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SANS 10160-3:2011

Edition 1.1

SOUTH AFRICAN NATIONAL STANDARD

Basis of structural design and actions for buildings and industrial structures

Part 3: Wind actions

WARNING — Can only be used in conjunction with SANS 10160-1.

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Table of changes

Change No.	Date	Scope
Amdt 1	2011	Amended to clarify the requirements for basic values, to correct the figure on the map of the fundamental value of the basic wind speed, $v_{b,0}$, to correct a value in the table on the variation of the $c_r(z)$ factor with height above ground level, to correct an equation in the clause on peak wind speed pressure, to clarify the requirements for vertical walls of rectangular plan buildings, to correct the key in the figures for the interpretation of zones for vertical walls, flat roofs and mono-pitch roofs, to correct the wind direction values in the tables on external pressure coefficients for mono-pitch roofs, duo-pitch roofs and hipped roofs, to correct a value and the key in the figure for the interpretation of loading zones for hipped roofs, to correct an overall force coefficient in the table on $c_{p,net}$ and c_f values for duo-pitch canopies, to correct the symbol for height in the table on the key interpretation of signboards, to change the term "hexagon" to the term "hexdecagon" in the table on force coefficient $c_{f,0}$ for regular polygonal sections, to correct the symbol for reference height in the clause on circular cylinders, to correct the symbol for the end-effect factor in the figures on pressure distribution for circular cylinders for different Reynolds number ranges and without end-effects and indicative values of the end-effect factor, ψ_λ as a function of solidity ratio, φ versus slenderness, λ, to correct the table on recommended values of λ for cylinders, polygonal sections, rectangular sections, sharp-edged structural sections and lattice structures, to correct a symbol in equation (40), to correct a symbol in the explanation to equations (A.2) and (A.3), to add values and a variable to the figure on factor, s, for cliffs and escarpments and the figure on factor, s, for hills and ridges, and to add a variable to the clause on neighbouring structures.

Acknowledgement

The SABS Standards Division wishes to acknowledge the valuable assistance derived from the South African Institution of Civil Engineering (SAICE).

Foreword

This South African standard was approved by National Committee SABS SC 59I, *Construction standards – Basis for the design of structures*, in accordance with procedures of the SABS Standards Division, in compliance with annex 3 of the WTO/TBT agreement.

This document was published in October 2011.

This document supersedes SANS 10160-3:2010 (edition 1).

A vertical line in the margin shows where the text has been technically modified by amendment No. 1.

The SANS 10160 series consists of the following eight parts, under the general title *Basis of structural design and actions for buildings and industrial structures*:

Part 1: Basis of structural design.

Part 2: Self-weight and imposed loads.

Part 3: Wind actions.

Part 4: Seismic actions and general requirements for buildings.

Part 5: Basis for geotechnical design and actions.

Part 6: Actions induced by cranes and machinery.

Part 7: Thermal actions.

Part 8: Actions during execution.

Annexes A, B and C are for information only.

Contents

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Basis of structural design and actions for buildings and industrial structures

Part 3:
Wind actions

1 Scope

1.1 Scope of application

The scope of application of this part of SANS 10160 falls within the general scope of application as given in SANS 10160-1.

1.2 Scope of SANS 10160-3

1.2.1 This part of SANS 10160 gives guidance on the determination of natural wind actions for the structural design of buildings and industrial structures including the entire structure, part of the structure, or elements attached to the structure.

1.2.2 This part of SANS 10160 is intended to predict characteristic wind actions on land-based structures and includes the following:

a) buildings and structures with an overall height of up to 100 m;

b) elements of buildings and structures having a natural frequency greater than 5 Hz; and

c) chimneys with circular cross-sections, with heights of less than 60 m and a height to diameter ratio of less than 6,5.

1.2.3 This part of SANS 10160 does not cover the following structures:

a) structures and buildings higher than 100 m;

b) dynamic effects and design of dynamically sensitive structures (for example slender chimneys);

c) off-shore structures;

d) bridge structures;

e) structures and buildings of unusual shapes;

f) structures, or their components, which are not fixed permanently but are designed to accommodate movement (for example, revolving antennas, telescope dishes and movable roofs);

g) high-risk structures (for example those containing nuclear or biological material); or

h) transmission lines.

