Republic of South Africa

EDICT OF GOVERNMENT

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SANS 10400-O (2011) (English): The application of the National Building Regulations Part O: Lighting and ventilation

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Edition 3

SOUTH AFRICAN NATIONAL STANDARD

The application of the National Building Regulations

Part O: Lighting and ventilation

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Edition 3

Table of changes

Change No.	Date	Scope

Acknowledgement

The SABS Standards Division wishes to acknowledge the work of Agrément South Africa, the South African Institution of Civil Engineering, and the South African Refrigeration and Air Conditioning Contractors Association in updating this document.

Foreword

This South African standard was approved by National Committee SABS TC 59, *Construction standards*, in accordance with procedures of the SABS Standards Division, in compliance with annex 3 of the WTO/TBT agreement.

This document was published in January 2011.

This document supersedes the corresponding parts of SABS 0400:1990 (first revision).

Compliance with the requirements of this document will be deemed to be compliance with the requirements of part O of the National Building Regulations, issued in terms of the National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977).

SANS 10400 consists of the following parts, under the general title *The application of the National Building Regulations:*

Part A: General principles and requirements.

Part B: Structural design.

Part C: Dimensions.

Part D: Public safety.

Part F: Site operations.

Part G: Excavations.

Part H: Foundations.

Part J: Floors.

Part K: Walls.

Part L: Roofs.

Part M: Stairways.

Part N: Glazing.

Part O: Lighting and ventilation.

Foreword (*concluded*)

Part P: Drainage.

Part Q: Non-water-borne means of sanitary disposal.

Part R: Stormwater disposal.

Part S: Facilities for persons with disabilities.

Part T: Fire protection.

Part V: Space heating.

Part W: Fire installation.

This document should be read in conjunction with SANS 10400-A.

Annex A forms an integral part of this document. Annex B is for information only.

Contents

The application of the National Building Regulations

Part O:
Lighting and ventilation

1 Scope

This part of SANS 10400 provides deemed-to-satisfy requirements for compliance with part O (Lighting and Ventilation) of the National Building Regulations.

NOTE Part O of the National Building Regulations, issued in terms of the National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977), is reproduced in annex A.

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 10114-1, *Interior lighting – Part 1: Artificial lighting of interiors.*

SANS 10400-A, *The application of the National Building Regulations – Part A: General principles and requirements.*

SANS 10400-N, *The application of the National Building Regulations – Part N: Glazing.*

SANS 10400-T (SABS 0400-T), *The application of the National Building Regulations – Part T: Fire protection.*

3 Definitions

For the purposes of this document, the definitions given in SANS 10400-A (some of which are repeated for convenience) and the following apply.

3.1
acceptable
acceptable

a) in the opinion of any local authority, or

b) in relation to any document issued by the council, in the opinion of the council

3.2
adequate
adequate

a) in the opinion of any local authority, or

b) in relation to any document issued by the council, in the opinion of the council

3.3
approved
approved

a) by any local authority, or

b) by the Review Board on appeal to the Review Board in terms of the Act

3.4
artificial ventilation system
system in which air is caused to circulate through a room by means of a mechanical apparatus which forces air into or extracts air from such room

3.5
building line
line prescribed in any town planning scheme or any other law designating the boundaries of the area of the site outside of which the erection above ground of any building is prohibited

3.6
category 1 building
building which

a) is designated as being of class A3, A4, F2, G1, H2, H3, or H4 occupancy (see Regulation **A20** in SANS 10400-A),

b) has no basements,

c) has a maximum length of 6,0 m between intersecting walls or members providing lateral support, and

d) has a floor area that does not exceed 80 m²

NOTE 1 Table B.1 outlines the difference in performance between category 1 buildings and other buildings that have the same occupancy designation in respect of a number of building attributes.

NOTE 2 A building may be classified as a category 1 building for the purposes of one or more parts of SANS 10400. Additional limitations may accordingly be imposed on category 1 buildings. For example, a category 1 building in terms of SANS 10400-T (Fire protection) will be restricted to a single storey.

NOTE 3 Fire requirements for category 1 buildings are based on occupants escaping quickly from buildings. The design population for occupancies as set out in table 2 of part A of the Regulations (see SANS 10400-A) should therefore not be exceeded.

3.7
competent person
person who is qualified by virtue of his education, training, experience and contextual knowledge to make a determination regarding the performance of a building or part thereof in relation to a functional regulation or to undertake such duties as may be assigned to him in terms of the National Building Regulations

NOTE This is a generic definition, to be used where no other definition is given, or no references are made to other standards. Other parts of SANS 10400 contain definitions of a more specific nature relevant to their disciplines.

3.8
competent person (mechanical engineering)
person who

a) is registered in terms of the Engineering Profession Act, 2000 (Act No. 46 of 2000),

b) has a tertiary qualification (degree or diploma) in mechanical engineering, and

c) is generally recognized as having the necessary experience and training to undertake rational assessments or rational designs in the field of lighting and ventilation

3.9
deemed-to-satisfy requirement
non-mandatory requirement, the compliance with which ensures compliance with a functional regulation

3.10
dwelling house
single dwelling unit and any garage and other domestic outbuildings thereto, situated on its own site

3.11
dwelling unit
unit containing one or more habitable rooms and provided with adequate sanitary and cooking facilities

3.12
flue
passage which conveys the discharge of a heat-generating appliance to the external air

3.13
functional regulation
regulation that sets out in qualitative terms what is required of a building or building element or building component in respect of a particular characteristic, without specifying the method of construction, dimensions or materials to be used

3.14
garage
enclosed area which is used or intended to be used for the parking, storing, servicing or repairing of motor vehicles

3.15
habitable room
room used or designed, erected, adapted or intended to be used by persons for sleeping in, living in, the preparation or consumption of food or drink, the transaction of business, the rendering of professional services, the manufacture, processing or sale of goods, the performance of work, the gathering together of persons or for recreational purposes

3.16
make-up air
air introduced to replace extracted air

3.17
natural ventilation
movement of air through a building due to natural causes

3.18
occupancy
particular use or the type of use to which a building or portion thereof is normally put or intended to be put

NOTE Regulation **A20** (see SANS 10400-A) classifies and designates occupancies.

