

By post and by email at enquiry@epd.gov.hk

19 November 2021

Environmental Protection Department
33/F Revenue Tower
5 Gloucester Road
Wan Chai, Hong Kong

Dear Sir/Madam

**Views from The Hong Kong Institution of Engineers
Regarding the New Practice Note on Control of Air Pollution
in Semi-Confined Public Transport Interchanges**

On behalf of the Institution, I am pleased to present to you our views and suggestions as set out in the enclosure for your consideration on the captioned subject.

The Institution welcomes the opportunity to work with the Government and offer our expertise and experience on the area of concern if and when it is needed.

Thank you.

Yours faithfully



Davis WONG (Mr)
Director

CKH/DW/SS

Enclosure

**Views from The Hong Kong Institution of Engineers
Regarding the New Practice Note on Control of Air Pollution
in Semi-Confined Public Transport Interchanges**

The Hong Kong Institution of Engineers (HKIE) would like to provide the following views and suggestions regarding the New Practice Note (PN) on Control of Air Pollution in Semi-Confined Public Transport Interchanges (PTIs) for the Environmental Protection Department (EPD)'s consideration:

2. In the context of the formulation and review of the PN, the Institution recognises the effort of the EPD and other relevant departments in closely monitoring the air quality and the operation of ventilation systems in semi-confined PTIs. We fully support the present review of the PN in order to enhance the air quality in semi-confined PTIs. In addition to the proposal being made on the new PN, we suggest the Government enhance the reduction at source of the air pollutant concentrations in semi-confined PTIs as responsibilities to be taken by the companies operating franchised public bus services, and upgrade the design guidelines of the ventilation system for air quality and thermal comfort improvement used in semi-confined PTIs.

Air Quality Guidelines

3. The Institution acknowledges the complexity and heavy resource required to effectively monitor the numerous air pollutants inside semi-confined PTIs. However, due to the recent complaints concerning the air quality and the exceedance of PM_{2.5} concentrations of air pollutants in semi-confined PTIs, the Government is recommended to consider adopting the fine suspended particulates (i.e. PM_{2.5}) as a surrogate air quality indicator in addition to carbon monoxide (CO) and nitrogen dioxide (NO₂).

Enhancement of the Air Pollution Reduction at Source: Responsibilities of Companies Operating Franchised Public Bus Services

4. As the key stakeholder in the matter in discussion, the companies operating franchised public bus services should enhance their commitment to achieving and maintaining better air quality in semi-confined PTIs. Management procedures and governance of these companies may be improved to integrate the improvement goal of the air quality in semi-confined PTIs at each stage of their procurement, design, operation and maintenance of the public buses in concerted actions with the EPD and relevant departments and in line with the standard guidelines and requirements. Some suggestions are as follows:

- (a) Design guidelines and improvement of air quality in the bus compartment

- (i) Priority shall be given to low pollution emission engine models.
 - (ii) The engine exhaust should be located away from the outside air intake of the bus ventilation system, so as to reduce the risk of short-circuiting of exhaust gases into the bus compartment.
 - (iii) The interior compartment body should be fully and effectively isolated from the exhaust of the engine.
 - (iv) The enhancement of the maintenance and cleaning works and the reduction of niches that may accumulate dirt and micro-organisms should be required.
 - (v) Effective ventilation system should be set at all parts of the compartment adequately.
 - (vi) Environmental-friendly materials that are with minimum emission of pollutants, such as paints with low VOC content and seat coverings that resist soiling, should be used inside the compartment body to avoid the growth of bacteria and fungi, etc.
 - (vii) Improving the induced outside air intake with an on-off damper operable by the captain, and locating outside air inlet at high level of the compartment body to avoid the intake of air pollutants from adjacent sources.
 - (viii) Upgrading the particulate filters by referencing the relevant ASHRAE standards; procuring and installing fans in proper sizes by taking into account the expected operational resistance of the filters (prior to filter cleaning or disposal) in order to deliver the designed flow rate at all times.
 - (ix) Designing and locating the air outlets and return air grilles so that air flow can be evenly distributed throughout the compartment for flushing all parts and avoiding excessive draughts on passengers.
 - (x) Reviewing and upgrading the adjustable vanes with air flow control dampers for air outlets with air stream directly impinging on the passengers.
- (b) Inspection, monitoring and maintenance of comfort in the bus compartment
- (i) The frequency of monitoring the concentrations of relevant air pollutants shall be increased monitor in concerted actions with the Government.

- (ii) The frequency of inspection and maintenance of the air condition and ventilation systems in the bus compartment should be increased to early detect probable deficiencies so that the concerned systems could be upgraded as appropriate.
- (iii) Regularly clean, replace and upgrade air filters in ventilation systems of the bus facilities.
- (iv) Regularly clean cooling coils, drain pans and accessible air ducts in bus compartments for passengers.
- (v) Using an upgraded high-suction power vacuum cleaner or other equivalent equipment to avoid dust being returned to the compartment.
- (vi) Adequately and regularly purge air ducts and cooling coils that have undergone cleaning procedures or fumigation with outdoor air before the buses are returned to service; and keep cleaning records for individual bus.

Improvement of Design Guidelines of the Ventilation System in Semi-Confined PTIs

5. To improve the design guidelines of the ventilation system in semi-confined PTIs, the following suggestions are put forward for consideration:

- (a) The outdoor air supply flow rate and the ventilation rate in semi-confined PTIs should be upgraded and designed based on the actual passenger transfer rates to effectively meet the air quality guidelines and comfort.
- (b) Upgrade particulate filters at the outside air inlet and at the re-circulated path; the efficiency of the filters should follow the relevant standards.
- (c) Reviewing and upgrading the installation of outside air fans; using appropriate fan size for air supply (free cooling fans), individual air supply fans, return air fans and exhaust air fans, in order to provide better system performance and adequate flexibility with air circulation and re-circulation in semi-confined PTIs.
- (d) The ventilation systems in semi-confined PTIs shall also take into account the expected latent heat load in calculating the cooling capacity of the primary air units and air-handling units.
- (e) Enhance the provision of equipment with adequate numbers of rows of cooling coils for the required duty, and avoid condensation and cold spots.

- (f) Air temperature and relative humidity should be the indicators of thermal comfort conditions that influence the perception of air quality in bus facilities. Passengers are likely to complain against cool drafts and high relative humidity may encourage the proliferation of bacteria and fungi.
- (g) The ventilation and air conditioning systems in semi-confined PTIs should effectively and permanently meet the standard and keep the ideal air temperature and relative humidity.

Air Quality Monitoring and Maintenance of Semi-Confined PTIs

6. The Institution recognises the Government's effort in periodically conducting air quality measurements and inspections in semi-confined PTIs to ensure proper maintenance of the air quality and comfort.
7. Nevertheless, the Government is suggested to increase the frequency of measurements and inspections as practicable as possible, in order to regularly and effectively evaluate possible unsatisfactory air quality and implement appropriate improvement measures at early stage, including extending the operating hours of ventilation systems, increasing the air volume, strengthening the regulation of switching off idling engines in semi-confined PTIs and urging the companies operating franchised public bus services to deploy more upgraded and environmentally friendly bus models.
8. The Institution believes that the close monitoring of air quality and thermal comfort in semi-confined PTIs will be helpful to effectively identify possible deficiencies and take additional measures to enhance the design of the ventilation system.