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7 June 2023

To: Recipients of FSD Circular Letters

Dear Sir/Madam,

FSD Circular Letter No. 2/2023

Fire Safety Requirements for Mechanical Ventilating Systems

This Circular Letter serves to announce the revised fire safety requirements for mechanical ventilating systems and arrangements of their implementation. These requirements will take effect on **1 September 2023**, thereby superseding relevant requirements stipulated in Part XI of FSD Circular Letter No. 4/96.

With a view to enhancing fire safety standards of mechanical ventilating systems, a Sub-working Group joined by the Ventilation Installation Liaison Group and the Fire Safety Standard Advisory Group, has conducted a holistic review on relevant requirements. The Sub-working Group revised the fire safety requirements for mechanical ventilating systems falling within the scopes of the following government regulations respectively. Details are as follows.

- (i) Building (Ventilating Systems) Regulations (Cap. 123J)
- (ii) Ventilation of Scheduled Premises Regulation (Cap. 132CE)

The revised requirements “Fire Safety Requirements for Mechanical Ventilating Systems”, is attached at **Appendix 1** to this letter. Apart from updating of relevant requirements with reference to the current international/national standards, main areas of revision are as follows:-

- (a) Specified requirements for installations inside mechanical ventilating systems;

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- (b) Specified requirements for air filter cells and air filter media, electrostatic precipitators, and fire and smoke dampers used in mechanical ventilating systems;
 - (c) Updated requirements for installation of insulation materials near fire dampers;
 - (d) Updated “Inspection Checklist for Mechanical Ventilating System”.
- (iii) Dangerous Goods Ordinance, Cap. 295

The requirements were revised to conform with the amended Dangerous Goods Ordinance (Cap. 295) which came into effect on 31 March 2022. The revised requirements were incorporated into Section 2.3.3, Chapter 2.3 of “A Guide to Application for Dangerous Goods Licence and Approval” issued by this Department. The guide can be downloaded from the following FSD’s Dangerous Goods Thematic website:

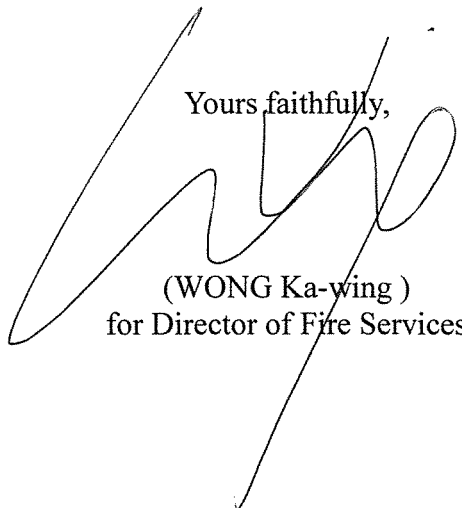
<https://es.hkfsd.gov.hk/dg/en/licence/guide/>

- (iv) Fire Service (Installation and Equipment) Regulations, Cap. 95B

The requirements were revised to align with the requirements of gas extraction system for the type of premises with battery rooms and electrical charging facilities stipulated in the Code of Practice for Minimum Fire Service Installations and Equipment (Sep 2022). These revised requirements are to be promulgated separately in FSD Circular Letter no. 3/2023.

For enquiries, please contact our Ventilation Division at 2718 7567 or Fire Service Installations Division at 3961 5217 during office hours.

Yours faithfully,



(WONG Ka-wing)
for Director of Fire Services

Encl.



**FIRE SAFETY REQUIREMENTS FOR
MECHANICAL VENTILATING SYSTEMS**

1. Installations inside Mechanical Ventilating Systems
2. Air Filters Used in Mechanical Ventilating Systems
3. Fire Dampers and Fire and Smoke Dampers Used in Mechanical Ventilating Systems
4. Electrostatic Precipitators Used in Mechanical Ventilating Systems
5. Thermal Insulation for Ductwork and Pipework
6. Electric Heating Elements Used in Mechanical Ventilating Systems
7. Flexible Air Ducts Used in Mechanical Ventilating Systems
8. Use of False Ceilings and Elevated Floors (Other Than Installations at Computer Rooms) as Ductwork
9. Requirements for Protection against Fire and Smoke in Protected Areas

Annex 1 Inspection Checklist for Mechanical Ventilating System

FIRE SAFETY REQUIREMENTS FOR MECHANICAL VENTILATING SYSTEMS

1. Installations inside Mechanical Ventilating Systems

1.1 Unless otherwise specified fire safety requirements, no combustible materials shall be allowed in ductwork and mechanical ventilating system equipment pursuant to the Building (Ventilating Systems) Regulations (Cap. 123J) or Ventilation of Scheduled Premises Regulation (Cap. 132CE). If forming part of the ventilating system, other apparatus such as tubes, electric wiring and control equipment shall be encapsulated in metallic conduits or castings.