3.19
outside air
air which is drawn into the building from the outside and which has not been circulated through such building

3.20
rational assessment
assessment by a competent person of the adequacy of the performance of a solution in relation to requirements including as necessary, a process of reasoning, calculation and consideration of accepted analytical principles, based on a combination of deductions from available information, research and data, appropriate testing and service experience

3.21
rational design
design by a competent person involving a process of reasoning and calculation and which may include a design based on the use of a standard or other suitable document

3.22
smoking area
area which does not exceed 25 % of the total floor area of a public space and which is partitioned off with solid partitions

3.23
smoking room
dedicated room where smoking is permitted

3.24
street boundary
boundary of a site which abuts any street

3.25
suitable
capable of fulfilling or having fulfilled the intended function, or fit for its intended purpose

3.26
the Act
National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977)

3.27
zone of space
volume of open air outside an opening in an external wall or a portion of such an opening

4 Requirements

4.1 General

4.1.1 The functional regulations pertaining to lighting in a habitable room, bathroom, shower room and room containing a toilet pan, contained in part O of the National Building Regulations (see annex A), shall be deemed to be satisfied where the lighting in such rooms complies with the requirements of SANS 10400-T and the requirements of 4.2.

4.1.2 The functional regulations pertaining to ventilation contained in part O of the National Building Regulations (see annex A) shall be deemed to be satisfied where the ventilation complies with the requirements of SANS 10400-T and

a) complies with the requirements of 4.3; or

b) is the subject of a rational design prepared by a competent person (mechanical engineering) in accordance with the requirements of 4.3.2, and is constructed in accordance with the specifications issued by said competent person.

4.2 Lighting

4.2.1 Natural lighting

4.2.1.1 General

4.2.1.1.1 Where, for the purposes of natural lighting, a room is provided with one or more openings, such opening or openings shall be situated in an external wall, or in a suitable position in the roof of the building, and shall be provided with a zone of space outside it in accordance with the requirements of 4.2.1.2.

4.2.1.1.2 Where such opening is glazed, it shall be glazed with transparent or approved translucent glazing material, in accordance with the requirements of SANS 10400-N.

4.2.1.1.3 The area of such opening, or the total area of such openings, inclusive of frames and glazing bars, shall be not less than

a) 5 % of the floor area of the room(s) in respect of category 1 buildings that have an occupancy class of F2, H3 or H4; and

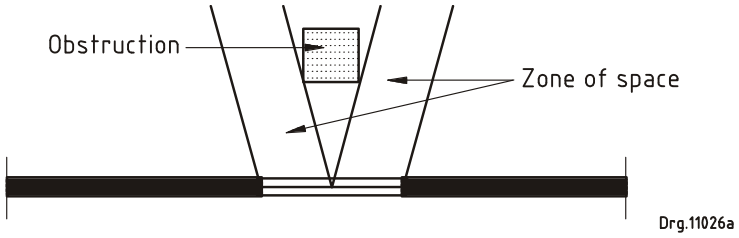
b) 10 % of the floor area of the room(s) in respect of other buildings, or 0,2 m^2, whichever is the greater.

NOTE The requirements of 4.2.1 do not apply to ventilated improved pit toilets.

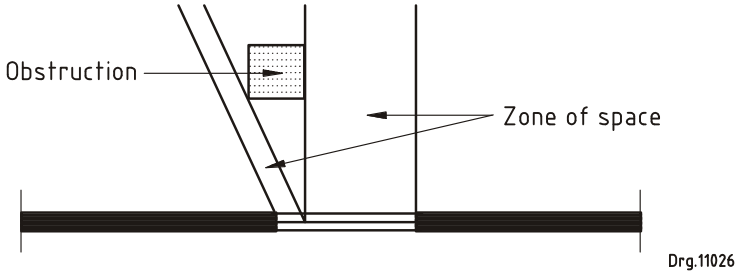
4.2.1.2 Zones of space for natural lighting

4.2.1.2.1 An opening provided in accordance with the requirements of 4.2.1.1 shall have a zone of space outside it, and such opening may be divided into portions, each with its own zone of space.

Figure 1 shows the zones of space that may exist when an opening is divided into portions. The lines that determine these zones depend on the size and shape of the obstruction.



a) Central obstruction



b) Offset obstruction

Figure 1 — Examples of zones of space with obstructions

4.2.1.2.2 A zone of space shall be limited by parallel planes passing through and extending from the highest and lowest points of such opening and by parallel planes passing through and extending from the points of such opening that are furthest apart in the lateral direction (see figure 2). Such parallel planes may extend from a building at any angle to the plane of the opening.

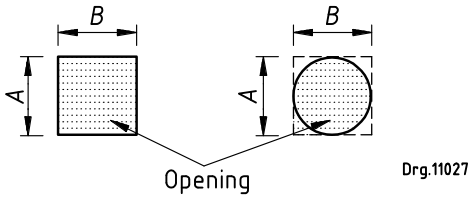
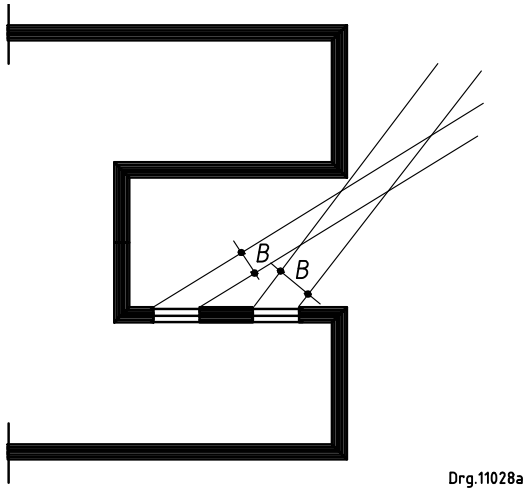
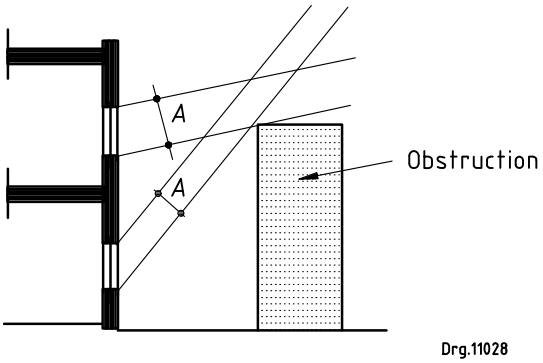


Figure 2 — Measurement of openings

4.2.1.2.3 Where the planes bounding a zone of space are not at right angles to the plane of the opening, the area of such opening shall, for the purpose of 4.2.1.1.3, be deemed to be $A \times B$, where A is the shortest distance between the planes bounding the top and bottom of such zone and B is the shortest distance between the vertical planes bounding the sides of such zone (see figure 3).



a) Obstruction caused by building



b) Obstruction adjacent to building

Figure 3 — Examples of zones of space at angles to openings

4.2.1.2.4 The available length of a zone of space shall be calculated either as half the sum of the lengths of the vertical planes or as half the sum of the lengths of the planes passing through the highest and lowest points of the opening.

