The influence of vehicular obstacles on longitudinal ventilation control in tunnel fires - DTU Orbit (12/01/2019)

**The influence of vehicular obstacles on longitudinal ventilation control in tunnel fires**
The effect of the vehicular blockage in a tunnel under longitudinal ventilation smoke control was systematically studied using a small-scale tunnel (1:30 of a standard tunnel section) with a helium-air mixture as the buoyant plume. The experimental results showed excellent agreement with full-scale data and reference correlations from former studies. When there are vehicular obstacles in the tunnel, the critical velocity decreased as a function of the blockage ratio. Notwithstanding, it was found that the relative size of the vehicular obstacle and the relative location of the fire source can have a reversed effect, inasmuch as the presence vehicular obstacle exerted an influence on the critical and confinement velocities. Moreover, the backlayering distance was evidently affected by the vehicular blockage. A parallel analysis was carried out for the backlayering distance for lower and upper regimes of the dimensionless heat release rate, where the current data was compared against data from other studies. The method and experimental set-up proved their ability to reproduce several phenomena and thus also their capability to supply relevant and valuable information on the effect of the vehicular blockage on tunnel fire dynamics.

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