(This is a normative appendix and is part of the standard.)

NORMATIVE APPENDIX B
SEPARATION OF EXHAUST OUTLETS AND OUTDOOR AIR INTAKES

B1. GENERAL

This appendix presents an alternative procedure for determining separation distance between outdoor air intakes and exhaust air and vent outlets. This analytical method can be used instead of Table 5.5.1.

Exhaust air and vent outlets, as defined in Table 5.5.1, shall be located no closer to outdoor air intakes, and operable windows, skylights, and doors, both those on the subject property and those on adjacent properties, than the minimum separation distance (L) specified in this section. The distance (L) is defined as the shortest "stretched string" distance measured from the closest point of the outlet opening to the closest point of the outdoor air intake opening or operable window, skylight, or door opening, along a trajectory as if a string were stretched between them.

B1.1 Application. Laboratory fume hood exhaust air outlets shall be in compliance with NFPA 45 [5] and ANSI/AIHA Z9.5 [6]. Nonlaboratory exhaust outlets and outdoor air intakes or other openings shall be separated in accordance with the following.

B1.2 Outdoor Air Intakes. The minimum separation distance between exhaust air/vent outlets as defined in Table 5.5.1 and outdoor air intakes to mechanical ventilation systems or operable windows, skylights, and doors that are required as part of natural ventilation systems shall be equal to distance (L) determined in accordance with Section B2.

Exception: Separation distances do not apply when exhaust and outdoor air intake systems are controlled such that they cannot operate simultaneously.

B1.3 Other Building Openings. The minimum separation distance between building exhaust air/vent outlets as defined in Table 5.5.1 and operable openings to occupiable spaces shall be half of the distance (L) determined in accordance with Section B2. The minimum separation distance between either Class 3, Class 4, cooling tower, or combustion appliance/equipment exhaust air/vent outlets and operable openings to occupiable spaces shall be equal to the distance (L) determined in accordance with Section B2.

B1.4 Additional Limitations for Noxious or Dangerous Air. The minimum separation distance between exhausts located less than 65 ft (20 m) vertically below outdoor air intakes or operable windows and doors shall be equal to a horizontal separation only as determined in accordance with Section B2; no credit may be taken for any vertical separation.

B1.5 Equipment Wells. Exhaust air outlets that terminate in an equipment well that also encloses an outdoor air intake shall meet the separation requirements of this section and, in addition, shall either

a. terminate at or above the highest enclosing wall and discharge air upward at a velocity exceeding 1000 fpm (5 m/s) or
b. terminate 3 ft (1 m) above the highest enclosing wall (with no minimum velocity).

TABLE B2-1 Minimum Separation Distance

Exhaust Air Class (See Section 5.16)	Separation Distance, L, ft (m)
Significant contaminant or odor intensity (Class 3)	15 (5)
Noxious or dangerous particles (Class 4)	30 (10)

TABLE B2-2 Minimum Dilution Factors

Exhaust Air Class (See Section 5.16)	Dilution Factor (DF)
Significant contaminant or odor intensity (Class 3)	15
Noxious or dangerous particles (Class 4)	50*

*Does not apply to fume hood exhaust. See Section B1.1.

Exception: Exhaust air designated as Class 1 or Class 2.

B1.6 Property Lines. The minimum separation distance between exhaust air/vent outlets and property lines shall be half of the distance (L) determined in accordance with Section B2.

Exception: For Class 3, Class 4, or combustion appliance/equipment exhaust air, where the property line abuts a street or other public way, no minimum separation is required if exhaust termination is at least 10 ft (3 m) above grade.

B2. DETERMINING DISTANCE *L*

The minimum separation distance (L) shall be determined using one of the following three approaches:

a. A value of L in Table B2-1 shall be used.
b. The value of L shall be determined using Equation B2-1 or B2-2.

$$L = 0.09 \times \sqrt{Q} \times (\sqrt{DF} - U/400) \text{ in feet} \quad \text{(I-P)} \quad \text{(B2-1)}$$

$$L = 0.04 \times \sqrt{Q} \times (\sqrt{DF} - U/2) \text{ in metres} \quad \text{(SI)} \quad \text{(B2-2)}$$

where

Q = exhaust airflow rate, cfm (L/s). For gravity vents, such as plumbing vents, use an exhaust rate of 150 cfm (75 L/s). For flue vents from fuel-burning appliances, assume a value of 250 cfm per million Btu/h (0.43 L/s per kW) of combustion input (or obtain actual rates from the combustion appliance manufacturer.

U = exhaust air discharge velocity, fpm (m/s). As shown in Figure B2-1, U shall be determined using Table B2-3.

DF = dilution factor, which is the ratio of outdoor airflow to entrained exhaust airflow in the outdoor air intake. The minimum dilution factor shall be determined as a function of exhaust air class in Table B2-2.