outlet and make-up air intake ➢ Suitable FRR to be provided for the ductworks according to CoP ➢ Clear indication of smoke zone which tally with the approved FSAR /design report / FS Notes ➢ The fan, fire shutter, fire curtain and modulated fire and smoke damper are clearly designated and in line with the layout and mode table	
16	The followings shall be included in the Layout: - ➢ Fire compartmentation which tally with the approved GBP / FSAR ➢ Location of fire shutter, fire curtain and modulated fire and smoke damper shall tally with the approved GBP / Fire Engineering Report ➢ Clear indication of smoke zone which tally with the approved FSAR / design report / FS Notes ➢ Suitable FRR to be provided for the ductworks according to CoP ➢ The fan, fire shutter, fire curtain and modulated fire and smoke damper are clearly designated and in line with the schematic and mode table ➢ Fan capacity, design flow rate and installation level of each smoke extraction outlet and make-up air intake ➢ System shall be arranged such that the travel of the smoke is generally counter-flow to that of the egress/escape route ➢ Smoke shall not travel more than 30 m before entering the nearest point of inlet to the extract system and at least one extract point shall be provided within each 500 square metres unit of floor area	
17	The followings shall be included in the Mode Table: - ➢ "Normal", "Fire" and "No Power / Fail Safe" modes shall be included in the mode table ➢ Arrangement under boundary fire condition ➢ Interlocking arrangement between smoke extraction fan and make-up air fan / other means of make-up air ➢ Design shall be made to ensure a free passage of smoke and maintenance of fire compartmentation under no power / fail safe condition ➢ The fan, fire shutter, fire curtain and modulated fire and smoke damper are clearly designated and in line with the schematic and mode table	

Appendix IV – Checklists for Staircase Pressurization System

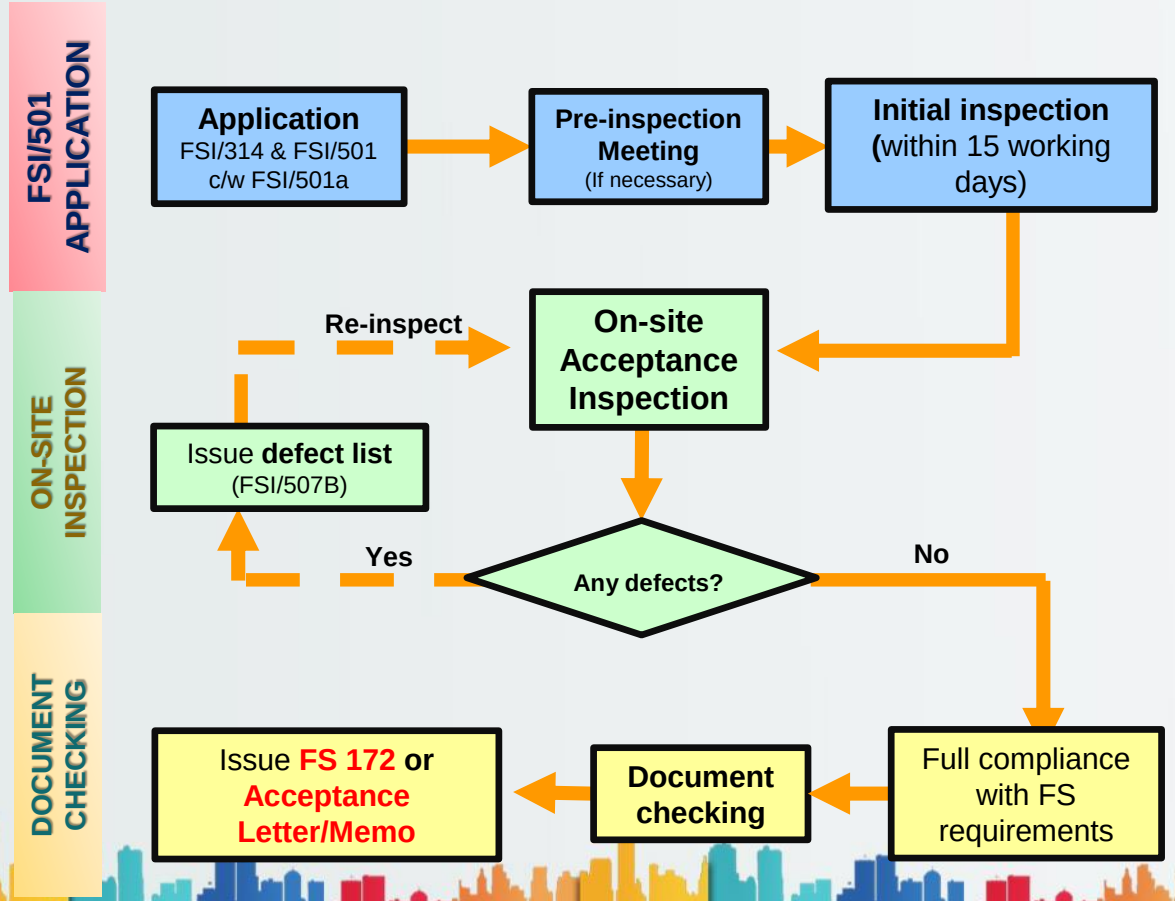
SPS Submission		
	Item	✓/ ✗
1	Submission of SPS drawings shall be accompanied by Form FSI/314 duly signed by AP and the appointed Fire Service Installation Consultant / Contractor certifying that the drawings are identical to the approved GBP	
2	Two sets of FSI drawings as prepared according to Part I of FSD Circular Letter No. 4/96 (one set of drawings shall be coloured) and design reports shall be submitted	
3	GBP with FS Notes approved by FSD and compartmentation plans shall be enclosed to verify the actual extent of the system	
4	If the system is designed based on fire engineering approach, the approved FSAR shall be enclosed for reference	
5	The following drawings and documents shall be provided for assessment: -	
	➢ Design Report of the System	
	➢ Schematic Diagram	
	➢ Layout Plan	
	➢ Mode Table	
	➢ Elevation Plan showing the air inlet, pressure relief and air release outlet	
	➢ Design Details of Supervisory Control Panel	
6	All submissions are signed by an RPE under Cap 409 in Building Service, Fire or Mechanical Engineering for certifying the design is fully compliant with the statutory requirements	
7	Safety factor shall be included for estimation of uncertain leakage path according to BS 5588-4	
8	Safety factor shall be included for leakage through ductworks according to BS 5588-4	
9	Clear identification of class of system according to BS 5588-4	
10	Means of pressure relief shall be clearly stated	
11	Proper design shall be made when there are both SES and SPS serving the same accommodation such that satisfactory performance shall be ensured during simultaneous operation of both systems	
12	The following parts shall be included in the Design Report: -	
	➢ Description of building	
	➢ Design criteria of the system (i.e. Fire Engineering Approach or	
	➢ Prescriptive Approach)	
	➢ Description of system including class of system; arrangement of duty and stand-by plants; means of air release and pressure relief; location of plant rooms etc	
	➢ Detail calculation of design air flow rate of pressurization fans and air release fans; effective area of pressure relief vent under critical scenario in both close door and open door condition	
	➢ Control and actuation methodology of system	
	➢ Drawing list	
	➢ Door schedule	
13	The followings shall be included in the Schematic Diagram: -	
	➢ Fan capacity, design flow rate and installation location of pressure relief vent, air inlet and air release louver	
	➢ Suitable FRR to be provided for the ductworks according to CoP	
	➢ Clear indication of pressure differential label	
	➢ The fans and Modulated Fire and Smoke Damper are clearly designated and in line with the layout and mode table	
	➢ Single / multiple inject system shall be adopted according to the CoP based on the building height	
	➢ System operation condition under critical scenario in both close door and open door condition	
	➢ Independent air intake louvers facing two different directions to be included if such louvers are not installed near ground level	
	➢ Probe type smoke detector installed in the air intake ductwork	
	➢ Area of pressure relief vent	
14	The followings shall be included in the Layout: -	
	➢ Fire compartmentation which tally with the approved GBP / FSAR	
	➢ Location of fire shutter and modulated fire and smoke damper shall tally with the approved GBP / FSAR	
	➢ Suitable FRR to be provided for the ductworks according to CoP	
	➢ Clear indication of pressure differential label	
	➢ The fan and modulated fire and smoke damper are clearly designated and in line with the schematic and mode table	
	➢ Fan capacity, design flow rate and installation location of pressure relief vent, air inlet and air release louver	
	➢ Smoke detector for actuation of system installed at distance not exceeding 1m from and outside the access doors to the staircase or its approach lobbies	
15	The followings shall be included in the Mode Table: -	
	➢ "Normal", "Fire" and "No Power / Fail Safe" modes shall be provided in the mode table	
	➢ Interlocking arrangement between pressurization fan and air release fan shall be included	
	➢ Design shall be made to ensure maintenance of fire compartmentation under no power / fail safe condition	