The lengths of individual planes shall be measured as the distance along such plane from the opening to

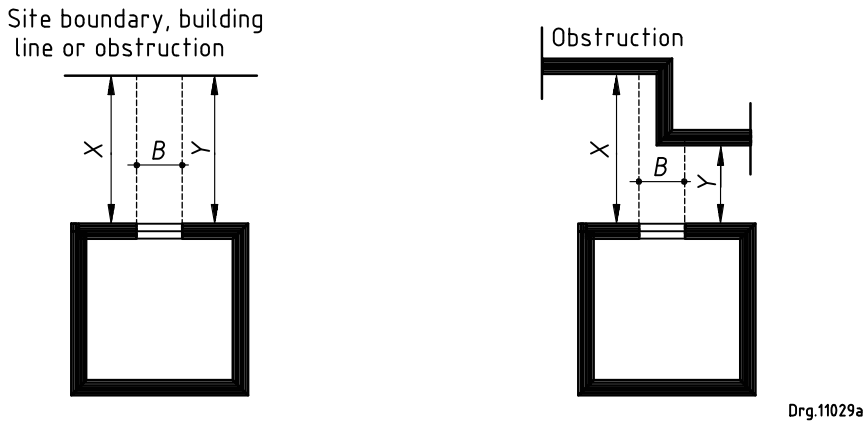
a) any obstruction on the site which intersects such plane, or

b) where there is no such obstruction, any statutory building line on an adjoining site, or

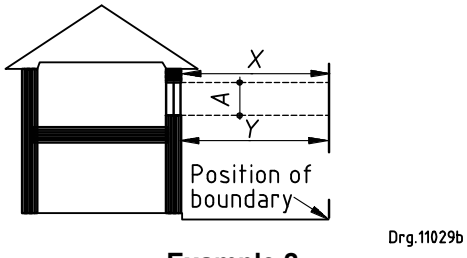
c) where there is no such obstruction or line, the boundary between the site and any adjoining site,

provided that where a zone extends across a street reserve, the statutory building line and the boundary considered in (b) and (c), respectively, shall be taken to mean the statutory building line and street boundary of the site opposite the site concerned.

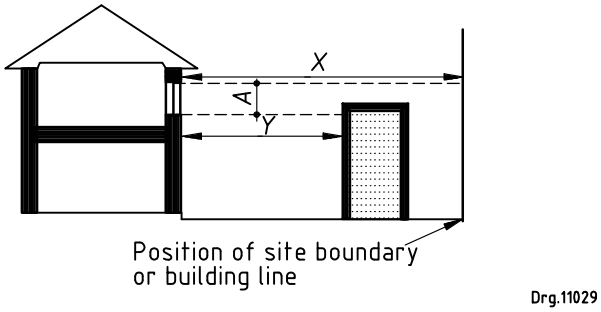
Figure 4 shows how the length of a zone of space can be calculated.



Example 1



Example 2



Example 3

In all cases the length of the zone of space is $\frac{X+Y}{2}$

Figure 4 — Measurement of zones of space

4.2.1.2.5 The available length of any zone of space when calculated in accordance with 4.2.1.2.4, shall be

a) not less than 0,5 m when measured to a boundary line, or

b) not less than 1 m when measured to a building line, and

c) notwithstanding the requirements contained in 4.2.1.2.6 and 4.2.1.2.7, not more than 8 m.

4.2.1.2.6 Where none of the planes bounding a zone of space intersects an obstruction on the site, the available length of such zone shall be not less than that contained in table 1, where *H* represents the distance measured vertically from the head of the opening to the top of the wall containing the opening.

4.2.1.2.7 Where one or more of the planes bounding a zone of space intersects an obstruction on the site, the available length of such zone shall be not less than that contained in table 1, where *H* represents the height of the obstruction above the level of the head of the opening concerned, provided that the shortest horizontal distance between the opening and such obstruction shall be not less than 1 m.

Table 1 — Length of zones of space

1	2
Type of room served by opening	**Length of zone of space**
Habitable room in dwelling house, dwelling unit or a building used for a residential or institutional occupancy	1/3*H*
Any other habitable room	1/5*H*
Bathroom, shower or room containing a toilet pan or urinal	1/10*H*

Figures 5 and 6 show the height of obstruction which controls the required length of a zone of space.

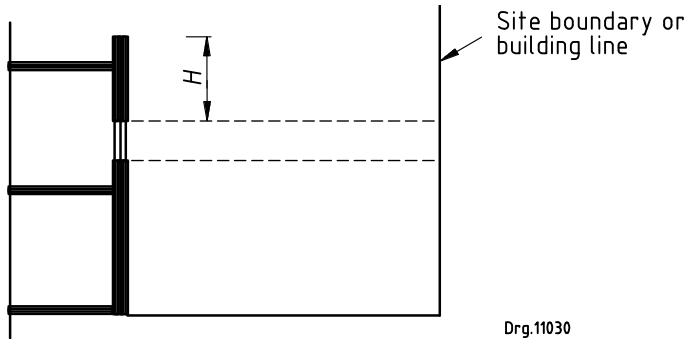


Figure 5 — Zone of space intersecting a boundary or building line

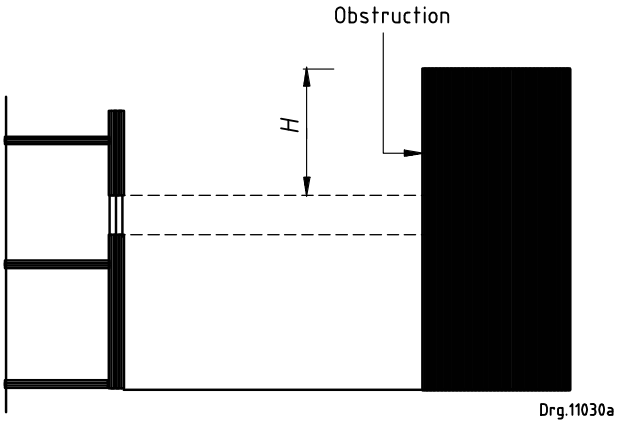


Figure 6 — Zone of space intersecting an obstruction

4.2.1.2.8 Where any projection from the surface of the wall above any opening in 4.2.1.1 is likely to significantly reduce the amount of light reaching such opening,

a) at least two-thirds of the plan area of the zone of space outside such opening shall have an unrestricted vertical shaft extending upwards from the plane bounding the top of such zone; and

b) no opaque projection over such zone shall extend to a line closer than 1 m away from any obstruction or lateral site boundary intersecting such zone.

