Table 34 Overall Force Coefficients for Square Towers Composed of Circular Members
[(*Clause* 7.4.3.5 (d)]

Sl No.	Solidity Ratio of Front Face Φ	Force Coefficient			
		Subcritical Flow ($D\ \bar{U}_g < 6$ m²/s)		Supercritical Flow ($D\ \bar{U}_g \geq 6$ m²/s)	
		Onto Face	Onto Corner	Onto Face	Onto Corner
(1)	(2)	(3)	(4)	(5)	(6)
i)	< 0.05	2.4	2.5	1.1	1.2
ii)	0.1	2.2	2.3	1.2	1.3
iii)	0.2	1.9	2.1	1.3	1.6
iv)	0.3	1.7	1.9	1.4	1.6
v)	0.4	1.6	1.9	1.4	1.6
vi)	0.5	1.4	1.9	1.4	1.6

for these elements. Allowance may be made for shielding effect from other elements.

8 INTERFERENCE EFFECTS

8.1 General

Wind interference is caused by modification in the wind characteristics produced by the obstruction caused by an object or a structure in the path of the wind. If such wind strikes another structure, the wind pressures usually get enhanced, though there can also be some shielding effect between two very closely spaced buildings/structures. The actual phenomenon is too complex to justify generalization of the wind forces/ pressures produced due to interference which can only be ascertained by detailed wind tunnel/CFD studies. However, some guidance can be provided for the purpose of preliminary design. To account for the effect of interference, a wind interference factor (IF) has been introduced as a multiplying factor to be applied to the design wind pressure/force. Interference effects can be more significant for tall buildings. The interference factor is defined as the ratio between the enhanced pressure/force in the grouped configuration to the corresponding pressure/force in isolated configuration. Since the values of IF can vary considerably based on building geometry and location, the given values of IF are a kind of median values and are meant only for preliminary design estimates. The designer is advised that for assigning values of IF for final design particularly for tall buildings, specialist literature be consulted or a wind tunnel study carried out.

8.2 Roof of Low-Rise Buildings

Maximum increase in wind force on the roof due to interference from similar buildings in case of closely spaced low-rise buildings with flat roofs may be up to 25 percent for c/c distance (x) between the buildings of 5 times the dimension (b) of the interfering building normal to the direction of wind (*see* Fig. 7). Interference effect beyond 20b may be considered to be negligible. For intermediate spacing linear interpolation may be used.

8.3 Tall Buildings

Based on studies on tall rectangular buildings, Fig. 8 gives various zones of interference. The interference factor (IF), which needs to be considered as a multiplication factor for wind loads corresponding to

Table 35 Overall Force Coefficients for Equilateral Triangular Towers Composed of Circular Members
[*Clause* 7.4.3.5(e)]

Sl No.	Solidity Ratio of Front Face Φ	Force Coefficient	
		Subcritical Flow ($D\ \bar{U}_g < 6$ m²/s)	Supercritical Flow ($D\ \bar{U}_g \geq 6$ m²/s)
		All wind Directions	All wind Directions
(1)	(2)	(3)	(4)
i)	< 0.05	1.8	0.8
ii)	0.1	1.7	0.8
iii)	0.2	1.6	1.1
iv)	0.3	1.5	1.1
v)	0.4	1.5	1.1
vi)	0.5	1.4	1.2

isolated building, may be assumed as follows, for preliminary estimate of the wind loads under interference caused by another interfering tall building of same or more height located at different zones Z1 to Z4 as shown in Fig. 8:

Zone	Z1	Z2	Z3	Z4
IF	1.35	1.25	1.15	1.07

The interference effect due to buildings of height less than one-third of the height of the building under consideration may be considered to be negligible while for interference from a building of intermediate height, linear interpolation may be used between one-third and full height.

9 DYNAMIC EFFECTS

9.1 General

Flexible slender structures and structural elements shall be investigated to ascertain the importance of wind induced oscillations or excitations in along wind and across wind directions.