Appendix IV – Checklists for Ventilation/Air-conditioning Control System Submission

VAC Submission		
	Item	✓/ ✗
1	Submission of VAC drawings shall be accompanied by Form FSI/314 duly signed by AP and the appointed Fire Service Installation Consultant / Contractor certifying that the drawings are identical to the approved GBP	
2	Two sets of FSI drawings as prepared according to Part I of FSD Circular Letter No. 4/96 (one set of drawings shall be coloured) shall be submitted	
3	GBP with FS Notes approved by FSD and compartmentation plans shall be enclosed to verify the actual extent of the system	
4	If the system is designed based on fire engineering approach, the approved FSAR shall be enclosed for reference	
5	The following drawings and documents shall be provided for assessment: - ➢ Equipment Schedule ➢ SchematicDiagram ➢ LayoutPlan	
6	The followings shall be included in the Equipment Schedule: - Designation of equipment ➢ Area served by the equipment ➢ Fire compartment according to the approved GBP ➢ Air flow rate of equipment ➢ Method of Tripping ➢ Criteria for exemption of tripping according to CoP ➢ Actuation device ➢ Equipment to be tripped shall be highlighted	
7	The followings shall be included in both Schematic Diagram and Layout: - ➢ Designation and capacity of equipment ➢ Indication of fire compartment ➢ Actuationdevice ➢ Equipment to be tripped shall be highlighted ➢ Manual override switch shall be highlighted ➢ Fire dampers forming fire compartment shall be included	