1.2.4 This part of SANS 10160 does not cover wind loads and wind effects due to high intensity winds, for example tornadoes or micro-bursts.

NOTE The high intensity winds are particularly rare and localised events, therefore, having a very small probability of occurrence at specific geographical location. However, wind forces generated by short duration gusts can be significantly greater than those considered in the international standard design practice.

1.2.5 This part of SANS 10160 does not cover designs assisted by testing and measurements where wind tunnel tests or properly validated numerical methods (or both), are used to obtain the load and response information, based on appropriate models of the structure, topography and the boundary-layer wind conditions.

NOTE Design standards are not able to consider the infinite permutations and combinations of building forms used in the modern design. The degree of applicability of the generic information included in the loading code to specific cases of structures to be designed needs to be assessed. In cases in which the agreement between the loading code information and the structure to be designed is poor, it is advisable to seek expert advice or design by testing (or both).

1.2.6 This part of SANS 10160 does not cover designs where the wind parameters appropriate to the specific site (for example a site which is significantly influenced by topography), as well as load response data have to be obtained from appropriate full-scale measurements.

NOTE In these cases the designer could consult appropriate standards such as EN 1991-1-4, or specialist literature.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies. Information on currently valid national and international standards can be obtained from the SABS Standards Division.

SANS 10100-1 (SABS 0100-1), *The structural use of concrete – Part 1: Design.*

SANS 10137 (SABS 0137), *The installation of glazing in buildings.*

SANS 10160-1, *Basis of structural design and actions for buildings and industrial structures – Part 1: Basis of structural design.*

SANS 10160-2, *Basis of structural design and actions for buildings and industrial structures – Part 2: Self-weight and imposed loads.*

SANS 10160-4, *Basis of structural design and actions for buildings and industrial structures – Part 4: Seismic actions and general requirements for buildings.*

SANS 10160-5, *Basis of structural design and actions for buildings and industrial structures – Part 5: Basis for geotechnical design and actions.*

SANS 10160-6, *Basis of structural design and actions for buildings and industrial structures – Part 6: Actions induced by cranes and machinery.*

SANS 10160-7, *Basis of structural design and actions for buildings and industrial structures – Part 7: Thermal actions.*

SANS 10160-8, *Basis of structural design and actions for buildings and industrial structures – Part 8: Actions during execution.*

SANS 10162-1, *The structural use of steel – Part 1: Limit-state design of hot-rolled steelwork.*

SANS 10162-2 (SABS 0162-2), *The structural use of steel – Part 2: Limit-states design of cold-formed steelwork.*

SANS 10162-4 (SABS 0162-4), *Structural use of steel – Part 4: The design of cold-formed stainless steel structural members.*

SANS 10163-1, *The structural use of timber – Part 1: Limit-states design.*

SANS 10164-2, *The structural use of masonry – Part 2: Structural design and requirements for reinforced and pre-stressed masonry.*

3 Definitions and symbols

For the purposes of this document the definitions and symbols given in SANS 10160-1 and the following apply.

3.1 Definitions

3.1.1
basic wind speed
fundamental value of the basic wind speed modified to account for the return period of the wind being considered

3.1.2
force coefficient
overall effect of the wind on a structure, structural element or component as a whole, including friction, if not specifically excluded

3.1.3
fundamental value of the basic wind speed
mean wind speed of 10 min with an annual probability of exceedance of 0,02, irrespective of wind direction, at a height of 10 m above flat open country terrain and accounting for altitude effects (if required)

3.1.3
net pressure coefficients
resulting effect of the wind on a structure, structural element or component per unit area

3.1.4
peak wind speed
basic wind speed modified to account for the effect of terrain roughness, topography and the conversion factor of 1,4

3.1.5
pressure coefficient

3.1.5.1
external pressure coefficient
gives the effect of the wind on the external surfaces of buildings

NOTE The external pressure coefficients are divided into overall coefficients and local coefficients. Local coefficients give the pressure coefficients for loaded areas of 1 m^2 or less, for example, for the design of small elements and fixings; overall coefficients give the pressure coefficients for loaded areas larger than 10 m^2.