Figure 7 shows the vertical shaft required above a zone of space which has a projection covering part of it.

4.2.1.3 Natural lighting of rooms opening onto enclosed balconies, galleries or verandahs

4.2.1.3.1 The openings to a room which opens onto a roofed and enclosed balcony, a gallery or a verandah, shall comply with the requirements of 4.2.1.1 and 4.2.1.2.

4.2.1.3.2 The area of the openings in a portion of the outer wall of such balcony, gallery or verandah, shall be at least 10 % of the combined floor area of the room concerned and the balcony, gallery or verandah.

4.2.1.3.3 The portion of the outer wall of a balcony, gallery or verandah in which openings that comply with the requirements of 4.2.1.3.1 and 4.2.1.3.2 are formed, shall be provided with a zone of space that complies with the requirements contained in 4.2.1.2.

4.2.1.4 Natural lighting of rooms opening onto enclosed and covered or partially covered courts

4.2.1.4.1 Any room with an opening which opens onto an enclosed and covered or partially covered court shall comply with the requirements of 4.2.1.1 and 4.2.1.2.

4.2.1.4.2 The cover to such courts shall be adequately translucent.

4.2.2 Artificial lighting

Where in any building the requirements for lighting contained in Regulation **O1** of the National Building Regulations (see annex A) shall be complied with by the installation of a system of artificial lighting, such lighting shall be in accordance with the relevant recommendations contained in SANS 10114-1.

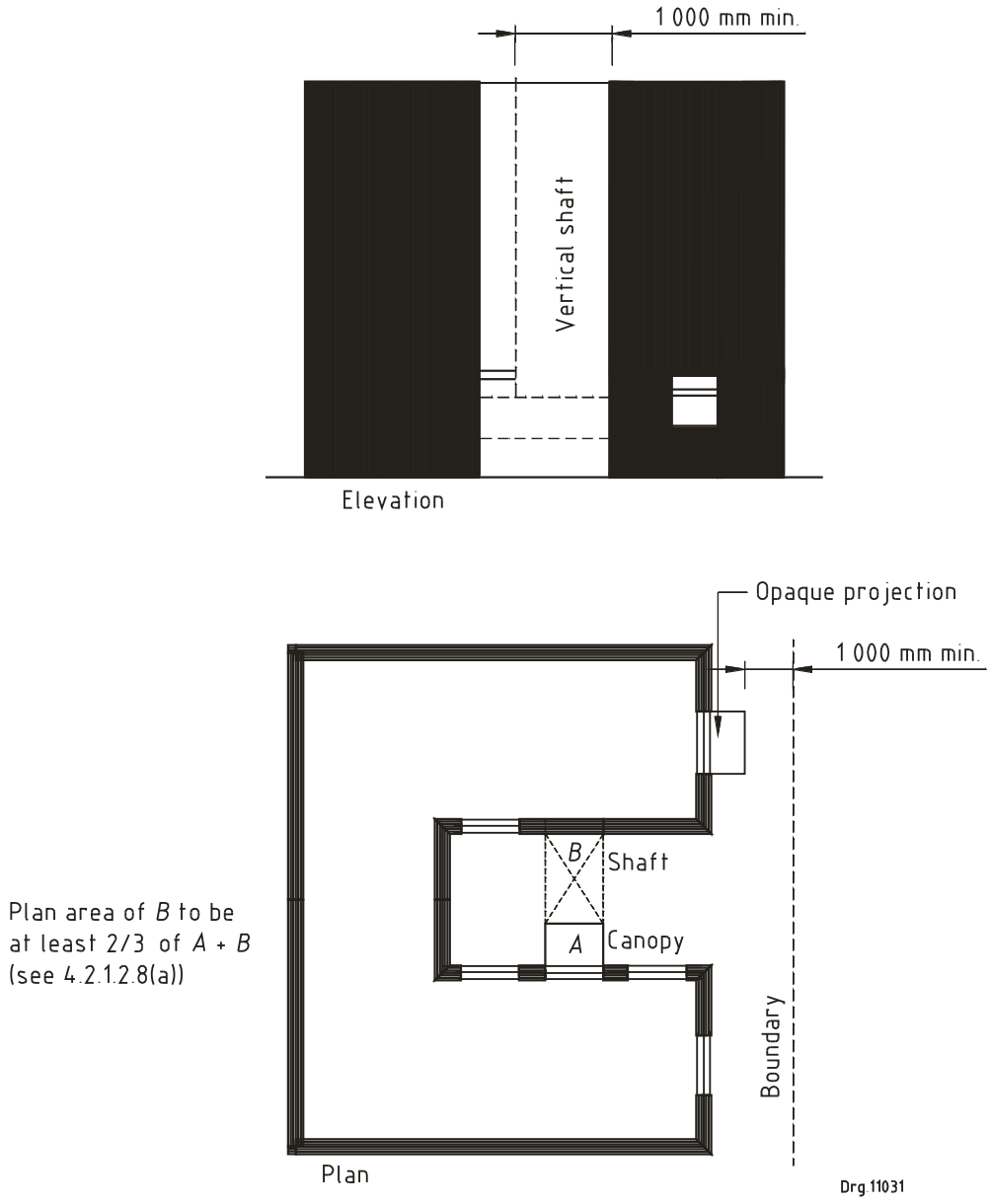


Figure 7 — Projection over zone of space

4.3 Ventilation

4.3.1 Natural ventilation

4.3.1.1 General

4.3.1.1.1 Where, for the purposes of natural ventilation, a room is provided with an opening or openings,

a) the position of such opening or openings in relation to each other and to internal doors to such room shall be such as to enable such room to be ventilated, and

b) the arrangement and sizes of such openings in a garage shall be such that the quantity of noxious fumes or gases in such garage does not exceed a safe limit.

