Module 25: Survey of National Building Regulations & SANS 10400

Module at a glance:

Topic	You will learn
NBR-A & SANS 10400-Part A	• Application of the NBR
NBR-B & SANS 10400-Part B	• Structural requirements
NBR-C & SANS 10400-Part C	• Dimensions
NBR-D & SANS 10400-Part D	• Public safety
NBR-E (No SANS 10400-Part E)	• Demolition
NBR-F & SANS 10400-Part F	• Site operations
NBR-G & SANS 10400-Part G	• Excavations
NBR-H & SANS 10400-Part H	• Foundations
NBR-J & SANS 10400-Part J	• Floors
NBR-K & SANS 10400-Part K	• Walls
NBR-L & SANS 10400-Part L	• Roofs
NBR-M & SANS 10400-Part M	• Stairways
NBR-N & SANS 10400-Part N	• Glazing
NBR-O & SANS 10400-Part O	• Lighting and ventilation
NBR-P & SANS 10400-Part P	• Drainage
NBR-Q & SANS 10400-Part Q	• Non-water-bourne means of sanitary disposal
NBR-R & SANS 10400-Part R	• Stormwater disposal
NBR-S & SANS 10400-Part S	• Facilities for persons with disabilities
NBR-T & SANS 10400-Part T	• Fire protection
NBR-U (No SANS 10400-Part U)	• Refuse removal
NBR-V & SANS 10400-Part V	• Space heating
NBR-W & SANS 10400-Part W	• Fire installation
NBR-XA & SANS 10400-Part XA	• Energy usage in buildings

Credits for source material for this SAHITA Module:

SANS 10400-A to XA. South African Bureau of Standards

Introduction to the National Building Regulations and the matching parts of SANS 10400 - Parts A to XA

The National Building Regulations (NBR), which are part of the National Building Regulations and Building Standards Act No. 103 of 1977, as amended in 2008 (the Act), the SANS 10400 “deemed to-satisfy” building standards and other relevant national standards, together form the framework for regulating building in South Africa.

The scope and content of this body of legislation, national building regulations and national building standards is vast.

The purpose of this SAHITA module is provide a summary guide in order to enable the building inspector to better understand and navigate the regulatory framework of South African building.

This SAHITA module covers:

- Some of the most relevant sections of the Act;
- All of the National Building Regulations;
- The corresponding "deemed-to-satisfy" building standards in SANS 10400. Related national standards are also referred to where applicable.

In the preceding SAHITA modules, of this South African building inspector course, relevant aspects of the National Building Regulations and the corresponding part of the "deemed-to-satisfy" SANS 10400 (Parts A to XA) were referred to. These SAHITA modules were presented in order to follow the natural sequence involved in the erection of a typical building.

SAHITA modules 1 to 24 have been designed to provide the building inspector with logical access to the vast body of compliance information which makes up the Act, the NBR, SANS 10400 and other relevant national standards.

The sequence which the SAHITA modules follow is:

- Design and submission of drawings to the local authority for approval.
- Site selection, soil analysis and site operations
- Excavations and using concrete to construct the foundations and slabs
- Erecting and plastering the masonry walls and installing windows and doors.
- Installing the roof structure and covering
- Installing services: Water, drains, electricity and hot water heating.

The objective of SAHITA Module 25 is to draw together and summarise this huge body of compliance information in order to give the building inspector a better overview of the whole.

The National Building Regulations are divided into 23 parts - Part A to Part XA. These are no parts "I", "Y" or "Z".

SANS 10400 follows the same sequence as the National Building Regulations - except that there is no corresponding parts in SANS 10400 for NBR- Part E - *Demolition* and Part U - *Refuse removal.*

The National Building Regulations can be divided in two parts:

1. ***Prescriptive regulations:***
   Prescriptive regulations are specific in prescribing what it allowed. Prescriptive regulations deal with matters such as the regulatory role of the local authority (LA) and the building control officer (BCO); the prescribed system for submitting plans for

approval and obtaining a “certificate of occupancy. The role of “competent persons” who are required to design and certify different parts of buildings is also prescribed.

2. Functional regulations:

Functional regulations prescribe only the objective (function) which is to be attained and not the method by which that objective is achieved. For instance, the function of foundations is that foundations must safely transmit to the ground all of the forces to which the foundations will be subjected. This means the foundations must carry the load of the building - walls, slabs and roof and also accommodate any anticipated ground movement on the brittle building. Another example: Roofs and walls must resist the penetration of moisture and wind into the interior of the building.

