

NEEDED FIRE FLOW

300. GENERAL:

This item develops Needed Fire Flows for selected locations throughout the city, which are used in the review of subsequent items of this Schedule. The calculation of a Needed Fire Flow (NFF_i) for a subject building in gallons per minute (gpm) considers the Construction (C_i), Occupancy (O_i), Exposure (X_i) and Communication (P_i) of each selected building, or fire division, as outlined below.

310. CONSTRUCTION FACTOR (C_i):

That portion of the Needed Fire Flow attributed to the construction and area of the selected building is determined by the following formula:

$$C_i = 18F (A_i)^{0.5}$$

F = Coefficient related to the class of construction:

- F = 1.5 for Construction Class 1* (Frame)
- = 1.0 for Construction Class 2* (Joisted Masonry)
- = 0.8 for Construction Class 3* (Non-Combustible) and Construction Class 4* (Masonry Non-Combustible)
- = 0.6 for Construction Class 5* (Modified Fire Resistive) and Construction Class 6* (Fire Resistive)

$$A_i = \text{Effective* area}$$

In buildings with mixed construction a value, C_{im} , shall be calculated for each class of construction using the effective area of the building. These C_{im} values are multiplied by their individual percentage of the total area. The C_i applicable to the entire building is the sum of these values. However, the value of the C_i shall not be less than the value for any part of the building based upon its own construction and area.

The maximum value of C_i is limited by the following:

- 8,000 gpm for Construction Classes 1 and 2
- 6,000 gpm for Construction Classes 3, 4, 5 and 6
- 6,000 gpm for a 1-story building of any class of construction

The minimum value of C_i is 500 gpm. The calculated value of C_i shall be rounded to the nearest 250 gpm.

320. OCCUPANCY FACTOR (O_i):

The factors below reflect the influence of the occupancy in the selected building on the Needed Fire Flow:

OCCUPANCY COMBUSTIBILITY CLASS*	OCCUPANCY FACTOR (O_i)
C-1* (Non-Combustible)	0.75
C-2* (Limited Combustible)	0.85
C-3* (Combustible)	1.00
C-4* (Free Burning)	1.15
C-5* (Rapid Burning)	1.25

330. EXPOSURE (X_i) AND COMMUNICATION (P_i) FACTORS:

The factors developed in this item reflect the influence of exposed and communicating buildings on the Needed Fire Flow. A value for ($X_i + P_i$) shall be developed for each side of the subject building:

$$(X + P)_i = 1.0 + \sum_{i=1}^n (X_i + P_i), \text{ maximum 1.75, where } n = \text{number of sides of subject building.}$$

A. Factor for Exposure (X_i):

The factor for X_i depends upon the construction and length-height value* (length of wall in feet, times height in stories) of the exposed building and the distance between facing walls of the subject building and the exposed building, and shall be selected from Table 330.A.

*When an asterisk is shown next to a term in this item, the term is defined in greater detail in the Specific Commercial Property Evaluation Schedule.

TABLE 330.A FACTOR FOR EXPOSURE (X_i)

Construction of Facing Wall of Subject Building	Distance Feet to the Exposed Building	Length-Height of Facing Wall of Exposed Building	Construction of Facing Wall of Exposed Building Classes.			
			1, 3	2, 4, 5, & 6		
				Unprotected Openings	Semi-Protected Openings (wired glass or outside open sprinklers)	Blank Wall
Frame, Metal or Masonry with Openings	0-10	1-100	0.22	0.21	0.16	0
		101-200	0.23	0.22	0.17	0
		201-300	0.24	0.23	0.18	0
		Over 400	0.25	0.25	0.20	0
		301-400	0.25	0.25	0.19	0
	11-30	Over 100	0.17	0.15	0.10	0
		101-200	0.18	0.16	0.12	0
		201-300	0.19	0.18	0.14	0
		301-400	0.20	0.19	0.15	0
		Over 400	0.20	0.19	0.15	0
	31-60	1-100	0.12	0.10	0.07	0
		101-200	0.13	0.11	0.08	0
		201-300	0.14	0.13	0.10	0
		301-400	0.15	0.14	0.11	0
		Over 400	0.15	0.15	0.12	0
	61-100	1-100	0.08	0.06	0.04	0
		101-200	0.08	0.07	0.05	0
		201-300	0.09	0.08	0.06	0
		301-400	0.10	0.09	0.07	0
		Over 400	0.10	0.10	0.08	0
Blank Masonry Wall	Facing Wall of the Exposed Building Is Higher Than Subject Building: Use the above table EXCEPT use only the Length-Height of Facing Wall of the Exposed Building ABOVE the Height of the Facing Wall of the Subject Building. Buildings five stories or over in Height, consider as five stories.					
	When the Height of the Facing Wall of the Exposed Building is the Same or Lower than the Height of the Facing Wall of the Subject Building, $X_i = 0$.					