4.3.1.1.2 Every such opening shall be either

a) an opening or door in an external wall, or

b) an openable glazed window in an external wall or in a suitable position in the roof, or

c) an opening in the ceiling or at the top of an internal wall, connected directly to a vertical ventilating flue.

4.3.1.1.3 The total area of an opening, a door or an openable glazed window that complies with the requirements of 4.3.1.1.2(a) or (b) shall be not less than 5 % of the floor area of the room, or

a) 0,1 m^2 in respect of category 1 buildings that have an occupancy class of E4, F2, H3, H4 or H5, and

b) 0,2 m^2 in respect of other buildings,

whichever is the greater.

4.3.1.1.4 The total area of an opening that complies with the requirements of 4.3.1.1.2(c) shall be not less than 2 % of the floor area of the room.

NOTE In any building which is not permanently occupied, such as a holiday home or chalet, windows providing ventilation might remain closed for long periods. In hot humid areas this can lead to problems such as dampness and mould growth, and some form of supplementary ventilation might be desirable. Airbricks provide a partial solution but as these might not be sufficient on their own, some other form of permanent ventilation, such as a roof vent, should also be considered.

4.3.1.2 Natural ventilation of rooms opening onto enclosed balconies, galleries, verandahs and courts

4.3.1.2.1 The openings to a room which opens onto any roofed and enclosed balcony, a gallery or a verandah, shall comply with the requirements of 4.3.1.1, and any such balcony, gallery or verandah shall be provided with doors or other openable areas with an area of at least 5 % of the combined floor area of the room concerned and the balcony, gallery or verandah.

4.3.1.2.2 Any room with an opening which opens onto an enclosed and covered or partially covered court shall comply with the requirements of 4.3.1.1 and

a) if not occupied for any purpose, shall either have a covered plan area of not more than one-third of the plan area of such court or be provided with additional openings from such court to the outside air to the extent that the total area of all such openings is equal to at least two-thirds of the plan area of such court; or

b) if occupied for any purpose, shall be provided with additional openings from such court to the outside air to the extent that the total area of all such openings is equal to at least two-thirds of the plan area of such court.

4.3.1.2.3 Where natural ventilation is required and the cover extends over more than one-third of any enclosed court, additional ventilation openings may be provided either as shown in figure 8 or through the building itself.

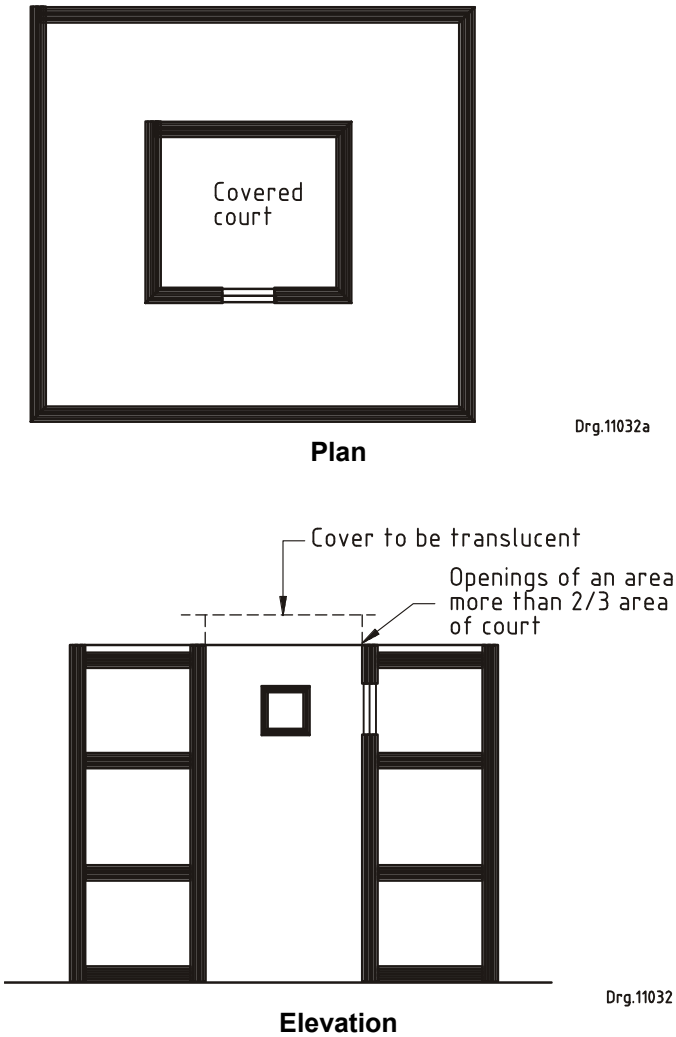


Figure 8 — Lighting and ventilation of court

4.3.2 Artificial ventilation

4.3.2.1 Outside air used in any artificial ventilation system shall be introduced to the system from an inlet positioned to ensure that such air is, as far as possible, free from local contamination. Where it is not possible to so position such inlet, the system shall incorporate suitable devices to

a) reduce contamination of outside air to an acceptable level, and

b) prevent discharge of dust, fluff or hazardous substances or materials that might have accumulated in ducts from entering the building spaces.

4.3.2.2 The exhaust outlets for air which has been used for artificial ventilation purposes shall be so located and arranged to ensure that such air does not cause a nuisance or contaminate air which is likely to be drawn into or ventilate an existing building. All exhaust outlets shall be constructed in a manner that ensures against any exhaust plume from the facility being entrained by natural forces, and re-entering the building via any building openings or ventilation openings.

4.3.2.3 Exhaust outlets and air inlets forming part of an artificial ventilating system shall be protected by a substantial grille, louvre or weather cowl fitted with a screen through which a 12 mm diameter sphere cannot pass.