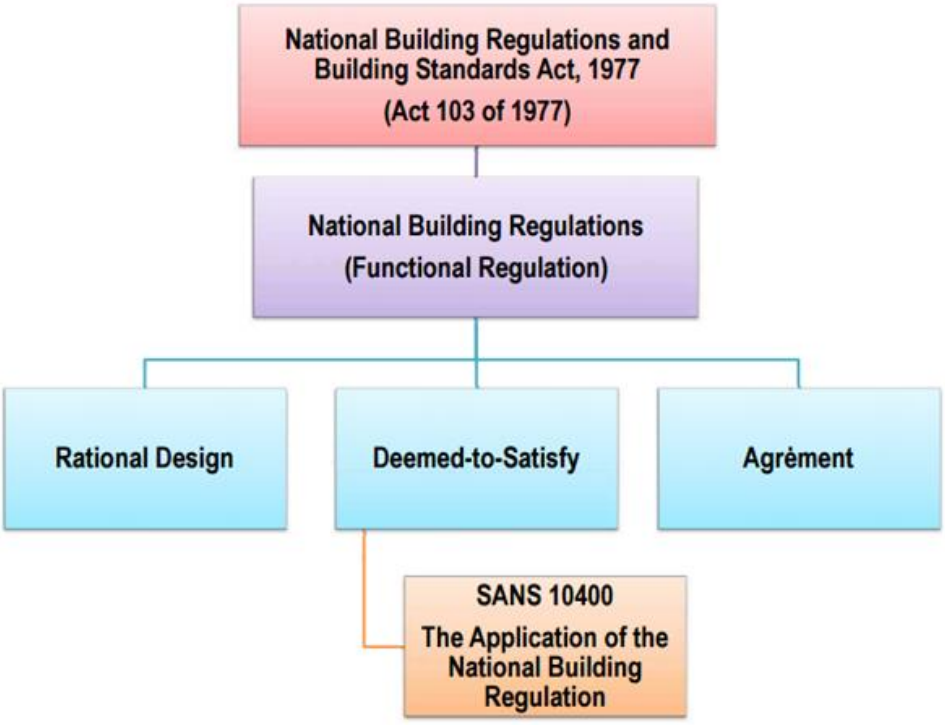
Compliance with the functional regulations

SANS 10400 sets out the different possible ways of achieving compliance with functional regulations, including a range of prescriptive provisions that are **”deemed to satisfy”** the functional requirements of the NBR.

There are no corresponding deemed-to-satisfy parts of SANS 10400 for Parts A, E and U of the NBR. All other parts of the NBR can be satisfied by means of following the prescriptive “deemed to satisfy” requirements of the corresponding part of SANS 10400.

SANS 10400-A.3.8: A “deemed-to-satisfy requirement” is *a non-mandatory requirement, compliance with which ensures compliance with a functional regulation*

Other than by following the deemed-to-satisfy minimum standards contained in SANS 10400, designers who are deemed “competent” by the local authority, are allowed to use “rational design”, so long as the designer can show the LA that the design meets or exceeds the deemed-to-satisfy standards in achieving the functionality required by the NBR.



SANS 10400-A: 3.7 defines a "competent person" as: A 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.

SANS 10400-A: 3.13 defines "rational design" as: *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*

As part of such "rational design" , innovative building materials and methods may be employed, again so long as the designer can demonstrate to the BCO employed by the LA that the materials or methods meets or exceeds the SANS 10400 deemed-to-satisfy standards in achieving the functionality required by the NBR. Such building innovation must be certified by the Agrément Board of South Africa.

The Act

It is important that building inspectors have a good understanding of the National Building Regulations and Building Standards Act No 103 of 1977 (as amended in 2008) (the Act). The Act is administered by the Department of Trade and Industries.

Here is a summary of the most important parts of the Act:

Act applies to all areas under the jurisdiction of any local authority (LA)

- **Section 2 (1):** The Act applies in the area of jurisdiction of any LA.

Does not bind the State

- **Section 2 (3) & 4:** The Act **does not bind the State** - plans for State buildings need only be submitted to the LA for information and comment - not for approval: *In respect of any building to be erected by or on behalf of the State, such plans, specifications and certificate as may be prescribed by national building regulation, shall before the commencement of such erection be lodged with the local authority in question for its information and comment*.

The Minister may exempt the erection of buildings connected with security or national key points from any of the provisions of the Act.