2. Air Filters Used in Mechanical Ventilating Systems

2.1 Air Filter Cells and Air Filter Media

2.1.1 Air filter cells (i.e. media plus media enclosure) and air filter media shall be constructed of materials in compliance with the fire property requirements under one of the following standards:

BS 476 : Part 4 - Non-combustibility Test for Materials

BS 476 : Part 6 - Method of Test for Fire Propagation for products with overall performance index "I" \leq 12 and sub-index "i₁" (derived from the initial period of the test) \leq 6

UL 900 - Standard for Air filter Units, Class 1 or Class 2

DIN 53438 Part 3 - Response to Ignition by a Small Flame, Surface Ignition, Class F1

2.2 Air Filter Cell Support Framework

2.2.1 Air filter cell support framework for individual and multiple cell installations shall be constructed of non-combustible materials conforming to BS 476 : Part 4 and have a mechanical strength equivalent to that of a 1 mm thick galvanised steel sheet.

2.2.2 All components such as gaskets, seals, etc. between the air filter cells and the support framework shall comply with the same fire property requirements for the cells as detailed in paragraph 2.1 above.

2.3 Metallic Air Filter Cells

- 2.3.1 Air filter cells wholly constructed of metal (i.e. where the filter media is formed from a grid or mesh of metal such as stainless steel, aluminium and etc.) shall not be subject to this set of fire safety requirements.

Note: No use of steel wool is permitted (please refer to section 4(1)(g) of the Building (Ventilating Systems) Regulations (Cap. 123J)).

- 2.3.2 If, however, the metallic media is coated with combustible substance, it shall be regarded as a special filter and be subject to requirements laid down in paragraph 2.4 below.

2.4 Special Filter Installations

- 2.4.1 For special filter applications such as the removal of smell by activated carbon filters, submissions shall be made to the Director of Fire Services for relaxation of the requirements laid down in paragraphs 2.1 and 2.2 above and for clarification on any specific additional fire safety precautions that may be necessary.

2.5 Filter Identification

- 2.5.1 All air filter cells and air filter media except those mentioned in paragraph 2.3 above shall, at the place of manufacture, have the following information clearly marked or stamped in a conspicuous and readily accessible location:

- (a) Manufacturer's name;
- (b) Country of origin;
- (c) Filter type and model number; and
- (d) The standard to which the filter has been type-tested.

- 2.5.2 The Director of Fire Services may require applicants to submit a copy of the Certificate of Type Test for the air filter cells and air filter media issued by (i) Mainland China's/overseas laboratories/organisations that provide product certification service with approved listing scheme/service and are accredited by Mainland China's/overseas accreditation bodies; or (ii) local laboratories/organisations that provide product certification service with approved listing scheme/service and are accredited by the Hong Kong Accreditation Service through the Hong Kong Certification Body Accreditation Scheme (HKCAS). Failure to submit the certificate will render the application for filter installation unsuccessful.

3. Fire Dampers and Fire and Smoke Dampers Used in Mechanical Ventilating Systems

The paragraphs below provide details about the manufacturing standards and installation requirements for fire dampers as well as fire and smoke dampers used in mechanical ventilating/air conditioning systems. Opening for passage of ductwork through any compartment wall, floor or ceiling of fire-rated structure should be protected with fire dampers to maintain the required fire resistance rating (FRR) of the building elements.

3.1 Non-proprietary Manufactured Blade Type Fire Dampers

3.1.1 For any ductwork which passes through any floor or ceiling and requires the provision of a fire damper, the fire damper blades shall be constructed of 6 mm thick mild steel plate. The associated casing shall also be constructed to this standard.

3.1.2 For any ductwork which passes through any wall and requires the provision of a fire damper, the fire damper shall be constructed of:

(a) 3 mm thick mild steel plate when the wall in which the fire damper is mounted has an FRR of less than 2 hours;

(b) 6 mm thick mild steel plate when the wall in which the fire damper is mounted has an FRR of 2 hours or more.

The associated casing shall also be constructed to this standard.

3.1.3 Angle section steel or similar structural members shall be employed in the construction of the fire damper casing framework to provide structural rigidity for the purpose of preventing the deforming of the damper casing and maintaining clearance between the fixed and the moving parts in all operating conditions.

3.1.4 The lateral clearance between the moving blades and the damper casing shall not exceed 1.5 mm. For multiple-blade fire dampers, each blade shall be arranged in such a way to come into contact and overlap the adjacent ones by a minimum of 5 mm when the damper is in the closed position. Suitable stoppers shall be provided on the casing to maintain the blades in a stable position when the damper is closed.

3.1.5 Bushes constructed of brass or similar materials shall be provided for all the blade spindles of the fire damper.

3.1.6 The length of the fire damper casing shall be longer than that of the fire damper assembly by not less than 30 mm when the fire damper is in an open position, i.e. not less than 15 mm at either end.