4.3.2.4 Where an artificial ventilation system has been connected to a room

a) designed to be occupied by persons suffering from infectious or contagious diseases,

b) referred to in Regulation **O1(3)(b**), or

c) containing a toilet pan or urinal, shower cubicle or bath, or used as a sauna, darkroom or refuse storage room,

air from such room shall not be recirculated to, or permitted to pass into, any other room, whether or not such room falls into the same occupancy category. All such air shall not be permitted to enter a ceiling void or space within the building envelope, but be discharged or exhausted to the outside air. The artificial ventilation system shall not be connected to any artificial lighting system for the purpose of on/off control.

NOTE An artificial ventilation system required in terms of 4.3.2.4 should remain in the 'on' position for a period after the room is vacated. This is to ensure that any residual moisture is removed from the room so that a damp environment does not develop.

4.3.2.5 In any room referred to in Regulation **O1(3)(b**) where heat, dust, gas, vapour, volatile matter or hazardous biological agents are liberated in one or more localized areas, each such area shall be provided with a suitable cascading air pressure control, and an extraction facility, which shall exhaust the contaminated air from such area. The rate of exhaust will be in accordance with the required air change rate to ensure appropriate levels of dilution of such heat, dust, gas, vapour, volatile matter or hazardous biological agents and to ensure that they are effectively removed via negative pressure ducted ventilation systems and then discharged directly to the outside air.

4.3.2.6 The artificial ventilation system serving a parking garage shall be separate from any other artificial ventilation system, provided that contaminated air exhausted from such garage may be circulated through a transformer, machine or similar service room in order to dissipate heat from machines before passing to the outside air. The arrangement and sizes of air inlets and outlets in every garage required in terms of this part of SANS 10400 to be artificially ventilated shall be such as to ensure that the level of noxious or toxic fumes or gases at any location in such garage does not rise above a safe limit.

4.3.2.7 Where a kitchen contains an extraction facility for the purpose of extracting heat or vapour, such facility shall, where it is to be subjected to an atmosphere containing grease in suspension, be fitted with a means which will filter the air entering such facility to prevent such grease being carried into the system. Where such means cannot be fitted, an easily accessible trap or settling chamber shall be installed in the duct leading from such facility. Provision shall be made at every change in direction of such duct for easy inspection and for cleaning of the interior of the duct.

Any such extraction facility and the artificial ventilation system required therefor shall be constructed or lined throughout with a non-combustible material and shall not be connected to any other extraction facility or artificial ventilation system. The exhaust outlet shall be positioned above the roof line and constructed in such a way as to ensure that the exhaust plume from the facility is not entrained by natural forces to re-enter the building via any building opening or ventilation inlet.

4.3.2.8 Where single air-conditioning units, which cannot comply with the outdoor air requirements to satisfy the types of occupancy covered by table 2 are utilized, a supplementary ventilation system other than openable windows shall be installed to ensure compliance with the minimum requirement for outdoor air. Where single air-conditioning units are installed in the perimeter wall of a building, and where such wall abuts on a public street or place, the units shall be installed and operated in such a way that condensate formed by the operation of the evaporator section of the unit is prevented from dripping onto such street or place by

a) the use of a unit which disposes of all condensate by evaporation, or

b) arranging for the condensate from the unit to be collected and disposed of into a drain.

4.3.2.9 The arrangement and sizes of air inlets and outlets in a room which is artificially ventilated shall be such as to ensure an even and uniform distribution and circulation of air throughout the occupied zone of the room without the creation of an air velocity of more than 0,5 m/s.

4.3.2.10 Designated smoking areas and smoking rooms shall comply with the requirements of 4.4.

4.3.2.11 A room or space which is required to be artificially ventilated and is used for an occupancy given in column 1 of table 2 shall be supplied with outside air at a rate not less than the greater rate given in columns 2 and 3 of table 2, provided that

a) where no value is given in column 2, the rate given in column 3 shall be used;

b) where the room or space is a dedicated smoking room or smoking area, in addition to complying with the requirements in table 2, the air quality shall attain a sensible heat load with a minimum of 15 air changes per hour;

c) where airborne toxic substances will be released into the room or space concerned, extraction ventilation, which is able to remove such substances, shall be provided;

d) in the case of a kitchen, or a room containing a bath, shower, toilet pan or urinal in a dwelling unit or private dwelling house or any such room serving a bedroom, infiltration air from adjacent rooms may be used instead of outside air and the system shall be capable of supplying the required quantity of air under conditions of intermittent use;

e) in the case of a motor-repair garage, photographic darkroom, working area in a commercial dry-cleaning establishment, private or central kitchen in a hotel, motel, resort, dormitory and similar facilities or any washroom or room that contains a toilet pan or urinal located in an office-type occupancy or intended for use by the public, the extraction ventilation quantity shall exceed the supply air quantity to ensure negative pressure in the area concerned.

   The artificial ventilation system shall be under negative pressure within the building envelope. Any ducted airways located after the extraction unit, which remain within the building envelope, shall be subjected to a pressure leakage test and validated by a competent person (mechanical engineering);

f) all air exhausted from internal spaces shall be discharged or exhausted directly to the outside of the building, and not into any ceiling void or space within the building envelope. The artificial ventilation system shall be under negative pressure within the building envelope and shall not be connected to any artificial lighting system for the purpose of on/off control;

g) in the case of a laboratory, any fume cupboard(s) provided shall be integrated into the laboratory's overall ventilation system and the air supply shall be sufficient to ensure that any fume cupboard(s) is capable of removing all fumes, gas, vapour or volatile matter likely to be generated in such cupboard(s) without affecting the desired air pressure control within the laboratory; and

h) in the case of a ticket kiosk situated in a parking garage, the air supply to such kiosk shall be sufficient to create positive pressure within the kiosk.

NOTE The requirements in this subclause are based on the assumption that the number of persons is in accordance with the requirements of Regulation **A21** of the National Building Regulations (see SANS 10400-A).