Acceptance Inspection

Workflow of the acceptance inspection of FSI for new building

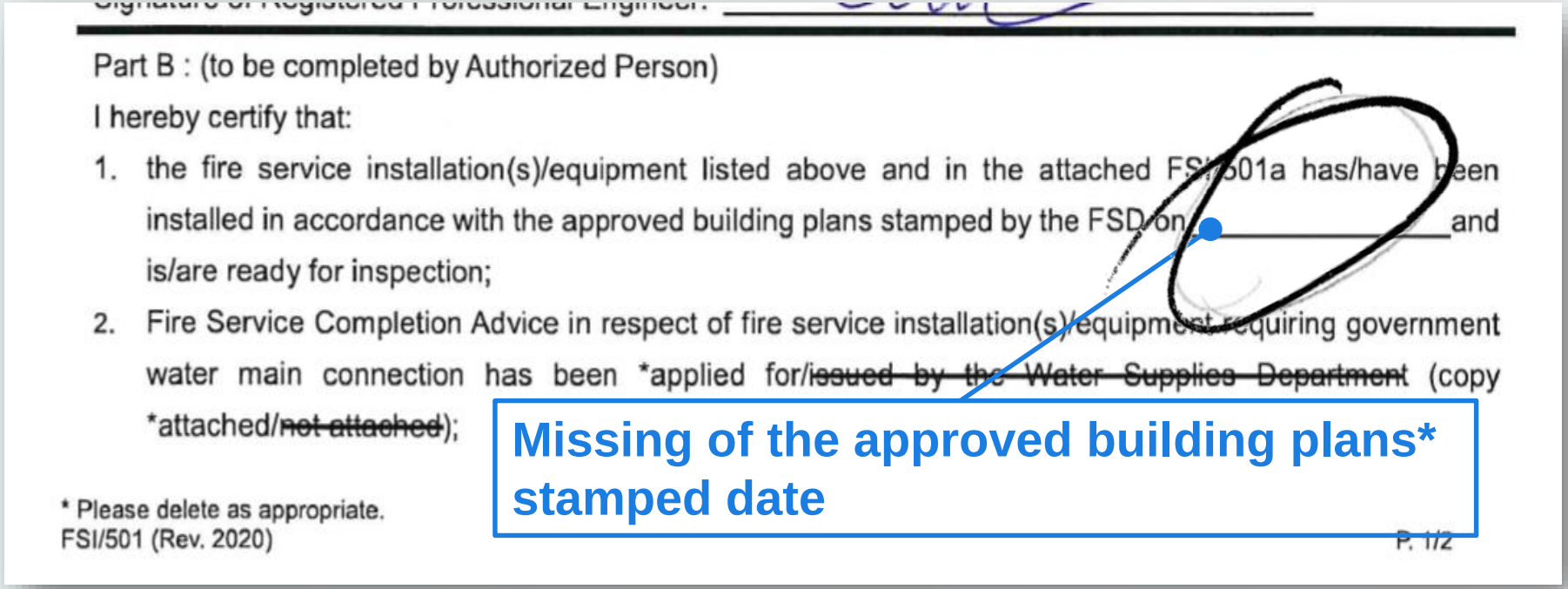


Observations on the unsuccessful applications

- Incomplete Application Form FSI/501
- Outstanding submission of Copy of Certificate [FSI/501a]
- Improper submission of Certificate [FSI/501a]

For example …

Incomplete Application Form FSI/501



Part B : (to be completed by Authorized Person)

I hereby certify that:

1. the fire service installation(s)/equipment listed above and in the attached FSI/501a has/have been installed in accordance with the approved building plans stamped by the FSD on _____ and is/are ready for inspection;
2. Fire Service Completion Advice in respect of fire service installation(s)/equipment requiring government water main connection has been *applied for/~~issued by the Water Supplies Department~~ (copy *attached/~~not attached~~);

Missing of the approved building plans* stamped date

* Please delete as appropriate.
FSI/501 (Rev. 2020)

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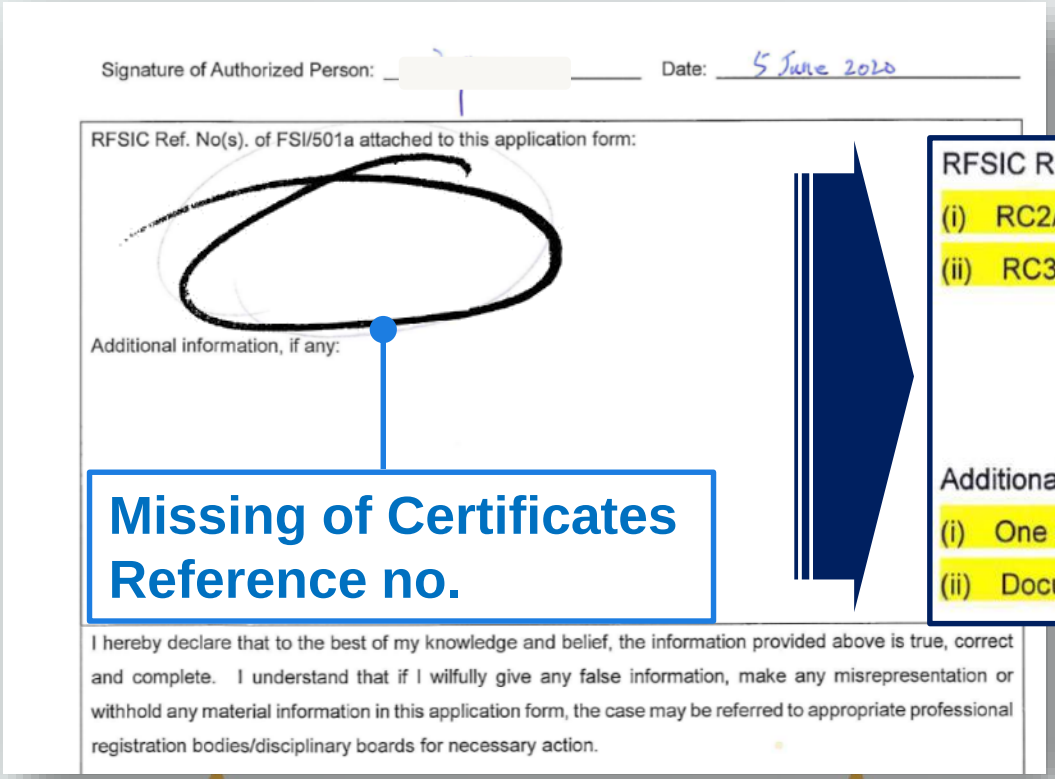
** Pursuant to 16(1)(b)(ii) of Buildings Ordinance (Cap. 123)*

Incomplete Application Form FSI/501



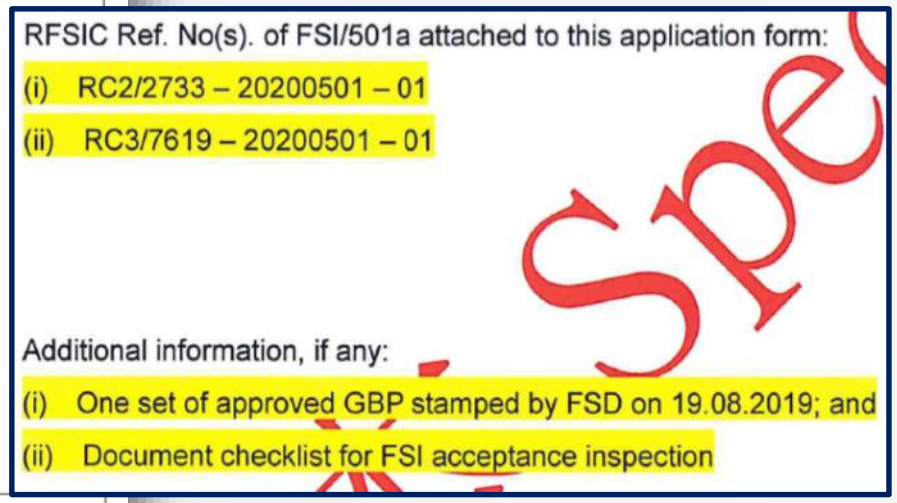
Signature of Authorized Person: _____ Date: 5 June 2020

RFSIC Ref. No(s). of FSI/501a attached to this application form:

Additional information, if any:

Missing of Certificates Reference no.