3.1.5.2
internal pressure coefficient
gives the effect of the wind on the internal surfaces of buildings

3.2 Symbols

NOTE The notation used is based on ISO 3898.

3.2.1 Latin upper case letters

A_c area enclosed by the boundaries of the face projected on a plane normal to the face

A_{gk} area of the gusset plate

A_{fr} area of external surface parallel to wind direction

A_{ref} reference area of the structure or structural element

F_{fr} friction force

F_w wind force calculated from pressure or force coefficient

$F_{w,e}$ external wind force

$F_{w,i}$ internal wind force

K shape parameter depending on the coefficient of variation of the extreme value distribution

L length

Re Reynolds number

3.2.2 Latin lower case letters

b breadth of the building

c_{f} force coefficient for a structure or structural element

c_{fr} friction coefficient

c_{pe} external pressure coefficient

c_{fi} internal pressure coefficient

c_{prob} probability factor

c_{r} roughness factor

$c_{\mathrm{s}}c_{\mathrm{d}}$ structural factor

c_{o} topography (orography) factor

d along-wind dimension of building

h height of a building

h_{e} height above ground to the centroid of the projected surface

h_{g} height above ground of the bottom edge of projected surface

h_{strip} height of horizontal strip

k equivalent surface roughness

l length of element

p probability of annual exceedance

q_{p} peak wind speed pressure

v_{b} basic wind speed defined at 10 m above ground in terrain category B

$v_{\mathrm{b,0}}$ fundamental value of the basic wind speed corresponding to the specific geographical location

$v_p(z)$ peak wind speed at height, z, and is determined by the basic wind speed, v_b, terrain roughness and topography

w_e external wind pressure

w_i internal wind pressure

z height above ground level

z_c height below which no further reduction in wind speed is allowed

z_g gradient height

z_0 height of the reference plane

3.2.3 Greek lower case letters

α pitch angle of a roof

ρ air density

λ effective slenderness

θ wind direction

φ blockage ratio

μ opening ratio or permeability

ψ_{mc} reduction factor

ψ_r reduction factor for square sections with rounded corners

ψ_λ end-effect factor for elements with free-end flow

ν kinematic viscosity of the air ($\nu = 15 \cdot 10^{-6}$ m^2/s)

4 Application requirements

4.1 This part of SANS 10160 shall be used in conjunction with the requirements specified in the following standards:

a) SANS 10160-1, for the basis of structural design;

b) SANS 10160-2, for self-weight and imposed loads;

c) SANS 10160-4, for the seismic actions and general requirements for buildings;

d) SANS 10160-5, for the basis for geotechnical design and actions;

e) SANS 10160-6, for actions induced by cranes and machinery;

f) SANS 10160-7, for thermal actions; and

g) SANS 10160-8, for actions during execution.

4.2 This part of SANS 10160 shall also be used in conjunction with appropriate standards for the structural design of buildings and industrial structures, such as the following materials-based structural design standards:

a) SANS 10100-1, for the structural use of concrete;

b) SANS 10137, for glazing in buildings;

c) SANS 10162-1, for the limit-states design of hot-rolled steelwork;

d) SANS 10162-2, for the limit-states design of cold-formed steelwork;

e) SANS 10162-4, for cold-formed stainless steel structural members;

f) SANS 10163-1, for the structural use of timber; and

g) SANS 10164-2, for the structural use of masonry.

5 Design situations

5.1 The relevant wind actions shall be determined for each design situation.

5.2 Other actions or elements (for example, the presence of traffic or the addition of large screens), which will modify the effects of wind, shall be taken into account.

5.3 The changes to the structure during various stages of execution (such as different stages of the form of the structure, which may modify the effects of wind) shall be taken into account.

5.4 If in a design the external skin of a building is assumed to be sealed under storm conditions, a situation of unforeseen or accidental openings shall also be considered.