- 3.1.7 The closing of the fire damper shall be done solely by the weight of the damper blade(s), not actuated by springs or other dead weights.
- 3.1.8 To avoid sagging of the damper blade under its own weight, each damper blade shall not be longer than 600 mm. Structural opening with a width greater than this dimension shall be protected by multiple fire damper units. In special cases where it is not possible to comply with the limit of 600 mm, a slight extension beyond this may be allowed but proof must be presented to the Director of Fire Services to establish that the smooth operation and the function of the fire damper will not be impaired.

3.2 Proprietary Manufactured Fire Dampers

3.2.1 As an alternative to the non-proprietary manufactured blade type fire dampers as specified in paragraph 3.1 above, proprietary manufactured fire dampers with the construction and mounting method conforming to a national/international standard accepted by (i) Mainland China's/overseas laboratories/organisations that provide product certification service and approved listing scheme/service, and are accredited by Mainland China's/overseas accreditation bodies; or (ii) local laboratories/organisations that provide product certification service and approved listing scheme/service and are accredited by the Hong Kong Accreditation Service through the Hong Kong Certification Body Accreditation Scheme (HKCAS) may be used, and the fire damper shall have an FRR that is the same as that of the structure it protects. The fire dampers shall comply with the fire property requirements under one of the following acceptable national or international standards:

- (a) BS 476 : Part 20 for Integrity only (i.e. excluding insulation and load bearing performance criteria)
- (b) BS EN 1366-2 for Integrity only (i.e. excluding insulation and load bearing performance criteria)
- (c) ISO 21925 -1 for Integrity only (i.e. excluding insulation and load bearing performance criteria)
- (d) Underwriters Laboratories Inc. - UL 555.

3.2.2 The following information shall, at the place of manufacture, be clearly and durably marked in a conspicuous location on the fire damper :

- (a) Manufacturer's name; and
- (b) Type and model number.

3.3 Fire and Smoke Dampers

3.3.1 Proprietary manufactured fire and smoke dampers with the construction and mounting method conforming to a national/international standard accepted by (i) Mainland China's/overseas laboratories/organisations that provide product certification service and approved listing scheme/service, and are accredited by Mainland China's/overseas accreditation bodies; or (ii) local laboratories/organisations that provide product certification service with approved listing scheme/service and are accredited by the Hong Kong Accreditation Service through the Hong Kong Certification Body Accreditation Scheme (HKCAS) may be used, and the fire and smoke damper has an FRR that is the same as that of the structure it protects. The fire and smoke dampers shall comply with the fire property requirements under one of the following acceptable national or international standards:

- (a) BS 476 : Part 20 or UL 555 for Integrity only (i.e. excluding insulation and load bearing performance criteria) and UL 555S Leakage Class 1 or 2;
- (b) BS EN 1366 - 2;
- (c) ISO 21925 - 1.

3.3.2 The following information shall, at the place of manufacture, be clearly and durably marked in a conspicuous place on the fire and smoke damper:

- (a) Manufacturer's name; and
- (b) Type and model number.

3.4 General Requirements

The requirements for fire dampers detailed below shall also apply to fire and smoke dampers.

3.4.1 The fusible link shall be located in such a way not to impede the closing action of the fire damper.

3.4.2 The fusible link shall be a type approved by the Director of Fire Services and shall be imprinted with its brand name, the operating temperature and/or a lot number and/or clearly marked/stamped with the standard to which the link has been type-tested. Under no circumstances shall the rated temperature of the fusible link exceed 69°C.

3.4.3 The fire damper shall be installed in such a way that the air flow will not impede the closing action of the fire damper.

- 3.4.4 The fire damper shall be securely installed on the plane of the fire separation wall in such a way that it will stay in place even if the ductwork is dislodged during a fire.
- 3.4.5 Where it is not possible to install a non-proprietary manufactured blade type fire damper on the plane of the fire separation wall due to site constraints, the section of the damper casing outside the wall, being an extension of the fire damper, must be encased in fire resistant materials with an FRR (integrity only) of not less than that of the wall and be adequately supported/protected against the risk of displacement/damage by impact. As for proprietary manufactured fire dampers, the construction and mounting method is subject to the requirements laid down in paragraph 3.2.1 above.
- 3.4.6 Each fire damper shall be provided with a properly located and adequately sized access panel to facilitate inspection and maintenance.
- 3.4.7 No ductwork internal lining and silencers packed with acoustic insulation materials shall be installed within 1 m from the fire damper; since in a fire, the damper, though closed, will be at an elevated temperature and may cause flame spread along the internal lining inside the ductwork in the adjoining compartments. However, the requirement on separation distance between the fire damper and internal insulation/silencers may be waived if the insulation/sound attenuation materials are securely encased in perforated galvanised steel sheet or metal and with diameter of perforation not greater than 3 mm and at distance between centres not less than 5 mm.

