Hot Issues in Fire Engineering

9 September 2011

Ventilation of Enclosed Train Vehicles

W.K. Chow
Research Centre for Fire Engineering, Department of Building Services Engineering
The Hong Kong Polytechnic University, Hong Kong, China

Unlike the conventional automotives, modern railway trains are designed with non-openable windows. A mechanical ventilation and air-conditioning (MVAC) system is installed in each train compartment for better indoor air quality as well as to provide a thermally comfortable environment. The ventilation rate is no doubt a critical element in the design of an MVAC system, especially in Hong Kong where the daily passenger load is extremely heavy.

Ventilation criteria for ensuring a clean environment with low carbon dioxide concentration should be watched. For an acceptable indoor air quality inside the train compartment, carbon dioxide has to be kept at a low level, say 0.1% (or 1000 ppm) of the air. This can be achieved by increasing the fresh air supply rate for dilution or providing a better air distribution design. Earlier studies illustrated that carbon dioxide should be controlled at this level by increasing the ventilation rate to 25.2 $m^3 h^{-1}$.

References

1. W.K. Chow & Philip C.H. Yu, “Simulation on energy use for mechanical ventilation and air-conditioning (MVAC) systems in train compartments”, Energy - The International Journal, Vol. 25, No. 1, p. 1-13 (2000).
2. W.K. Chow, “Ventilation of enclosed train compartments in Hong Kong”, Applied Energy, Vol. 71, No. 3, p. 161-170 (2002).