6 Modelling of wind action

6.1 Nature of wind actions

Wind actions fluctuate with time and act directly as pressures on the external surfaces of enclosed structures and because of porosity of the external surfaces, also act indirectly on the internal surfaces. In the case of open structures, they act both on external and internal surfaces.

Pressures, which act over surfaces, result in forces normal to the surfaces of the structure or individual cladding elements. Additionally, when large surfaces of structures are subject to wind flow directed along the surfaces, substantial friction forces develop.

6.2 Representation of wind actions

Wind action is represented by a simplified set of pressures or forces whose effects are equivalent to the extreme effects of turbulent wind.

6.3 Classification of wind actions

Wind actions shall be classified as variable and fixed actions.

6.4 Characteristic values

The actions are determined from the basic values of wind speed and wind pressure. The basic values are characteristic values having an annual probability of exceedance of 0,02, which is equivalent to a mean return period of 50 years.

NOTE All coefficients and procedures used to derive wind actions from basic values are chosen so that the probability of the calculated wind action does not exceed the probability of these basic values.

6.5 Models

The response of structures shall be calculated according to the procedure outlined in 7.5, from the peak speed pressure, q_p, at the reference height in an undisturbed wind flow, and the pressure and force coefficients, while adopting a structural factor, $c_s c_d$ = 1,0 (see 7.5.3.2). The peak wind speed pressure, q_p, depends on the wind climate, terrain roughness and topography.

NOTE The effect of wind on a structure depends on the size, shape and dynamic properties of the structure. This part of SANS 10160 is based on a static representation of wind action in which the dynamic properties of structures and the dynamic response are not considered. The effects of non-simultaneous occurrence of peak wind pressures are also ignored. This assumption may lead to a certain degree of over estimation of loads for low-rise but large structures. Tall and dynamically sensitive structures are not covered in this part of SANS 10160.

7 Wind speed and wind pressure

7.1 Basis for calculation

7.1.1 The basic wind speed, v_b, depends on the fundamental value of basic wind speed, $v_{b,0}$, adjusted for return period probability factor and shall be determined in accordance with 7.2.2.

7.1.2 The peak wind speed, $v_p(z)$, is determined by the basic wind speed, v_b, terrain roughness and topography and shall be determined in accordance with 7.3.

7.1.3 The peak wind pressure, $q_p(z)$, is a function of peak wind speed, $v_b(z)$, and air density, ρ, and shall be determined in accordance with 7.4.

7.2 Basic values

7.2.1 The fundamental value of the basic wind speed, $v_{b,0}$, is the characteristic 10 min mean wind speed, irrespective of wind direction and time of the year, measured at 10 m above ground level in open country terrain with low vegetation, such as grass and isolated obstacles, with separation of at least 20 obstacle heights.

NOTE This terrain corresponds to category B given in 7.3.2.2.

7.2.2 The basic wind speed shall be calculated using the following equation:

$$v_b = c_{prob} \times v_{b,0} \tag{1}$$

where

v_b is the basic wind speed defined at 10 m above ground in terrain category B;

$v_{b,0}$ is the fundamental value of the basic wind speed corresponding to the specific geographical location, which shall be taken from figure 1;

c_{prob} see 7.2.3.

7.2.3 The basic values are characteristic values having an annual probability of exceedance of 0,02, which is equivalent to a mean return period of 50 years. The probability factor, c_{prob}, is given in equation 2: **Amdt 1**