3.5 Air Transfer Openings Breaching FRR Enclosures

- 3.5.1 All air transfer openings breaching the walls, floor or ceiling of a fire rated enclosure shall be protected by fire dampers which have an FRR not less than that of the enclosure and conform to the requirements as detailed in paragraph 3.1 or 3.2 above.

4. Electrostatic Precipitators Used in Mechanical Ventilating Systems

- 4.1 Electrostatic precipitators shall be of a type approved by the Director of Fire Service, with their construction in compliance with the applicable safety requirements stipulated in UL 867 and UL 710 or other acceptable national or international standards.
- 4.2 The electrostatic precipitator shall, at the place of manufacture, have the following information clearly marked in a conspicuous location:
- (a) Manufacturer's name;
 - (b) Country of origin; and
 - (c) Type and model number.

Besides, a warning notice bearing the words “DANGER - HIGH VOLTAGE PARTS INSIDE/危險—內有高壓零件” shall be displayed on the equipment’s casing.

- 4.3. Protective, safety interlocking and monitoring devices shall be in good working order.

5. Thermal Insulation for Ductwork and Pipework

5.1 Definitions

The following terms are defined as below:

5.1.1 “Ductwork” refers to all types of duct or plenum for conveying air; and

5.1.2 “Pipework” refers to all types of piping.

5.2 Application

5.2.1 This section lays down the fire safety requirements for ductwork and pipework in terms of thermal or acoustic insulation.

5.3 Internal Insulation for Ductwork

5.3.1 The fire property requirement for ductwork in terms of internal insulation stipulates that all insulation materials, including the associated fasteners, adhesives, tapes etc., shall conform to BS 476 : Part 6 with the overall performance index “I” not exceeding 12 and the sub-index “i₁” not more than 6. Equivalent national or international standards are also acceptable.

5.4 External Insulation for Ductwork and Pipework

5.4.1 The fire property requirement for ductwork and pipework in terms of external insulation stipulates that all insulation materials, including the associated fasteners, adhesives, tapes flexible connectors etc., shall conform to BS 476 : Part 7, Class 1 or 2 or equivalent national or international standards, or be brought up to that standard by the use of an approved fire-retardant product.

5.4.2 For the purpose of paragraph 5.4.1 above, an “approved fire-retardant product” refers to any of the following:

- (a) Aluminium foil vapour barrier (for mineral wool and fibre glass insulating materials only);
- (b) Plastering of 12 mm minimum thickness; or

(c) Metal (aluminium, galvanised steel, etc.) cladding.

5.5 External Insulation for Ductwork and Pipework at Points of Penetration through Compartment Walls, Floors or Ceilings

5.5.1 Where ductwork passes through a structure and is provided with a fire damper, its external insulation shall not pass through the structure, but shall stop at a suitable fire barrier securely fixed to the external casing of the fire damper and the structure.

5.5.2 Insulation for pipework passing through a structure shall stop at a suitable fire barrier securely fixed to the pipe's external surface and the structure.

5.5.3 For the purpose of paragraphs 5.5.1 and 5.5.2 above, the fire barrier shall have the same FRR as that of the structure through which ductwork or pipework passes. It should be noted that the Building Authority is the enforcement authority in respect of fire resistance requirements.

6. Electric Heating Elements Used in Mechanical Ventilating Systems

6.1 Electric Heating Element Assemblies

6.1.1 Electric heating elements shall be evenly spaced across the sectional area of the ductwork on the plane where they are installed.

6.1.2 The elements shall be metal sheathed and of the "black heat" type with extensions for cable connections. They must be secured to fixtures constructed of fire resistant materials and end supports shall be provided for those exceeding 800 mm in length.

6.1.3 An external terminal box constructed of fire resistant materials shall be provided for all connections. A warning notice bearing the words "DANGER - LIVE TERMINALS/危險—電源接頭" shall be displayed on the front side of the box.

6.1.4 Internal wiring shall be heat resistant and the heat resistant rating shall be compatible with the normal working temperature of the electric heating elements.

6.1.5 No internal insulation of the ductwork for either acoustic or thermal purposes shall be installed within 1 m from the electric heating element assembly.

6.1.6 An access panel shall be put in place for the assembly to facilitate maintenance and cleaning. A small hole for the insertion of a testing thermometer shall be provided in the ductwork at approximately 150 mm above the elements.

