

2.7. Atrium and Large Volume Smoke Control System

- 2.7.1.** Atrium Smoke Control systems shall comply with the relevant general requirements for smoke control systems as per **Section 2.5** and **Table 10.5.**, Atrium and Large Volume Smoke Control System requirements.

Table 10.5.: Atrium and Large Volume Smoke Control System

ITEMS	REQUIREMENTS
1. GENERAL	<ul style="list-style-type: none"> i. Atrium spaces shall be protected by a smoke management system, designed in accordance with an engineering analysis and/or computational software to maintain tenable conditions (smoke interface layer) at a minimum height of 1830 mm above the highest walking surface open to the atrium or floor which serves as part of the means of egress, for a duration of 20 minutes or 1.5 times the calculated egress time, whichever is more. ii. Where the atrium does not provide for any egress path or walkway and a smoke clearance from the atrium is a priority, the atrium smoke management system should be designed to clear smoke from the atrium within 10 minutes. iii. The minimum smoke layer depth shall be 20% of the floor-to-ceiling height except when an engineering analysis using full scale data, scale modeling or CFD modeling indicates otherwise. See Figure 10.17. iv. The engineering analysis for the atrium smoke management system should include the following elements <ul style="list-style-type: none"> a. Fire dynamics b. Fire size and location c. Materials likely to be burning d. Fire plume geometry e. Fire plume or smoke layer impact on means of egress f. Tenability conditions during the period of occupant egress g. Response and performance of building systems, including passive barriers, automatic detection and extinguishing, and smoke control h. Response time required for building occupants to reach building exits, including any time required to exit through the atrium.
2. MAKE-UP AIR (REPLACEMENT AIR)	<ul style="list-style-type: none"> i. The makeup air velocity shall not exceed 1.02 m/s where the makeup air could come into contact with the plume, unless a higher makeup air velocity is supported by an engineering analysis. ii. Mechanical makeup air shall be designed to achieve 85% to 95% of the exhaust mass flow rate, not including the leakage through these small paths. iii. Makeup air shall be provided by fans, openings to the outside leakage paths, or the combination thereof. iv. The supply points for the makeup air shall be located beneath the smoke layer interface, unless otherwise determined by computer model analysis. v. Mechanical makeup air shall be less than the mass flow rate of the mechanical smoke exhaust. vi. The makeup air shall not cause door-opening force to exceed allowable limits.
3. MAXIMUM MASS FLOW AND SMOKE TEMPERATURE	<ul style="list-style-type: none"> i. Due to practical limitations, a smoke ventilation system shall have: <ul style="list-style-type: none"> a. A maximum mass flow not exceeding 175 kg/s b. A minimum smoke layer temperature of 18°C above ambient.