Table 2 — Air requirements for different types of occupancies

1	2	3	4
Type of occupancy	**Minimum outdoor air requirements**		**Requirement**
	Air changes per hour	**L/s per person**	
Public halls			
Assembly halls	10	7,5	Air supply required per person with required minimum air changes per hour
Churches	10	7,5	
Theatres (including lobbies and auditoriums)	10	7,5	
Cinemas	10	7,5	
Dry-cleaners and laundries			
Commercial dry-cleaners (working areas)	–	120,0	Air supply required per person with required minimum air changes per hour
Storage/collection area	10	7,5	
Laundries	10	7,5	
Educational buildings			
Classrooms	2	7,5	Air supply required per person with required minimum air changes per hour
Laboratories	2	7,5	
Libraries	2	6,5	
Food and eating facilities (public)			
Dining rooms and restaurants	10	7,5	Air supply required per person with required minimum air changes per hour
Cafeterias	10	7,5	
Bars and cocktail lounges	10	7,5	
Kitchens	20	17,5	
Photographic darkrooms	–	10,0	Air supply required per person
Dwelling units			
Kitchens	10	50,0	Air supply required per person with required minimum air changes per hour
Other living areas	2	5,0	
Bathrooms and shower rooms	10	25,0	
Rooms containing a toilet pan or urinal	10	25,0	
Shops			
Malls, arcades, warehouses	–	7,5	Air supply required per person with required minimum air changes per hour
Wholesale stores	2	7,5	
Sales floors, showrooms, dressing rooms	2	7,5	
Sports and amusement facilities			
Ballrooms and discos	10	7,5	Air supply required per person with required minimum air changes per hour
Bowling alleys (seating area)	10	7,5	
Playing area (gymnasiums, etc.)	–	10,0	
Locker rooms	15	7,5	
Spectator areas	6	5,0	
Health spas and slimming salons	2	7,5	
Garages			
Parking garages	10	7,5	Air supply required per square metre of floor area

Table 2 (*continued*)

1	2	3	4
Type of occupancy	**Minimum outdoor air requirements**		**Requirement**
	Air changes per hour	**L/s per person**	
Motor car repairs	30	10,0	Air supply required per square metre of floor area
Ticket kiosks	2	5	Air supply required per person with required minimum air changes per hour
Health care facilities			
Surgical and critical care:			
Operating theatres and suites	20	–	Pressure relative to adjacent area shall be positive
Wound intensive care (burns)	6	–	Pressure relative to adjacent area shall be positive
Critical and intensive care, treatment and delivery rooms	6	–	Pressure relative to adjacent area shall be positive
Trauma, ER waiting rooms, radiology waiting rooms and triage	12	–	Pressure relative to adjacent area shall be negative
Diagnostic and treatment areas:			
Bronchoscopy, sputum collection, examination room and treatment room (general)	12	–	Pressure relative to adjacent area shall be negative
Medication room	4	–	Pressure relative to adjacent area shall be negative
Physical therapy and hydrotheraphy	6	–	Pressure relative to adjacent area shall be negative
Inpatient nursing areas:			
General wards, paediatric wards and labour/delivery/recovery/postpartum rooms	2	–	Pressure relative to adjacent area shall be negative
Airborne infection/protective environment wards and anterooms or airlocks	12	–	Pressure relative to adjacent area shall be negative
Laboratories			
Microbiological (molecular)	6	–	Pressure relative to adjacent area shall be positive
Bacteriological P1	6	–	Pressure relative to adjacent area shall be negative
Bacteriological P2, P3 and P4	12	–	Pressure relative to adjacent area shall be negative
General biochemistry, cytology, histology, nuclear medicine, pathology and serology	6	–	Pressure relative to adjacent area shall be negative
Radiology			
General radiology areas	6	–	Pressure relative to adjacent area shall be negative

Table 2 (*concluded*)

1	2	3	4
Type of occupancy	**Minimum outdoor air requirements**		**Requirement**
	Air changes per hour	**L/s per person**	
Hotels, motels, resorts, dormitories and similar facilities			
Lobbies	2	7,5	Air supply required per person with required minimum air changes per hour
Conference rooms	10	7,5	
Assembly rooms	19	7,5	
Bedrooms	2	7,5	Air supply required per person with required minimum air changes per hour
Living rooms (suites)	2	7,5	
Central kitchens	10	17,5	Air supply required per person with required minimum air changes per hour
Private kitchens	10	50,0	Air supply required per room
Libraries			
General	2	7,5	Air supply required per person with required minimum air changes per hour
Bookstock	2	7,5	
Offices			
General	2	7,5	Air supply required per person with required minimum air changes per hour
Meeting and waiting spaces	2	7,5	
Conference and board rooms	10	10,0	
Cleaner's rooms	10	1,0	Air supply required per square metre of floor area
Stages, TV, radio and movie film	10	7,5	Air supply required per person with required minimum air changes per hour
Rooms containing baths, showers, toilet pans or urinals			
Serving a dwelling unit or a bedroom	15	25,0	Air supply required per room
All others	20	20,0	Air supply required per bath, shower, toilet pan, urinal stall or 600 mm of urinal space
Transportation			
Waiting rooms, ticket and baggage areas, corridor and gate areas, platforms, concourses	10	7,5	Air supply required per person with required minimum air changes per hour
For occupancies other than those listed above, the minimum outdoor air requirements shall be as determined by the local authority.			

4.4 Designated smoking areas and smoking rooms

NOTE Smoking is regulated in terms of the Tobacco Products Control Act, 1993 (Act No. 83 of 1993). In terms of Government Notice R 975 of 29 September 2000, smoking is currently permitted in demarcated areas in the following public places, subject to certain conditions:

a) Smoking establishments.

b) Bars, pubs, taverns or any other public places where the primary business is the sale of alcoholic beverages.

c) Night clubs, casinos or any other public places where the primary business is the provision of entertainment.

d) Restaurants.

e) Hotels, guest houses, bed and breakfast places, game lodges, and other places where accommodation is offered for sale.

f) Workplaces.

g) Airports.

4.4.1 Smoking rooms shall be designed to extract smoke from the room and to supply fresh air to the room in such a way that a negative pressure is maintained in such room and the contaminated air is prevented from passing back into the building. The extracted air shall exhaust to the environment in such a way that it will not cause any nuisance.

4.4.2 Make-up air shall be introduced to dedicated smoking rooms and smoking areas, which open to the outside, by a separate and dedicated mechanical device that continuously supplies and extracts air to the outside during any smoking activity.

4.4.3 Make-up air shall not be introduced from an existing Heating, Ventilation or Air-conditioning (HVAC) system in the building. Smoking rooms and areas shall be provided with a dedicated supply extraction system. Make-up air from the building shall not be considered.

4.4.4 Smoking areas shall be separated by a solid wall or partition with an entrance door on which "Smoking area" or "Smoking room" is displayed in black letters at least 4 cm high and 3 cm wide on a white background.