6.2 Control and Sequence Interlocking of Heater and Fan

- 6.2.1 The fan motor shall be controlled by an electromagnetic type contactor complete with a suitable thermal overload protection device, manual reset on/off push button(s), main and auxiliary contacts for sequence interlocking control with the electric heating elements and a heavy-duty time delay device with a minimum operational time setting of 3 minutes for the fan motor stop control.
- 6.2.2 The electricity supply assembly of the electric heating elements shall be controlled by contactor(s) and, if required, a step controller as well as the fan motor interlocked in the manner as described in paragraphs 6.2.3 to 6.2.10 below.
- 6.2.3 A sequence interlocking control shall be provided to ensure that the electric heating elements will not be energised before the start of the fan motor.
- 6.2.4 A sail switch/differential pressure switch with a fail-safe feature shall be provided to de-energise the electric heating elements in case of air flow failure inside the ductwork.
- 6.2.5 A duct-type overheat thermostat with a fail-safe feature and a manual reset button shall be provided at a maximum distance of 600 mm from the electric heating elements to ensure that the elements will be switched off before the mean temperature inside the ductwork reaches 50°C or within 90 seconds when the mean temperature exceeds 50°C.
- 6.2.6 For the purpose of paragraphs 6.2.4 and 6.2.5 above, “fail-safe” refers to the ability of the sail switch/differential pressure switch/overheat thermostat to switch off the electric heating elements when losing all forms of power, i.e. when the power supply to the sail switch/ differential pressure switch/ overheat thermostat is “OFF”.
- 6.2.7 The time delay device shall be set in such a way to ensure that once switching off button of the ventilating system is pressed, the power supply to the electric heating elements will be cut off instantly but the fan will be allowed to continue to run for a minimum of 3 minutes to dissipate the residual heat inside the ductwork system.
- 6.2.8 An emergency stop push button shall be provided for, and installed next to, the fan motor and the circuit shall be designed in such a way to override the time delay device and enable the fan motor to be switched off instantly once the emergency stop push button is pressed. The button shall be of a manual reset type.

6.2.9 For summer/winter switching, the time delay control for the fan motor shall remain functional when heating or reheating facilities are in the summer mode.

6.2.10 Control circuit voltages shall not exceed 220 volts.

6.3 Fan Coil Units with Electric Heating Elements

6.3.1 Fan coil units with electric heating elements, which have a total loading not exceeding 2 kW, may be exempted from the requirements stipulated in paragraphs 6.2.4 and 6.2.7 to 6.2.9 above. Sequence interlocking and overheat thermostat control shall be put in place in accordance with paragraphs 6.2.3 and 6.2.5 above.

7. Flexible Air Ducts Used in Mechanical Ventilating Systems

7.1 General Requirements

7.1.1 Flexible air ducts used in mechanical ventilating systems shall conform fully to one of the following standards:

(a) UL 181 Class 1

(Note: Where flexible ducts tested to UL 181 Class 1 standards are constructed of composite layers of materials, these materials shall be permanently bonded to each other. Otherwise, each of the materials shall be individually tested for flame spread index and smoke developed and shall conform to UL 181 Class 1 standards. In addition, the internal lining must pass the puncture test as described in paragraph 7.1.2 below); or

(b) BS 476 : Part 6, with the overall performance index “I” not exceeding 12 and the sub-index “i₁” not more than 6, and pass the puncture test as described in paragraph 7.1.2 below.

7.1.2 Puncture Test

(a) Principles of the Puncture Test

The puncture test shall be carried out by using the free fall of a plunger onto the surface of a flexible air duct sample. If the flexible duct is provided with an external removable insulation layer, the test shall be carried out on the duct surface with the insulation layer removed. If the flexible air duct comes with a spiral wire, the impact position of the plunger shall be on the duct pitch surface and between two consecutive wires.

(b) Details of the Puncture Test

The plunger shall consist of a 10 mm diameter steel rod together with a steel head of 15 mm diameter, a flat impact end and rounded edges. The length of the plunger assembly shall be sufficient to provide a 1 kg weight. The surface of the rod and head shall be smooth.

Guides shall be provided and arranged to facilitate an essentially frictionless fall of the plunger. A means for measuring the height of fall shall also be provided.

Two flexible air duct samples, each measuring 600 mm in length when fully stretched, shall be employed for the test. The entire duct shall be provided with firm support below, with both ends securely maintained in a fully stretched position throughout the test. Each sample shall be put to the puncture test at three equally spaced points on the duct periphery by rotating it 120 degrees after each test.

(c) Acceptance/Failure Criterion for the Puncture Test

The flexible air duct samples shall be able to resist the complete penetration of the duct surface by the plunger head when the latter has fallen from a height of not less than 500 mm to the surface of the samples. Complete penetration of the plunger at any of the six test points means that the samples have failed the test.

- 7.2 In addition to paragraph 7.1 above, all flexible air ducts used in mechanical ventilating systems shall not exceed 4 m in length for each connection or the final connection from the rigid duct to the outlet grilles, VAV boxes, etc. In special cases where it is not possible to comply with the requirement of not exceeding the length limit of 4 m due to engineering or construction constraints, a slight extension beyond the limit is acceptable subject to the agreement of the Director of Fire Services, which shall be obtained before installation.
- 7.3 No flexible air ducts shall be permitted for use as main air distribution ducts.
- 7.4 No flexible air ducts shall be allowed to penetrate through fire resisting walls, floors, ceilings and partitions. No direct connection of flexible air ducts to fire dampers or fire and smoke dampers shall be allowed.