Applications for the erection of buildings

- **Section 4(1):** *No person shall without the prior approval in writing of the local authority in question, erect any building in respect of which plans and specifications are to be drawn and submitted in terms of this Act.*
- **Section 4(3)(b):** Any application shall: *Be accompanied by such plans, specifications, documents and information as may be required by or under this Act, and by such particulars as may be required by the local authority in question for the carrying out of the objects and purposes of this Act.*

Appointment of a Building Control Officer (BCO)

- **Section 5 (1) & (2):** A local authority shall appoint a building control officer.
- **Section 5 (3) (a):** Two or more local authorities may appoint one person as BCO for all such local authorities.
- The qualifications for a **BCO** are prescribed in **NBR A16:** *The minimum qualification of any building control officer appointed in terms of section 5 of the Act shall be of a standard equivalent to a senior certificate plus three years tertiary education, at an accredited educational institution, in one of the following building disciplines: Civil engineering; structural engineering; architecture; building management; building science; building surveying; or quantity surveying.*

Functions of a building control officer (BCO)

Section 6: A BCO shall:

- Make recommendations to the LA regarding plans, specifications and documents submitted to the local authority in connection with an application for the approval of the erection of a building..
- Inspect the erection of a building for which approval for erection has been granted.
- Delegate, with the approval of the LA, to any officer under the control of the BCO, any power, duty or function entrusted to the BCO in terms of the Act.

Local authority approval for the erection of buildings

Sections 7, 8 & 9: The LA, after considering the recommendations of the BCO with regard to the erection of any building, may:

- Grant its approval for the erection of a building. Approval must be endorsed on at least one copy of the plans, specifications and documents returned to the applicant.
- Refuse to grant its approval. Grounds for refusal by the LA may be that:
    - The application does not comply with the requirements of the Act and NBR.
    - The area in which the building was to be erected will probably be disfigured.
    - The building may be unsightly or objectionable.
    - The building may derogate the value of adjoining or neighbouring properties.
    - The building may be dangerous to life or property.
- In respect of applications for the erection of buildings with a maximum "architectural area" of 500 m² approval, or refusal, shall be given within 30 days of receipt of the application. For buildings with an architectural area greater than 500 m², approval or refusal shall be given within 60 days. **"Architectural area"** *means the sum of the areas of the several floors of a building, including basements, mezzanine and intermediate floor tiers and penthouses of headroom height, measured from the exterior faces of the exterior walls.*
- Approvals will lapse within 12 months if building work has not commended or if the LA has not granted an extension.
- Applications which have been refused may be resubmitted within 12 months at no additional cost if the defects to the application which resulted in the application being refused have been corrected.

"Stop build" notice

Section 10: A LA may give written notice to stop building operations if, in the opinion of the LA, the building or earthworks may be: Unsafe, unsightly, objectionable, may derogate the value of neighbouring properties; or may be prone to flooding

- If a LA fails to grant or refuse approval timeously, the applicant may ask a court (High Court or magistrate's court) to order the LA to comply with Section 7.
- Any person may appeal a refusal of a local authority to grant approval. The appeal shall be made to a review board constituted by the Minister.

Demolition order

Section 21: *A magistrate shall have jurisdiction, on the application of any local authority or the Minister, to make an order prohibiting any person from commencing or proceeding with the erection of any building or authorizing such local authority to demolish such building if such magistrate is satisfied that such erection is contrary to or does not comply with the provisions of this Act or any approval or authorization granted thereunder.*

Time limit for the erection of a building

Section 11: If building operations cease for more than three months the LA may give the owner written notice to resume of complete building operations.

- If the owner does not comply and the LA is of the opinion that the building is dangerous, unsightly or derogates the value of neighbouring properties, then the LA may order to the owner to demolish the building, remove all material and clean the site.
- If the owner fails to comply with the order to either resume building operations or to demolish the building and clean the site then the LA may demolish the building and clean the site and recover costs involved from the owner.

Dilapidated buildings and dangerous building work, earthworks, or land

Section 12: A LA may take the following actions with regard to dilapidated existing buildings, building work, earthworks, or land which shows signs of becoming dangerous to life or property.

- The LA may order the owner to demolish the dangerous structure, or to alter and secure the building or earthworks so that it will no longer be dilapidated or dangerous. If the LA is of the opinion that urgent steps need to be taken to protect life or property it may act without notice to the owner.
- Alternatively the LA may order the owner to instruct an architect or other registered professional to investigate and report to the LA on the steps to be taken to render the building, land or earthwork safe.
- If the LA deems it necessary for safety reasons, it may order the evacuation of people from the property or building deemed unsafe.