330. EXPOSURE (X_i) AND COMMUNICATION (P_i) FACTORS: (Continued)

B. Factor for Communications (P_i):

The factor for P_i depends upon the protection for communicating party wall* openings and the length and construction of communications between fire divisions* and shall be selected from Table 330.B. When more than one communication type exists in any one side wall, apply only the largest factor P_i for that side. When there is no communication on a side, $P_i = 0$.

*When an asterisk is shown next to a term in this item, the term is defined in greater detail in the Specific Commercial Property Evaluation Schedule.

TABLE 330.B FACTOR FOR COMMUNICATIONS (P_i)

Description of Protection of Passageway Openings	Fire Resistive, Non-Combustible or Slow-Burning Communications				Communications with Combustible Construction					
	Open		Enclosed		Open			Enclosed		
	Any Length	10 Ft. or Less	11 Ft. to 20 Ft.	21 Ft. to 50 Ft. +	10 Ft. or Less	11 Ft. to 20 Ft.	21 Ft. to 50 Ft. +	10 Ft. or Less	11 Ft. to 20 Ft.	21 Ft. to 50 Ft. +
Unprotected	0	++	0.30	0.20	0.30	0.20	0.10	++	++	0.30
Single Class A Fire Door at One End of Passageway	0	0.20	0.10	0	0.20	0.15	0	0.30	0.20	0.10
Single Class B Fire Door at One End of Passageway	0	0.30	0.20	0.10	0.25	0.20	0.10	0.35	0.25	0.15
Single Class A Fire Door at Each End or Double Class A Fire Doors at One End of Passageway	0	0	0	0	0	0	0	0	0	0
Single Class B Fire Door at Each End or Double Class B Fire Doors at One End of Passageway	0	0.10	0.05	0	0	0	0	0.15	0.10	0

For over 50 feet, $P_i = 0$.

++ For unprotected passageways of this length, consider the 2 buildings as a single Fire Division.

Note: When a party wall has communicating openings protected by a single automatic or self-closing Class B fire door, it qualifies as a division wall* for reduction of area.

Note: Where communications are protected by a recognized water curtain, the value of P_i is 0.

*When an asterisk is shown next to a term in this item, the term is defined in greater detail in the Special Commercial Property Evaluation Schedule.

340. CALCULATION OF NEEDED FIRE FLOW (NFF_i):

$$NFF_i = (C_i)(O_i)[1.0 + (X + P)_i]$$

When a wood shingle roof covering on the building being considered, or on exposed buildings, can contribute to spreading fires, add 500 gpm to the Needed Fire Flow.

The Needed Fire Flow shall not exceed 12,000 gpm nor be less than 500 gpm.

The Needed Fire Flow shall be rounded off to the nearest 250 gpm if less than 2,500 gpm and to the nearest 500 gpm if greater than 2,500 gpm.

Note 1: For 1- and 2-family dwellings not exceeding 2 stories in height, the following Needed Fire Flows shall be used:

DISTANCE BETWEEN BUILDINGS	NEEDED FIRE FLOW
Over 100'	500 gpm
31-100'	750
11-30'	1,000
10' or less	1,500

Note 2: Other habitational buildings, up to 3,500 gpm maximum.