4.4.5 A sign in black letters at least 4 cm high and 3 cm wide on a white background, containing the following notice, shall be placed at the entrance to all smoking rooms:

> "Smoking of tobacco products is harmful to health. Tobacco smoke is harmful to non-smokers. Children under the age of 18 years shall not be permitted in a permissible smoking area. If you are pregnant or breastfeeding, tobacco may harm your baby."

4.4.6 Notices and signs which indicate where smoking is permitted and where smoking is not permitted shall be permanently displayed. Signs indicating that smoking is not permitted shall carry the following warning:

> "Any person who fails to comply with this notice shall be liable to be prosecuted and may be subject to a fine."

Annex A
(normative)

National Building Regulations
Part O: Lighting and Ventilation

Definition

approval
approval by

a) any local authority, including approval contemplated in section 7(7)(b) of the Act, or

b) the Review Board on appeal to the Review Board in terms of the Act

Regulations

O1 Lighting and Ventilation Requirement

(1) Any habitable room, bathroom, shower-room and room containing a toilet pan or urinal, or any room which is a parking garage shall be provided with a means of lighting and ventilation which will enable such room to be used, without detriment to health or safety or causing any nuisance, for the purpose for which it is designed.

(2) The requirement of subregulation **(1)** shall be deemed to be satisfied where the lighting and ventilation are in accordance with SANS 10400-O.

(3) **(a)** Notwithstanding the provision of any openings for natural light in accordance with subregulation **(2)** any room contemplated in subregulation **(1)** or any corridor, lobby or staircase serving such room shall be provided with a means of artificial lighting –

(i) for periods when natural lighting is inadequate; or

(ii) where the size or shape of any such room, or the glazing material used in any such opening, will not permit sufficient natural light effectively to illuminate all parts of such room.

(b) Notwithstanding the provision of openings for natural ventilation in accordance with subregulation **(2)** any room subject to the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993), shall in terms of the said Act be provided with artificial ventilation as prescribed by such Act; and any room contemplated in subregulation **(1)** which is –

(i) a room which, due to conditions of high temperature, may be dangerous to safety or health;

(ii) a room where there will be dust, gas, vapour or volatile matter and hazardous biological agents which might be dangerous to safety or health; or

(iii) used for any purpose for which natural ventilation is not suitable,

shall be provided with a means of artificial ventilation.

O2 Special Provision of Natural Lighting

Any habitable room in any dwelling house or dwelling unit, or any bedroom in any building used for residential or institutional occupancy shall, notwithstanding the provision of artificial lighting, be provided with at least one opening for natural light in accordance with subregulation **O1(1)**.

O3 Approval of Artificial Ventilation Systems

No person shall without prior written approval of the local authority install any artificial ventilation system in any building: Provided that this prohibition shall not apply in the case of room air conditioners or other individual appliances installed for comfort.

O4 Design of Artificial Ventilation Systems

Any rational design of an artificial ventilation system shall be carried out by or under the supervision of an approved competent person who shall certify in accordance with the requirements of Regulation **A19** that the system has been designed to comply with regulation **O1.**

O5 Artificial Ventilation Plant

(1) Any plant forming part of an artificial ventilation system shall be so designed, located and protected that –

(a) any condensate from such plant cannot be the cause of danger or nuisance to the public;

(b) inspection and servicing can be undertaken; and

(c) unauthorized persons cannot tamper with such plant.

(2) The requirements of subregulation **(1)** shall be deemed to be satisfied where the design, location and protection of such plant comply with SANS 10400-O.

O6 Testing of Artificial Ventilation Systems

(1) The owner shall at acceptable intervals of time submit to the local authority test reports indicating that any artificial ventilation system installed in terms of these regulations is operating in the designed manner.

(2) Records and log books shall be kept of the commissioning information, operational management, monitoring and maintenance and repair of all ventilation plant, including individual ventilation fans.

(3) Where specialist ventilation plants are provided as part of the protection measures against hazardous substances, and for the protection of occupants and to ensure safe procedures, such as in hospital theatres, such plant shall be inspected and validated at least every 12 months by an independent competent person.

O7 Fire Requirements

In addition to the requirements of this part, lighting and ventilation shall be provided to comply with Part T of these regulations.

Annex B
(informative)

Differences in performance between category 1 buildings and other buildings

Table B.1 — Principal differences between category 1 buildings and non-category 1 buildings

1	2
Technical aspect	**Differences between user performance levels**
Size and type of building	Category 1 buildings are restricted to those which have no basements, have floor areas of less than 80 m^2, and have a maximum length of 6,0 m between intersecting walls or members providing lateral support.
Maintenance cycles	Category 1 buildings might require more frequent maintenance.
Earthquakes	Not applicable.
Windstorms	Not applicable.
Deflection and deviation from the horizontal and vertical	Deflections and deviation from the horizontal and vertical are greater in category 1 buildings than those associated with non-category 1 buildings and might be visible/noticeable to a trained eye, although structural performance and safety is not impaired.
Expected damage in walls and floors	The degree of expected damage will generally be greater in category 1 buildings; such damage will nevertheless be of a minor nature and be repairable during the course of normal redecoration.
Behaviour in fire	Restrictions will be placed on the size and layout of the building in category 1 buildings.
Severe condensation and consequential mould growth	No prohibition is placed on the use of category 1 buildings with poor thermal performance in areas with high winter rainfall and humidity such as the Southern Cape Condensation Problem Area, provided that it can be demonstrated that the building is upgradable to a non-category 1 building without having to rebuild the structure.
Attack by biological agents	Not applicable.
Rising damp	Not applicable.
Resistance of walls and roofs to rain penetration	Minor ingress might be experienced in infrequent major storms but not to the extent that any permanent damage might be caused.
Hail resistance	Elements other than normal glazing in category 1 buildings might be more susceptible to hail damage in severe hail storms.
Resistance to local damage/soft body impact	The resistance to local damage when struck by sharp-edged objects and the ability to hold fittings and the impact resistance to soft body impacts will be lower in the case of category 1 buildings than that for non-category 1 buildings. The reduction in performance does not compromise the safety of the structure in any way under all normal circumstances of use.
Accuracy of construction	Tolerances will be greater (i.e. relaxed) in category 1 buildings.
Lighting and ventilation	Reduction in category 1 buildings in size of openings for occupancy classes E3, H3 and H4 only.

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