I hereby declare that to the best of my knowledge and belief, the information provided above is true, correct and complete. I understand that if I wilfully give any false information, make any misrepresentation or withhold any material information in this application form, the case may be referred to appropriate professional registration bodies/disciplinary boards for necessary action.



RFSIC Ref. No(s). of FSI/501a attached to this application form:

(i) RC2/2733 – 20200501 – 01

(ii) RC3/7619 – 20200501 – 01

Additional information, if any:

(i) One set of approved GBP stamped by FSD on 19.08.2019; and

(ii) Document checklist for FSI acceptance inspection

Spe

Sample

Missing of Signature

I hereby declare that to the best of my knowledge and belief, the information provided above is true, correct and complete. I understand that if I wilfully give any false information, make any misrepresentation or withhold any material information in this application form, the case may be referred to appropriate professional registration bodies/disciplinary boards for necessary action.

Signature of Registered Professional Engineer
(if applicable)

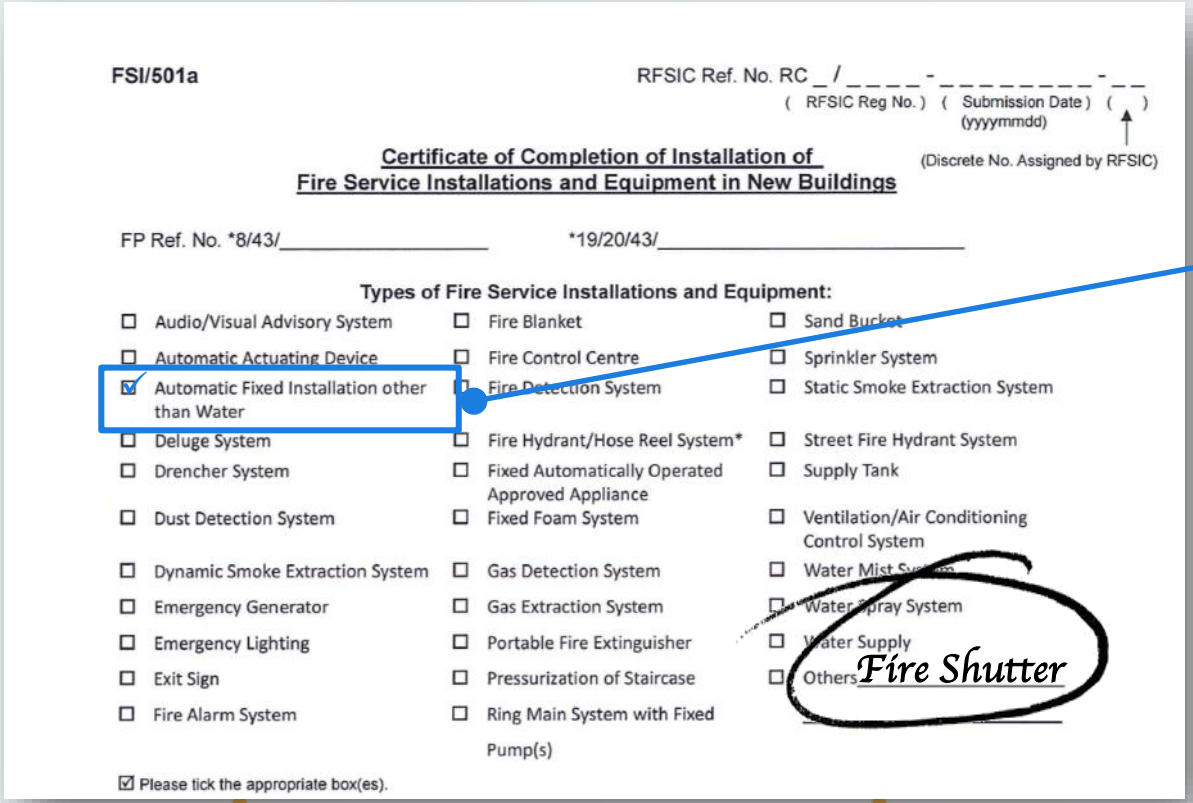
Signature of Authorized Person

RPE  **&**  **AP**

* Please delete as appropriate.
FSI/501 (Rev. 2020)

P. 2/2

Improper submission of Certificate [FSI/501a]



FSI/501a

RFSIC Ref. No. RC _ / _ _ _ _ - _ _ _ _ _ _ _ _ - _ _
(RFSIC Reg No.) (Submission Date) ( )
(yyyymmdd)
(Discrete No. Assigned by RFSIC)

Certificate of Completion of Installation of Fire Service Installations and Equipment in New Buildings

FP Ref. No. *8/43/_____ *19/20/43/_____

Types of Fire Service Installations and Equipment:

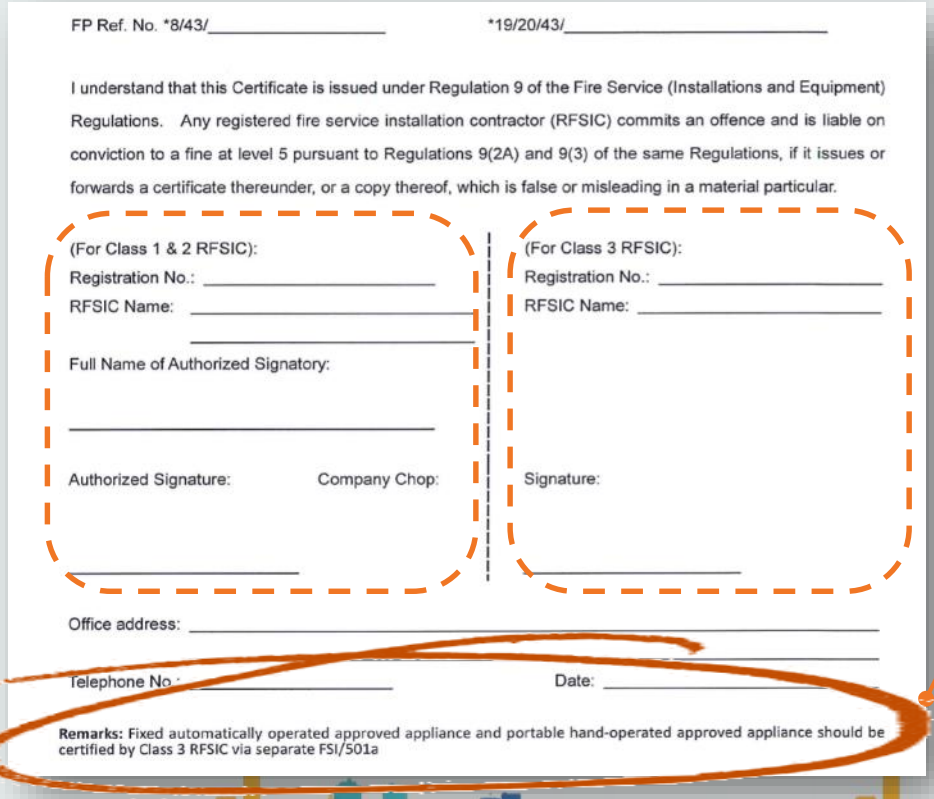
☐ Audio/Visual Advisory System	☐ Fire Blanket	☐ Sand Bucket
☐ Automatic Actuating Device	☐ Fire Control Centre	☐ Sprinkler System
☑ Automatic Fixed Installation other than Water	☐ Fire Detection System	☐ Static Smoke Extraction System
☐ Deluge System	☐ Fire Hydrant/Hose Reel System*	☐ Street Fire Hydrant System
☐ Drencher System	☐ Fixed Automatically Operated Approved Appliance	☐ Supply Tank
☐ Dust Detection System	☐ Fixed Foam System	☐ Ventilation/Air Conditioning Control System
☐ Dynamic Smoke Extraction System	☐ Gas Detection System	☐ Water Mist System
☐ Emergency Generator	☐ Gas Extraction System	☐ Water Spray System
☐ Emergency Lighting	☐ Portable Fire Extinguisher	☐ Water Supply
☐ Exit Sign	☐ Pressurization of Staircase	☐ Others: Fire Shutter
☐ Fire Alarm System	☐ Ring Main System with Fixed Pump(s)	

☑ Please tick the appropriate box(es).

CoP Part V Clause 5.2

Fire shutter referred as Automatic Actuating Device (AAD)

Improper submission of Certificate [FSI/501a]



FP Ref. No. *8/43/_____ *19/20/43/_____

I understand that this Certificate is issued under Regulation 9 of the Fire Service (Installations and Equipment) Regulations. Any registered fire service installation contractor (RFSIC) commits an offence and is liable on conviction to a fine at level 5 pursuant to Regulations 9(2A) and 9(3) of the same Regulations, if it issues or forwards a certificate thereunder, or a copy thereof, which is false or misleading in a material particular.

(For Class 1 & 2 RFSIC):
Registration No.: _____
RFSIC Name: _____
_____
Full Name of Authorized Signatory:
_____
Authorized Signature: Company Chop:

(For Class 3 RFSIC):
Registration No.: _____
RFSIC Name: _____
Signature:

Office address: _____
_____
Telephone No.: _____ Date: _____

Remarks: Fixed automatically operated approved appliance and portable hand-operated approved appliance should be certified by Class 3 RFSIC via separate FSI/501a

Fixed automatically operated approved appliance
Portable hand-operated approved appliance should be certified by Class 3 RFSIC via separate FSI/501a

Improper submission of Certificate [FSI/501a]

The above fire service installation(s)/equipment has/have been installed at (address of premises)

_____

_____

_____

and the installation work was completed on_____. I hereby certify that such fire service installation(s)/equipment, which was/were installed according to the FSI plans submitted under the cover of FSI/314 dated _____ and/or building plans approved by FSD on _____, has/have been tested and, to the best of my knowledge, is/are in efficient working order in accordance with the Codes of Practice for Minimum Fire Service Installations and Equipment and Inspection, Testing and Maintenance of Installations and Equipment published from time to time by the Director of Fire Services.

Original/certified true copies of the following documents are attached as follows:

- ☐ Completed testing and commissioning checklist(s)
- ☐ *Listing certificate(s)/record(s)/document(s)/printout(s) from product certification bodies
- ☐ *FSD approval/acceptance letter(s)
- ☐ *Test certificate(s)/data sheet(s)/catalogue(s)/calculation(s)
- ☐ Others (please specify, e.g. Fire Safety Management Plan, Fire Engineering Report):_____

☑ Please tick the appropriate box(es).

Remarks: Relevant test report(s) for dynamic smoke extraction system/ staircase pressurization system endorsed by the Registered Professional Engineer, if applicable, should be attached.

This certificate shall be issued by RFSIC to the person on whose instructions the installation work was undertaken and a copy thereof shall be forwarded to the Director of Fire Services within 14 days after completion of the work.

* Please delete as appropriate.