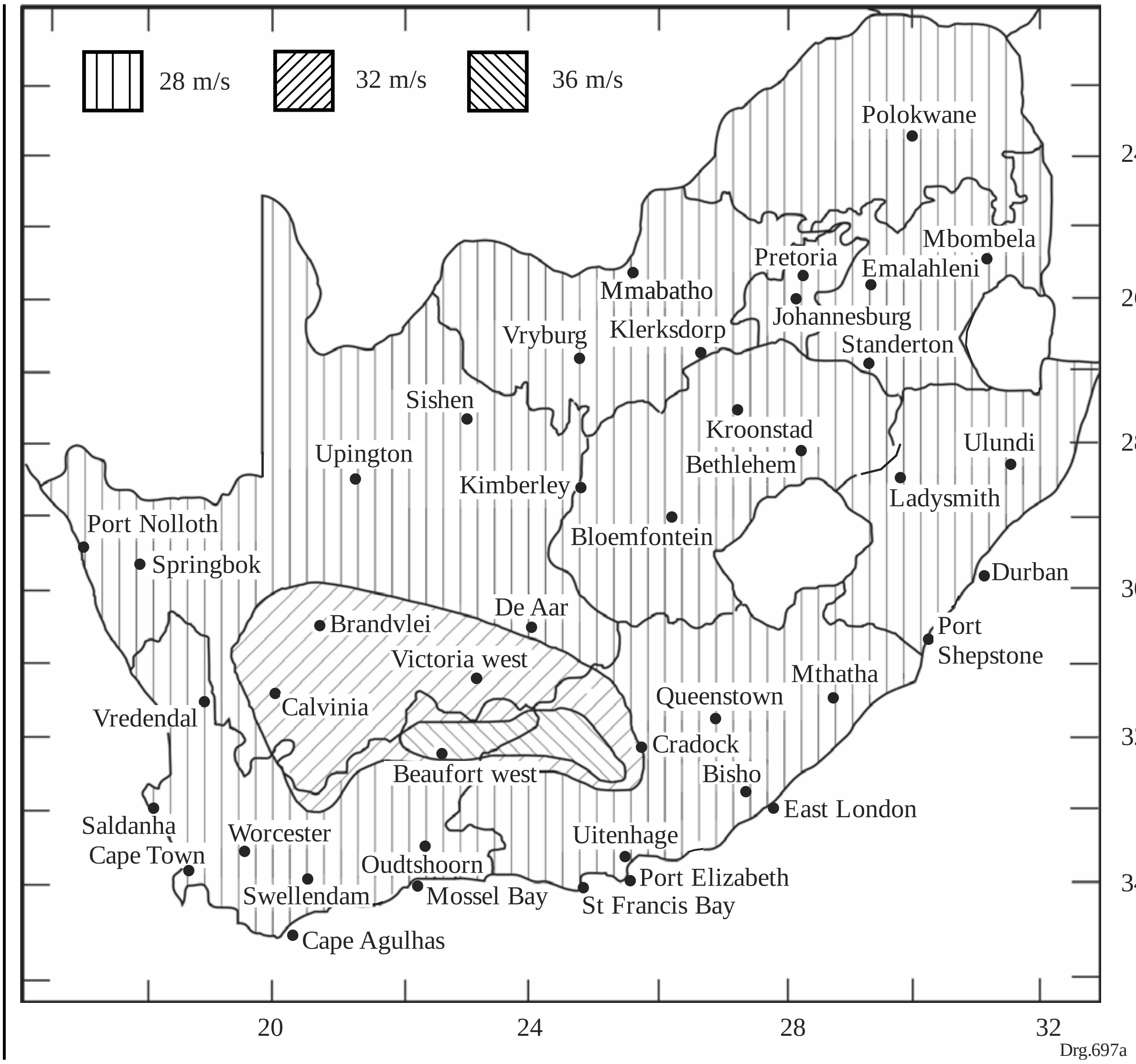
$$c_{prob} = \left[\frac{1 - K \times ln\{- ln\,(1 - p)\}}{1 - K \times ln\{- ln 0,98\}} \right]^n \tag{2}$$

where

K is the shape parameter depending on the coefficient of variation of the extreme value distribution with a value of 0,2;

n is the exponent with a value of 0,5.

NOTE The return period may be taken as the design working life of the structure (see SANS 10160-1).



Amdt 1

NOTE For most areas of the country a basic fundamental wind speed of 28 m/s is stipulated. The South African climate (i.e. also the wind climate) is complex, in particular with regard to the dominance of frontal winds in coastal areas and intense thunderstorms inland. These two types of strong wind events cannot be fairly represented by a single value of mean wind speed in terms of 10 min averaging time. In order to overcome this problem an actual magnitude of wind speed of 28 m/s was obtained for coastal areas based on a conversion factor between hourly and 10 min mean wind speeds. For inland areas of the country an effective speed of 28 m/s was adopted.

