wind speed and damage to buildings and structures point to the fact that the speeds given in the basic wind speed map are often exceeded during the cyclones. The effect of cyclonic storms is largely felt in a belt of approximately 60 km width at the coast. In order to ensure better safety of structures in this region (60 km wide on the east coast as well as on the Gujarat Coast), the following values of k_4 (as recommended in IS 15498) are stipulated as applicable according to the importance of the structure:

	k_4
Structures of post-cyclone importance for emergency services (such as cyclone shelters, hospitals, schools, communication towers, etc)	1.30
Industrial structures	1.15
All other structures	1.00

6.4 Hourly Mean Wind Speed

The hourly mean wind speed at height z, for different terrains can be obtained as

$$\overline{V}_{z,H} = \overline{k}_{2,i} V_b$$

where

$\overline{k}_{2,i}$ = hourly mean wind speed factor for terrain category 1

$$= 0.1423 \left[\ln\left(\frac{z}{z_{0,i}}\right) \right] (z_{0,i})^{0.0706}$$

The design hourly mean wind speed at height z can be obtained as:

$$\overline{V}_{z,d} = \overline{V}_{z,H} k_1 k_3 k_4$$

$$= \overline{V}_b k_1 \overline{k}_{2,i} k_3 k_4$$

6.5 Turbulence Intensity

The turbulence intensity variations with height for different terrains can be obtained using the relations given below:

a) *Terrain category 1*

$$I_{z,1} = 0.3507 - 0.0535 \log_{10}\left(\frac{z}{z_{0,1}}\right)$$

b) *Terrain category 2*

$$I_{z,2} = I_{z,1} + \frac{1}{7}\left(I_{z,4} - I_{z,1}\right)$$

c) *Terrain category 3*

$$I_{z,3} = I_{z,1} + \frac{3}{7}\left(I_{z,4} - I_{z,1}\right)$$

d) *Terrain category 4*

$$I_{z,4} = 0.466 - 0.135\,8 \log_{10}\left(\frac{z}{z_{0,4}}\right)$$

6.6 Off Shore Wind Velocity

Cyclonic storms form far away from the sea coast and gradually reduce in speed as they approach the sea coast. Cyclonic storms generally extend up to about 60 km inland after striking the coast. Their effect on land is already reflected in basic wind speeds specified in Fig. 1. The influence of wind speed off the coast up to a distance of about 200 km may be taken as 1.15 times the value on the nearest coast in the absence of any definite wind data. The factor 1.15 shall be used in addition to k_4.

7 WIND PRESSURES AND FORCES ON BUILDINGS/STRUCTURES

7.1 General

The wind load on a building shall be calculated for:

a) Building as a whole,
b) Individual structural elements as roofs and walls, and
c) Individual cladding units including glazing and their fixings.

7.2 Design Wind Pressure

The wind pressure at any height above mean ground level shall be obtained by the following relationship between wind pressure and wind speed:

$$p_z = 0.6\, V_z^2$$

where

p_z = wind pressure at height z, in N/m^2; and

V_z = design wind speed at height z, in m/s.

The design wind pressure p_d can be obtained as,

$$p_d = K_d K_a K_c p_z$$

where

K_d = wind directionality factor,

K_a = area averaging factor, and

K_c = combination factor (*see* **7.3.3.13**).

The value of p_d, however shall not be taken as less than 0.70 p_z.

NOTES

1 The coefficient 0.6 (in SI units) in the above formula depends on a number of factors and mainly on the atmospheric pressure and air temperature. The value chosen corresponds to the average Indian atmospheric conditions.

2 K_d should be taken as 1.0 when considering local pressure coefficients.

7.2.1 *Wind Directionality Factor, K_d*

Considering the randomness in the directionality of wind and recognizing the fact that pressure or force coefficients are determined for specific wind directions, it is specified that for buildings, solid signs, open signs,