FSI/501a

P. 1/2

Within 14 days
a Copy to FSD

RFSIC

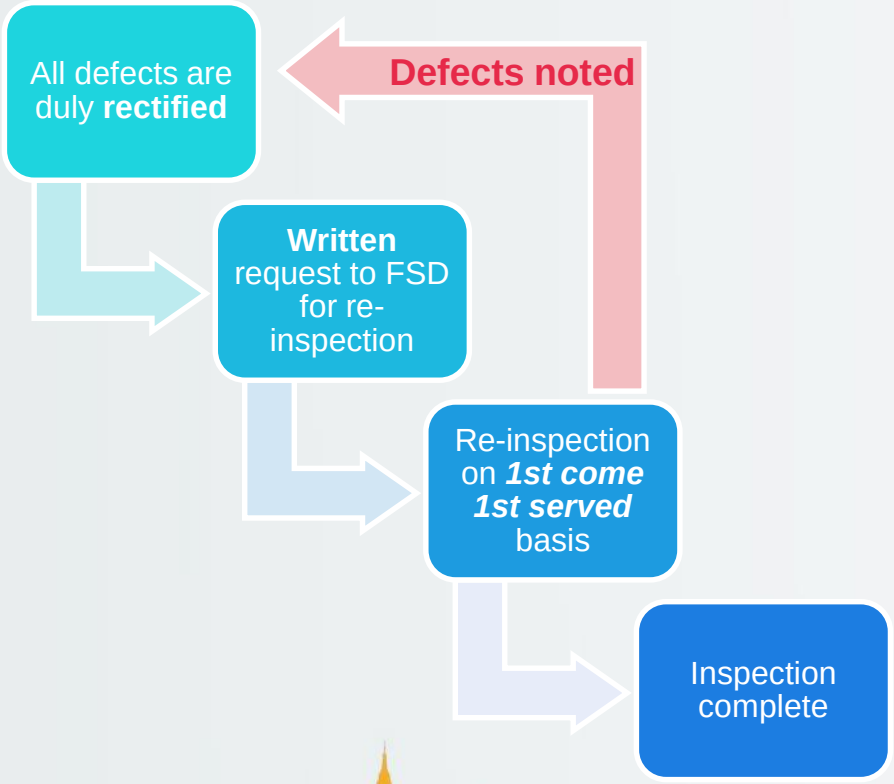
Pre-inspection meeting

- Conducted on a need basis before on-site inspection.
- Objectives:
  1. Review the project status and site readiness;
  2. Conduct preliminary checking of submitted documents;
  3. Receive supplementary documents; and
  4. Formulate an inspection schedule as agreed by all parties.

On-site Inspection

–will be conducted within 15 working days

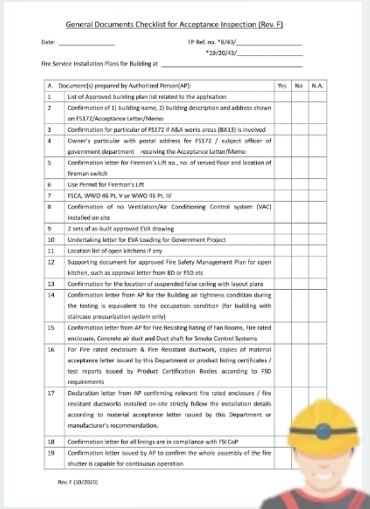
Re-inspection Arrangement



Document Checklist [Rev. F (10/2020)]

- **To enhance the efficiency of document checking after/befor e on-site acceptance inspection**

Authorized Person



General Documents Checklist for Acceptance Inspection (Rev. F)

Date: _____ FP Ref. no. *B/43/_____ *19/20/43/_____

Fire Service Installation Plans for Building at _____

A.	Document(s) prepared by Authorized Person(AP):	Yes	No	N.A.
1	List of Approved building plan list related to the application			
2	Confirmation of 1) building name, 2) building description and address shown on FS72/Acceptance Letter/Memo			
3	Confirmation for particular of FS172 if A&A works areas (BA13) is involved			
4	Owner's particular with postal address for FS172 / subject officer of government department receiving the Acceptance letter/Memo			
5	Confirmation letter for Fireman's Lift no., no. of served floor and location of fireman switch			
6	Use Permit for Fireman's Lift			
7	FSCA, WWO 46 Pt. V or WWO 46 Pt. IV			
8	Confirmation of no Ventilation/Air Conditioning Control system (VAC) installed on site			
9	2 sets of as-built approved EVA drawing			
10	Undertaking letter for EVA Loading for Government Project			
11	Location list of open kitchens if any			
12	Supporting document for approved Fire Safety Management Plan for open kitchen, such as approval letter from BD or FSD etc			
13	Confirmation for the location of suspended false ceiling with layout plans			
14	Confirmation letter from AP for the Building air tightness condition during the testing is equivalent to the occupation condition (for building with staircase pressurization system only)			
15	Confirmation letter from AP for Fire Resisting Rating of Fan Rooms, Fire rated enclosure, Concrete air duct and Duct shaft for Smoke Control Systems			
16	For Fire rated enclosure & Fire Resistant ductwork, copies of material acceptance letter issued by this Department or product listing certificates / test reports issued by Product Certification Bodies according to FSD requirements			
17	Declaration letter from AP confirming relevant fire rated enclosure / fire resistant ductworks installed on-site strictly follow the installation details according to material acceptance letter issued by this Department or manufacturer's recommendation.			
18	Confirmation letter for all linings are in compliance with FSI CoP			
19	Confirmation letter issued by AP to confirm the whole assembly of the fire shutter is capable for continuous operation			

Rev. F (10/2020)

Building Owner

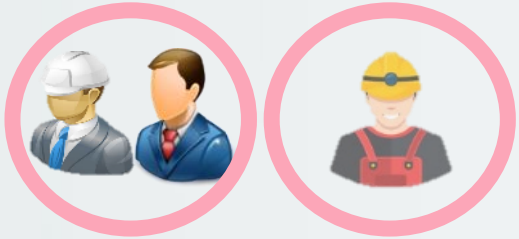
Registered FSI Contractor

Case Sharing on Irregularities and Observations

Proper T & C before FSI/501 application

Testing & Commissioning

No defects



Application of FSI/314 & FSI/501

On-site Acceptance Inspection

Common Defects associated with prescribed requirements

- Inconsistence with approved conditions, for example:-
  - Exemption of Sprinkler Coverage
  - Non-FSI load connection to emergency generator
  - Assumption in fully hydraulic calculations

FSD Circular Letter No. 4/2008:

(e) In case of major or fundamental error(s) in installations or submissions noted which may impede the commencement of initial compliance inspection, the AP and FSIC will be requested to withdraw the submitted FSI/501 (Rev. 08) and the onus in this regard will rest with the AP and/or the FSIC.