Figure 1 — Map of the fundamental value of the basic wind speed, $v_{b,0}$

7.3 Peak wind speed

7.3.1 Variation with height

7.3.1.1 The peak wind speed, $v_p(z)$ at a height, z, above the terrain, depends on the terrain roughness and topography as well as on the basic speed, v_b, and shall be determined using the following equation:

$$v_p(z) = c_r(z) \times c_0(z) \times v_{b,.peak} \qquad (3)$$

where

$$v_{b,peak} = 1{,}4 v_b; \qquad (4)$$

$c_r(z)$ is the roughness factor, given in 7.3.2;

$c_o(z)$ is the topography (orography) factor, taken as 1,0 unless specified otherwise in 7.3.3.

NOTE In equation (4) a conversion takes place from the 10 min mean wind speed, in terms of which the basic wind velocities, $v_{b,0}$ and v_b, are defined to 3 s gust wind speed.

7.3.1.2 The influence of neighbouring structures on the wind speed at a specific site shall be considered, as described in 7.3.4 and 7.3.5.

7.3.2 Terrain roughness

7.3.2.1 The terrain roughness factor, $c_r(z)$, accounts for the variability of the mean wind speed at the site of the structure due to

a) the height above ground level, and

b) the ground roughness of the terrain upwind of the structure in the wind direction under consideration.

The factor, $c_r(z)$, shall be determined using the following equation:

$$c_r(z) = 1{,}36 \left(\frac{z - z_o}{z_g - z_c} \right)^{\alpha} \qquad (5)$$

where

z is the height above the ground level;

z_o is the height of the reference plane, as defined in table 1;

z_g is the gradient height, as defined in table 1;

z_c is the height below which no further reduction in wind speed is allowed as defined in table 1;

α is the exponent as defined in table 1.

Table 1 — Parameters of wind profile

1	2	3	4	5
Terrain category	**Height** z_g	**Height** z_o	**Height** z_c	**Exponent** α
A	250	0	1	0,070
B	300	0	2	0,095
C	350	3	5	0,120
D	400	5	10	0,150

7.3.2.2 Various terrain categories are specified in table 2. (See annex A.)

7.3.2.3 At low elevations above the ground level, the wind profile (i.e. magnitude of the c_r(z) factor) is strongly influenced by local surroundings, which are site specific and which may introduce acceleration of the wind flow. This is especially relevant within developed areas i.e. rough terrain categories. No further reductions in the wind speed below cut-off heights, z_c, which are stipulated in table 1, are permitted.

7.3.2.4 The variation of the roughness factor, c_r(z), with height, is given in table 3 and in figure 2.

7.3.2.5 The terrain roughness to be used for a given wind direction depends on the distance of the terrain covered with a uniform roughness within an angular ± 15° sector of this direction. Small areas, with a deviation in the roughness, which constitute less than 10 % of the overall area, can be ignored.

7.3.2.6 When there is a choice between adopting two or more terrain categories for a given area then the terrain category with a lower roughness shall be used.

7.3.2.7 The smoother terrain category in the upwind direction shall be adopted if a structure is situated near a change of terrain roughness at the following distances and in the following categories:

a) less than 2 km from the smoother category A; or

b) less than 1 km from smoother categories B and C.

In other cases the procedure described in A.2 may be used.