8. Use of False Ceilings and Elevated Floors (Other Than Installations at Computer Rooms) as Ductwork

- 8.1 The voids created between a false ceiling and the building structure, or between the building structure and an elevated floor, shall be used as ductwork attached to a mechanical ventilating system only if the conditions laid down in paragraph 8.2 below are satisfied.

(Note: Naturally ventilated spaces are exempted from this requirement if there is a fire separation wall between compartments.)

- 8.2 Specially designed non-combustible false ceilings, ventilated ceilings or elevated floors can be used as a means for conveying air subject to the following conditions:
- 8.2.1 The materials used in the construction of the false ceiling, ventilated ceiling or elevated floor, including any building elements, shall be classified as non-combustible when tested to BS 476 : Part 4 or equivalent national or international standards accepted by (i) Mainland China's/overseas laboratories/organisations that provide product certification service with approved listing scheme/service and are accredited by Mainland China's/overseas accreditation bodies; or (ii) local laboratories/organisations that provide product certification service with approved listing scheme/service and are accredited by the Hong Kong Accreditation Service through the Hong Kong Certification Body Accreditation Scheme (HKCAS). The fire property requirements for internal insulation for the false ceiling, ventilated ceiling or elevated floor shall conform to BS 476 : Part 6 as detailed in paragraph 5.3.1 above.
 - 8.2.2 The serviceability of fire compartments shall be maintained by the provision of fire and smoke dampers operated by a smoke detector system of the probe type.
 - 8.2.3 All electrical mains distribution and control wirings in the void must be contained in heavy-duty gauge metal cable ducts and/or screwed metal conduits terminated in such a way to comply with the requirements stipulated in the current edition of Code of Practice for the Electricity (Wiring) Regulations issued by the Electrical and Mechanical Services Department.
 - 8.2.4 All pipes in the void shall be metallic, and all insulation materials therein shall comply with the requirements laid down in paragraph 5 above.
 - 8.2.5 Pneumatic control lines for air conditioning systems within the void shall be constructed of copper. Flexible tubes shall be used only at the final connections from the copper pneumatic lines to the air conditioning terminals. The tubes shall not exceed 300 mm in length and shall have a maximum fire spread distance of 1.5 m when tested to UL 1820.
 - 8.2.6 The false ceiling, ventilated ceiling or elevated floor shall not contain any services other than the essential ones and those exclusively for the area.
 - 8.2.7 Access to the void shall be provided for cleaning and inspection purposes.

9. Requirements for Protection against Fire and Smoke in Protected Areas

- 9.1 “Protected areas” refer to protected exit and protected lobby as defined in the current edition of Code of Practice for Fire Safety in Buildings issued by the Buildings Department.
- 9.2 No services such as ductworks, drain pipes, chilled water pipes and electrical cables/switchgears shall be installed in protected areas. Any of them found installed in protected areas shall either be removed or be encased in a fire resistant enclosure having an FRR equivalent to that of protected areas in which the services are installed. It should be noted that the fire resistant enclosure for this purpose shall not reduce the effective dimensions of protected areas as this will cause obstruction to safe egress. The arrangements shall be subject to acceptance by the Building Authority.
- 9.3 Ventilation/air conditioning (excluding staircase pressurisation) for protected areas can be only provided subject to the following conditions:
- 9.3.1 All ventilation openings, either supply or exhaust (other than those direct to open air), shall be protected by fire and smoke dampers actuated by smoke detectors located in protected areas and adjoining compartments on the air side which communicate with protected areas.
- 9.3.2 Fire and smoke dampers installed in this manner shall comply with the requirements stated in paragraph 3.3 above.
- 9.3.3 Self-contained fan coil units, which serve only and are wholly situated in protected areas, can be installed provided that:
- (a) The fan coil volute casing, fan blades, fan coil enclosure, connected ductwork and air distribution devices etc. shall be all constructed of or encased in metallic materials;
 - (b) All electrical wirings shall be installed inside metal conduits and/or enclosures; and
 - (c) Insulation materials for the fan coil unit and the associated pipework/ductwork shall comply with the requirements as stipulated in paragraph 5 above.

Annex 1 Inspection Checklist for Mechanical Ventilating Systems

The Checklist at Annex 1 is designed to provide guidelines for Registered Specialist Contractors in the Ventilation Works Category (RSC(V)) to carry out acceptance inspection and testing of mechanical ventilating systems. It will also assist the relevant works inspectors and the contractors in verifying whether the equipment and systems are in conformity with the specified standards and requirements.