Improper installation of exit sign

Improper type of directional signs

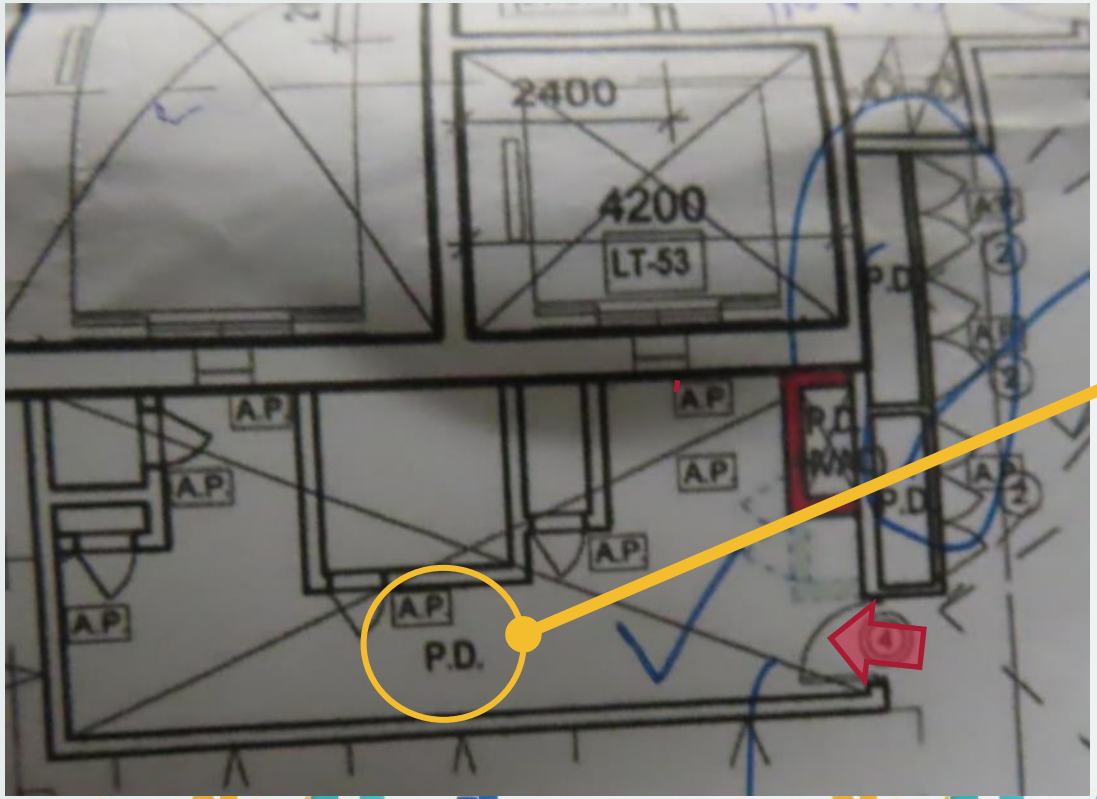
Incomplete F.S. & Sprinkler inlet ENCLOSURE

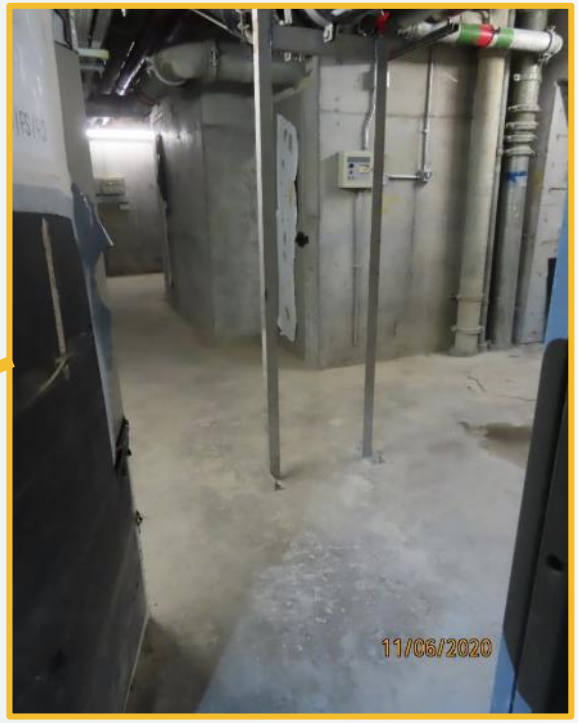
Obstruction of FSI by other services

Exit Sign was obstructed by vent duct

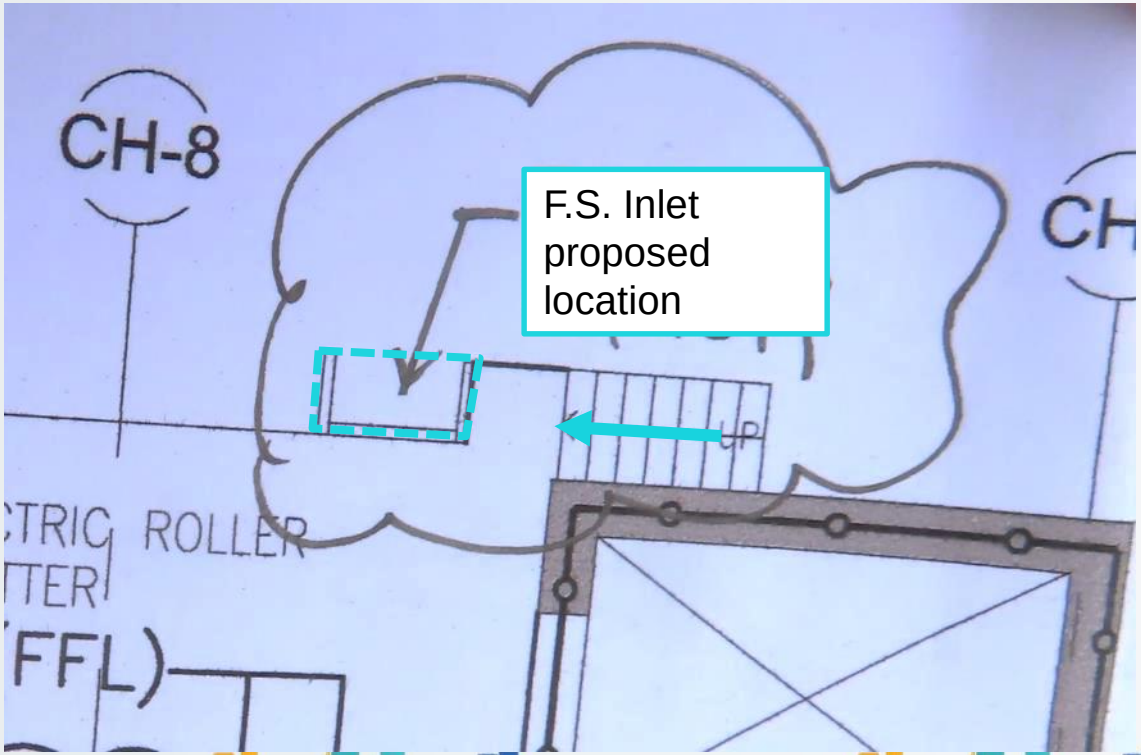
Sprinkler heads were obstructed by ductworks