Table 2 — Terrain categories

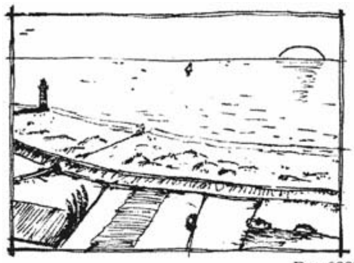
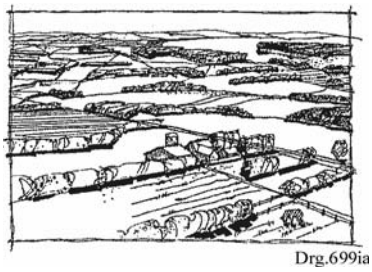
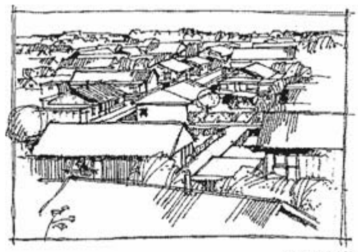
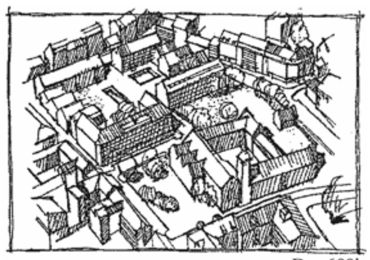
1	2	3
Category	**Description**	**Illustration**
A	Flat horizontal terrain with negligible vegetation and without any obstacles (for example coastal areas exposed to open sea or large lakes)	 Drg.699i
B	Area with low vegetation such as grass and isolated obstacles (for example trees and buildings) with separations of at least 20 obstacle heights	 Drg.699ia
C	Area with regular cover of vegetation or buildings or with isolated obstacles with separations of maximum 20 obstacle heights (such as villages, suburban terrain and permanent forest)	 Drg.699ib
D	Area in which at least 15 % of the surface is covered with buildings and their average height exceeds 15 m	 Drg.699ic
NOTE 1 A certain amount of a reduction in loading for category D can be obtained (see 7.3.5) by using a procedure described in A.5, which takes into account the vertical displacement of the peak wind pressure profile, within an environment with closely spaced obstructions.		

Table 3 — Variation of the $c_r(z)$ factor with height above ground level

1	2	3	4	5
Elevation m	**Category**			
	A	**B**	**C**	**D**
0	0,92	0,85	0,73	0,71
2	0,97	0,85	0,73	0,71
4	1,02	0,90	0,73	0,71
6	1,05	0,94	0,77	0,71
10	1,09	0,98	0,85	0,71
15	1,12	1,02	0,91	0,78
20	1,14	1,05	0,95	0,83
30	1,17	1,09	1,00	0,90
40	1,20	1,12	1,04	0,95
50	1,22	1,15	1,07	0,98
60	1,23	1,17	1,09	1,01
70	1,24	1,18	1,12	1,04
80	1,26	1,20	1,14	1,06
90	1,27	1,21	1,15	1,08
100	1,28	1,23	1,17	1,10

Amdt 1

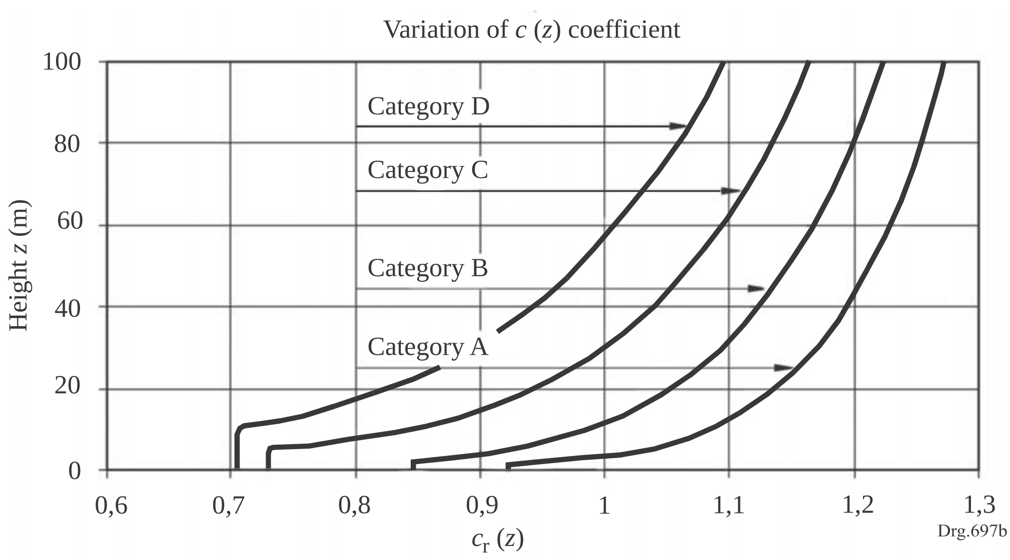


Figure 2 — Variation of the $c_r(z)$ factor with height above ground level

7.3.3 Terrain topography

7.3.3.1 Where the terrain topography (for example hills or cliffs) increases wind speeds by more than 5 %, these effects shall be taken into account by using the topography factor, $c_0(z)$.