Inspection Checklist for Mechanical Ventilating System

Type of Premises :		FSD reference :	
Address :			
	<u>Inspection Items</u>	Comply with FSD Requirements	Remarks
1.	<u>AIR INTAKE</u>		
	a. Wire meshes made of corrosion-resistant materials having a mesh opening not greater than 12 mm provided	(Y / N / NA)	
	b. Located away from areas with potential fire hazards	(Y / N / NA)	
2.	<u>DUCTWORKS</u>		
	a. Made of non-combustible materials having strength and durability not less than that of galvanized iron or steel sheets	(Y / N / NA)	
	b. Flexible connectors conform to BS 476: Part 6, with the overall performance index “ I ” ≤ 12 and sub-index “ i ₁ ” ≤ 6 (with documentary proof attached)	(Y / N / NA)	
3.	<u>AIR FILTERS</u>		
	a. Air filters installed	(Y / N / NA)	
	b. Metallic air filter provided	(Y / N / NA)	
	c. Conform to FSD accepted standards (with documentary proof attached) Specify : _____	(Y / N / NA)	
	d. Air filter cells made of non-combustible materials	(Y / N / NA)	
	e. Air filters are clean	(Y / N / NA)	
4.	<u>FIRE DAMPERS</u>		
	<u>General Requirements</u> (applicable to Fire and Smoke Dampers)		
	a. Fire dampers installed for all air transfer openings and ductworks breaching fire compartments	(Y / N / NA)	
	b. Fire damper operation matches the air flow direction	(Y / N / NA)	
	c. Fire dampers properly secured to the structure	(Y / N / NA)	

	d. Adequate access provided for maintenance	(Y / N / NA)	
	e. No ductwork internal lining and silencers packed with acoustic insulation materials installed within 1 m from the fire damper or the insulation/sound attenuation materials are securely encased in perforated galvanized steel sheet or metal and with diameter of perforation not greater than 3 mm and at distance between centers not less than 5 mm.	(Y / N / NA)	
	f. Fire dampers are of an appropriate fire resistance rating	(Y / N / NA)	
	g. Fire dampers close properly when the fusible link is disconnected	(Y / N / NA)	
	h. Builder's works around the fire damper casing properly made good	(Y / N / NA)	
	<u>Non-Proprietary Manufactured Fire Dampers</u>		
	i. Bushes made of brass or similar materials	(Y / N / NA)	
	j. For multiple-blade fire dampers, each blade is arranged in such a way to come into contact and overlap the adjacent ones by a minimum of 5 mm	(Y / N / NA)	
	k. The lateral clearance between the moving blades and the damper casing does not exceed 1.5 mm	(Y / N / NA)	
	l. The casing is of robust structure	(Y / N / NA)	
	m. Suitable stoppers provided	(Y / N / NA)	
	n. Closing solely done by the weight of the damper blade(s)	(Y / N / NA)	
	o. Length of the blade does not exceed 600 mm	(Y / N / NA)	
	p. The casting is longer than the blade width by at least 15 mm at each end when the fire damper is in an open position	(Y / N / NA)	
	q. Angle section steel or similar structural members employed for the casing framework	(Y / N / NA)	
	<u>Proprietary Manufactured Fire Dampers and Fire and Smoke Dampers</u>		
	<u>Fire Damper</u>		
	r. Conform to FSD accepted standards (with documentary proof attached) Specify : _____	(Y / N / NA)	

	s. Installed according to the manufacturer's recommendations (with details attached)	(Y / N / NA)	
	t. Marked with the manufacturer's name, type and model number	(Y / N / NA)	
	<u>Fire and Smoke Damper</u>		
	u. Conform to FSD accepted standards (with documentary proof attached) Specify : _____	(Y / N / NA)	
	v. Installed according to the manufacturer's recommendations (with details attached)	(Y / N / NA)	
	w. Marked with the manufacturer's name, type and model number	(Y / N / NA)	
	<u>Fusible Link</u>		
	x. The fusible link installed is of a type approved by the Director of Fire Services (with documentary proof)	(Y / N / NA)	
	y. The fusible link does not hinder the damper from closing	(Y / N / NA)	
	z. The fusible link is imprinted with its brand name, operating temperature, lot number and/or the standard to which it has been type-tested	(Y / N / NA)	
	5. <u>ELECTROSTATIC PRECIPITATORS</u>		
	a. Electrostatic precipitators are of a type approved by the Director of Fire Services (with documentary proof)	(Y / N / NA)	
	b. Electrostatic precipitators are marked with the manufacturer's name, country of origin, type and model number	(Y / N / NA)	
	c. Warning notice bearing the words "DANGER - HIGH VOLTAGE PARTS INSIDE/危險—內有高壓零件" is displayed on the equipment's casing.	(Y / N / NA)	
	d. Protective, safety interlocking and monitoring devices are in good working order	(Y / N / NA)	