CLARIFICATION OF “pipeduct” USAGE

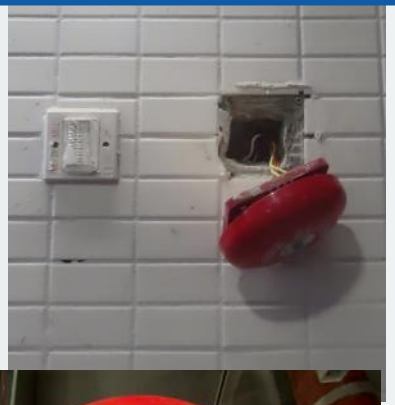




Not tally with layout drawing

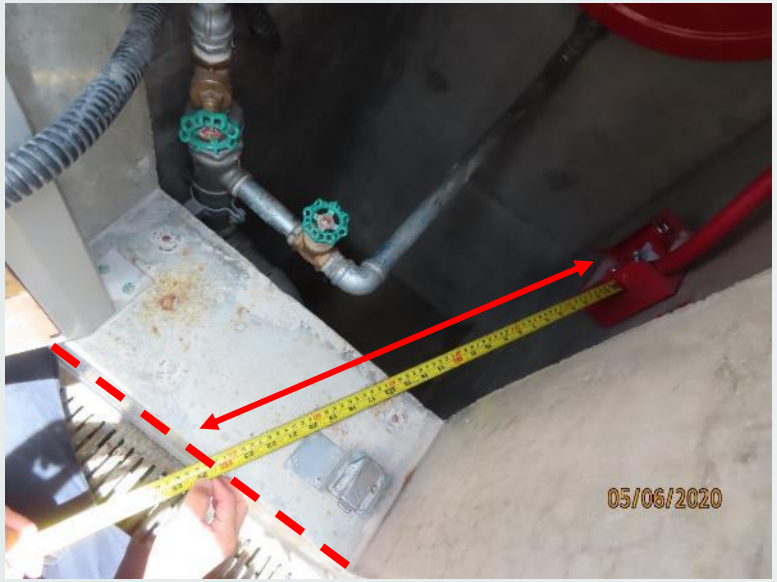


Improper installation of fsi



Hand-wheel’s operation ineffective

Improper location of the nozzle

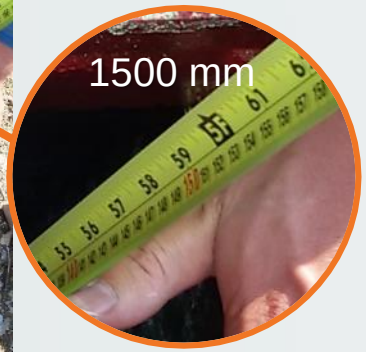


Control valve and nozzle are sited in a discernible and accessible position should be of not more than 500 mm from the surface of the doors

More than 500 mm is not acceptable

Reference: FSD Circular Letter 1/2015 – Appendix 5

Improper installation of FSI



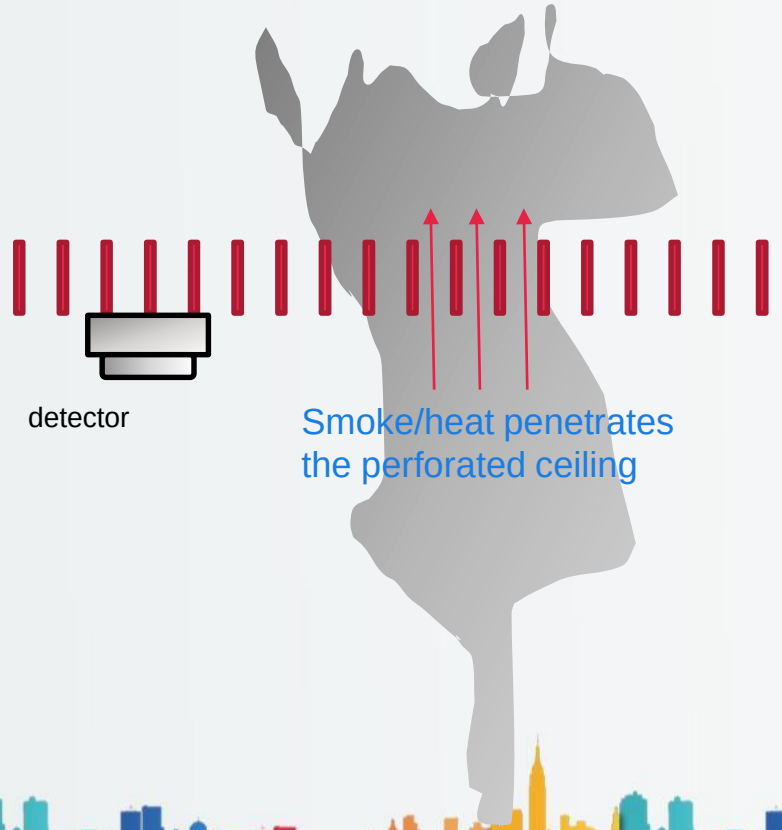
Spindle of the underground valve should be within 250 – 500 mm below valve pit cover

Reference: FSD Circular Letter 1/2015 – Appendix 7

Obstruction to smoke detector

Reference: Figure 8 of BS 5839-1:2002+A2:2008

Improper installation of smoke detector



Reference: Figure 11 of BS 5839-1:2002+A2:2008

Improper location of Automatic Actuating Devices (AAD)

- Clearance below detector should be maintained of 500 mm at least
- Detectors should not be mounted within 1m of any air inlet of a forced ventilation system

Reference: FSD Circular Letter 1/2015 – Appendix 4 – T&C Checklist for Fire Detection and Fire Alarm System

Exceeded static pressures of Fire Hydrant system

Static pressure at hydrant outlet exceeded 850 kPa

1100 kPa

HINTS FOR SUCCESSFUL INSPECTION

1 **Assure Collaborative Involvement**

- Liaisons among RPE, owner, AP, consultant, RFSIC and etc.

2 **Familiar with acceptance criteria**

- Submit Accurate T&C Report and doc.
- Possess good understanding of project specific FS provision

3 **Perform High quality of works**

- Confirm Site Readiness and Safety
- Prepare Smooth Rundown

4 **Avoid Alternation to Prescribed F.S. Requirements**

- Ensure consistence among site condition and design
- Strictly follow approved condition

Thank You