NOTE The recommended procedure is given in A.3.

7.3.3.2 The effects of topography may be neglected when the average slope of the upwind terrain is less than 3°. The effects of the up-wind topography have to be considered to a distance of ten times the height of the isolated topographical feature.

7.3.4 Large and considerably higher neighbouring structures

If a structure under consideration is to be located within a close proximity of another, which protrudes at least twice as high as the average heights of neighbouring structures, then the structure under consideration could be subject to accelerated wind speeds. Such cases shall be taken into account in the design process.

NOTE A recommended conservative approximation, which takes this effect into account, is given in A.4. Alternatively wind-tunnel modelling can be used.

7.3.5 Closely spaced buildings and obstacles

The effect of closely spaced buildings and other obstacles shall be taken into account.

NOTE In a rough terrain with closely spaced buildings the mean wind flow near the ground is modified as if the ground level was raised to a height which is called a displacement height, h_{dis}. A recommended approximate procedure in this respect is given in A.5.

7.4 Peak wind speed pressure

The peak wind speed pressure, $q_p(z)$ at height, z, which includes the mean and short duration wind speed fluctuations, shall be determined using the following equation:

$$q_p(z) = \frac{1}{2} \times \rho \times v_p^2(z) \qquad (6)$$ **Amdt 1**

where

ρ is the air density, expressed in kilograms per cubic metre (kg/m³).

NOTE The recommended values of the air density as a function of altitude above sea level are given in table 4.

Table 4 — Air density as a function of site altitude

1	2
Site altitude above sea level m	**Air density** ρ kg/m^3
0	1,20
500	1,12
1 000	1,06
1 500	1,00
2 000	0,94
NOTE 1 A temperature of 20° has been selected as appropriate for South Africa and the variation of mean atmospheric pressure with altitude is allowed for in the above table. NOTE 2 Intermediate values of ρ may be obtained from linear interpolation.	

7.5 Wind actions

7.5.1 Calculation procedure

A summary of calculation procedures for the determination of wind actions is given in table 5.

Table 5 — Calculation procedure

1	2	3
Description	**Symbol**	**Reference**
Fundamental basic wind speed	$v_{b,0}$	Figure 1
Basic wind speed	v_b	Equation (1)
Terrain category	A, B, C, D	Table 2
Reference height	z_e	7.5.2.2
Topography coefficient	$c_0(z)$	7.3.3
Roughness/Height coefficient	$c_r(z)$	7.3.2
Peak wind speed	$v_p(z)$	Equations (3) and (4)
Peak wind speed pressure	$q_p(z)$	Equation (6)
Internal pressure coefficient	c_{pi}	8.3.9
External pressure coefficient	c_{pe}	8.3.2 to 8.3.8
Internal wind pressure	w_i	Equation (7)
External wind pressure	w_e	Equation (8)
Wind force calculated from force coefficient	F_w	Equations (9) and (10)
Internal forces	$F_{w,i}$	Equation (11)
External forces	$F_{w,e}$	Equation (12)
Friction forces	F_{fr}	Equation (13)

7.5.2 Wind pressure on surfaces

7.5.2.1 Wind action on structures and structural elements shall be determined by taking into account the simultaneous actions of external and internal wind pressures.

NOTE The fluctuating internal pressures are generated by wind penetrating the outer skin of a structure via passages, which may include the following:

a) permanent openings (vents, louvers);

b) temporary openings (windows and doors);

c) leakages (via. windows and cladding); and

d) accidental openings (broken windows, displaced sheeting).

7.5.2.2 The wind action shall be determined for a selected value of the reference height of the surface of the structure, z_e, depending on the configuration and geometry of the structure as specified in 8.3.