6.	<u>THERMAL INSULATION</u>		
	a. Internal insulation and associated fixing assemblies conform to BS 476: Part 6, with the overall performance index "I" ≤ 12 and sub-index "i ₁ " ≤ 6 (with documentary proof attached)	(Y / N / NA)	
	b. External insulation and associated fixing assemblies conform to BS EN 476: Part 7 (with documentary proof attached)	(Y / N / NA)	
	c. Mineral wool or fiberglass insulating material used	(Y / N / NA)	
7.	<u>ELECTRIC HEATING ELEMENT IN DUCTWORK</u>		
	a. Electric heating elements shall be metal sheathed and of the "black heat" type with extensions for cable connections	(Y / N / NA)	
	b. Electric heating elements evenly spaced across the sectional area of the ductwork and securely fixed to fire resisting fixtures	(Y / N / NA)	
	c. Supports provided for electric heating elements > 800 mm in length	(Y / N / NA)	
	d. External terminal boxes provided for all connections, with a warning notice in both English and Chinese	(Y / N / NA)	
	e. Internal wiring is heat resistant	(Y / N / NA)	
	f. No internal insulation of the ductwork for either acoustic or thermal purposes within 1 m from the electric heating element assembly	(Y / N / NA)	
	g. A small hole provided for the insertion of a testing thermometer	(Y / N / NA)	
	h. Electric heating elements and the blower fan interlocked with a time delay device control	(Y / N / NA)	
	i. Once switching off button of the ventilating system is pressed, the power supply to the electric heating elements cut off instantly and the fan is allowed to continue to run for a minimum of 3 minutes	(Y / N / NA)	
	j. Sail switch/differential pressure switch/overheat thermostat to switch off the electric heating elements when losing all forms of power	(Y / N / NA)	

	k. The fail-safe overheat thermostat installed and fitted with a manual reset button	(Y / N / NA)	
	l. Heating elements is switched off before the mean temperature inside the ductwork reaches 50°C or within 90 seconds when the mean temperature exceeds 50°C	(Y / N / NA)	
	m. An emergency stop push button provided	(Y / N / NA)	
	n. Access panels provided for maintenance	(Y / N / NA)	
8.	<u>FLEXIBLE AIR DUCTS</u>		
	a. Fully conform to UL 181 Class 1 standards or BS EN 476: Part 6, with the overall performance index “I” ≤ 12 and sub-index “i ₁ ” ≤ 6 , and pass the puncture test (with documentary proof attached)	(Y / N / NA)	
	b. Not exceeding 4 m in length	(Y / N / NA)	
	c. Not used as the main air distribution duct	(Y / N / NA)	
	d. Not penetrating through the fire compartment	(Y / N / NA)	
9.	<u>VENTILATED FALSE CEILINGS OR ELEVATED FLOORS</u>		
	a. Materials used for false ceilings or elevated floors conform to BS 476: Part 4, (with documentary proof attached)	(Y / N / NA)	
	b. Fire and Smoke Dampers conform to FSD accepted standards (with documentary proof attached) Specify : _____	(Y / N / NA)	
	c. Serviceability of fire compartments maintained by the provision of fire and smoke dampers operated by an approved smoke detector system of the probe type	(Y / N / NA)	
	d. All electrical mains distribution and control wirings in the void are contained in heavy-duty gauge metal cable ducts and/or screwed metal conduits in compliance with relevant standards	(Y / N / NA)	
	e. All pipes in the void are metallic	(Y / N / NA)	

	f. Internal insulation and associated fixing assemblies in the void conform to BS 476: Part 6, with the overall performance index "I" ≤ 12 and sub-index "i ₁ " ≤ 6 (with documentary proof attached)	(Y / N / NA)	
	g. Pneumatic control lines are made of copper	(Y / N / NA)	
	h. Pneumatic control flexible tubes do not exceed 300 mm in length and are of the fire-retardant type	(Y / N / NA)	
	i. No services other than the essential ones and those exclusively for the area are installed in the void	(Y / N / NA)	
	j. Access provided for cleaning and inspection	(Y / N / NA)	
10.	<u>PROTECTED AREAS</u>		
	a. Provided with fire and smoke dampers actuated by approved smoke detectors	(Y / N / NA)	
	b. Fire and Smoke Dampers conform to FSD accepted standards (with documentary proof attached) Specify : _____	(Y / N / NA)	
	c. Fire and smoke dampers installed according to manufacturer's recommendations, with details attached	(Y / N / NA)	
	d. The fan coil volute casing, fan blades, fan coil enclosure, connected ductwork and air distribution devices etc. shall be all constructed of or encased in metallic materials	(Y / N / NA)	
11.	<u>OTHERS</u>		
	a. No combustible materials in the ductwork and mechanical ventilating system equipment	(Y / N / NA)	
<u>Inspected and verified by</u>			
(Signature) : _____		_____ (Company Chop)	
*Contractor's Authorized Signatory (Name in Block Letters)		*Contractor Company Name (Name in Block Letters)	
Date : _____		*Contractor is a Registered Specialist Contractor in the Ventilation Works Category	