In general, the following guidelines may be used for examining the problems of wind-induced oscillations.

a) Buildings and closed structures with a height to minimum lateral dimension ratio of more than about 5.0, or

b) Buildings and structures whose natural frequency in the first mode is less than 1.0 Hz.

Any building or structure which satisfies either of the above two criteria shall be examined for dynamic effects of wind.

NOTES

1 The fundamental time period (T) may either be established by experimental observations on similar buildings or calculated by any rational method of analysis. In the absence of such data, T may be determined as follows for multi-storied buildings:

a) For moment resistant frames without bracings or shear walls resisting the lateral loads,

$T = 0.1\,n$

where

n = number of storeys including basement storeys; and

b) for all others

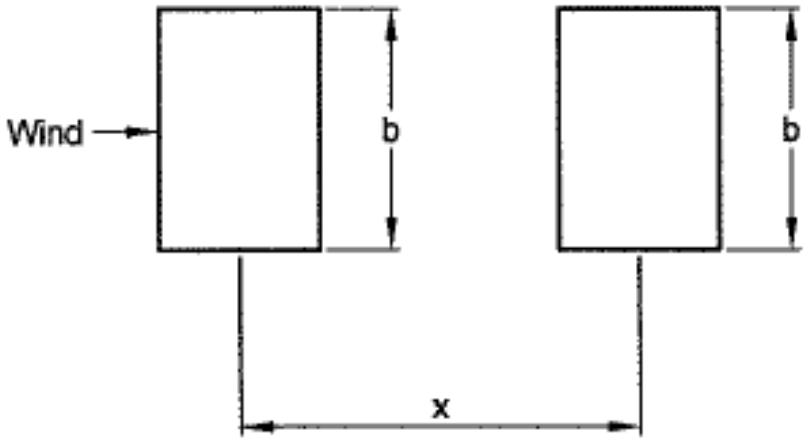
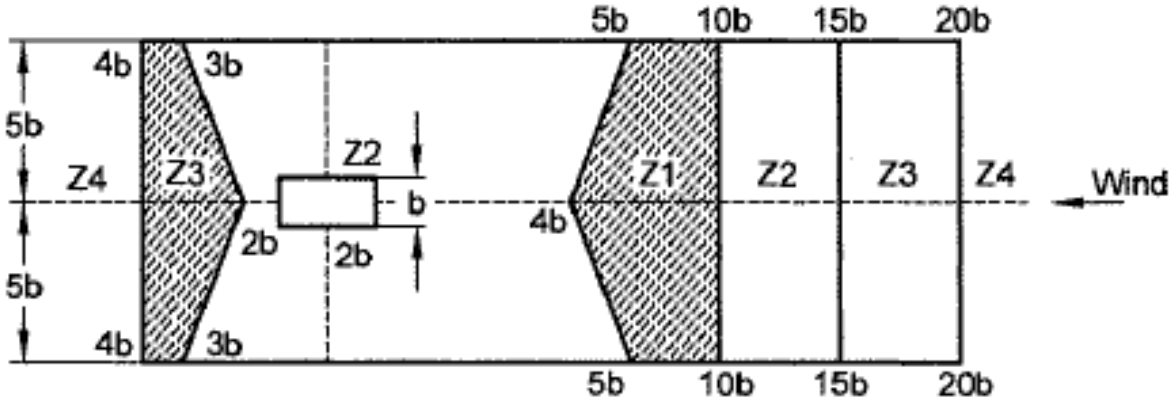


FIG. 7 LOW-RISE BUILDINGS IN TANDEM CAUSING INTERFERENCE EFFECT



Z1 - Zone of high interference

Z2 - Zone of moderate interference

Z3 - Zone of low interference

Z4 - Zone of insignificant interference

FIG. 8 INTERFERENCE ZONES FOR TALL RECTANGULAR BUILDINGS OF SAME OR GREATER HEIGHT (CLAUSE 7.3)