Minor building work exempted from approval process

Section 13: Property owners contemplating "minor building work" on their property must notify the building control officer of the intention to erect specified minor building work.

Where minor building work is concerned, the BCO may exempt, in writing, the owner from the obligation to submit a plan, in conformity to the National Building Regulations. The BCO may grant authorization for the minor building work subject to conditions or directions.

"Minor building work" referred to in section 13 of the Act is defined in the Act as:

- The erection of any:
  - Poultry house - maximum 10 m²;
  - Aviary - maximum 20 m²;
  - Solid fuel store - maximum 10 m² in area and 2 m in height;
  - Tool shed - maximum 10 m²;
  - Child's playhouse - maximum 5 m²;
  - Cycle shed - maximum 5 m²;
  - Greenhouse - maximum 15 m²;
  - Open-sided carport, caravan, or boat shelter - maximum 40m²;
  - Any free-standing wall constructed of masonry, concrete, steel, aluminium or timber or any wire fence where such wall or fence does not exceed 1,8 m in height at any point above ground level and does not retain soil;
  - Any pergola;

    - Private swimming pool;
    - Change room - maximum 10 m², at a private swimming pool;
- The replacement of a roof or part thereof with the same or similar material;
- The conversion of a door into a window or a window into a door without increasing the width of the opening;
- The making of an opening in a wall which does not affect the structural safety of the building concerned;
- The partitioning or the enlarging of any room by the erection or demolition of an internal wall if such erection or demolition does not affect the structural safety of the building concerned;
- The erection of any solar water heater not exceeding 6 m² in area on any roof or 12 m² when erected other than on any roof; and
- The erection of any other building where the nature of the erection is such that in the opinion of the BCO it is not necessary for the applicant to submit, with his application, plans prepared in full conformity with the NBR.

Certificates of occupancy

Section 14:

- The LA must issue a certificate of occupancy within 14 days of the completion of new building work.
- New building work may not be occupied, except by workers completing the building, unless a certificate of occupancy has been issued.
- The LA may, at the request of the owner, and under any conditions imposed by the LA, grant permission in writing to use the building before a certificate of occupancy has been issued.
- Upon completion of the structural, fire protection or fire installation system all competent persons appointed to design and inspect the erection of the systems, must certify to the LA that the system has designed and erected in accordance with the approval granted by the LA. **See SANS 10400-A19 (12) (a).**
- The owner of the property must obtain an electrical certificate of compliance (CoC) from a licenced electrician in terms of the Electrical Regulations issued by the Department of Labour, in order for the electrical installation to be connected to the LA or Eskom supply.
- Unless a certificate of occupancy has been issued for a building, any owner who permits the occupation or use of that building, except as is necessary for the completion of the building, shall be guilty of an offence.

Entry by a BCO into a building

Section 15:

Any BCO or other person authorised by the LA may enter any building or land at a reasonable time to inspect and determine whether the owner of the building or land complies with any provision of the Act, or any other condition imposed by the LA in terms of the Act.

Scope of the National Building Regulations

Section 17:
The NBR as proclaimed by the Minister have the following scope:

- The preparation, submission and approval of plans and specifications for buildings and alterations to buildings.
- To provide for inspections and tests in respect of buildings, whether before, during , or after the completion of the building.
- The nature and preparation of building sites.
- The strength and stability of buildings.
- Fire safety for buildings.
- Resistance of buildings to flooding, damp, sound, heat and vermin.
- The durability of buildings.
- The provision of water, sewerage and drainage services to buildings.
- The ventilation and natural lighting of buildings.
- The supply and installation of gas and electricity to buildings.
- To regulate the use of any building.
- To protect the general safety, health and convenience of the public and users of the building during and after the erection of a building.
- To regulate access to buildings and site on which buildings were, or are being, erected.
- To regulate and prevent dangers or obstructions during the erection of buildings.
- To regulate the erection of temporary buildings.
- To protect public and private property during the erection of buildings.
- To regulate the demolition of buildings.

Deviation and exemption from the NBR

Section 18:

- A LA may at the request of the property owner, in respect of the erection of a building, or the land on which it is to be erected, grant a deviation or an exemption from any applicable national building regulation, except a NBR regarding the strength and stability of buildings.
- The National Regulator for Compulsory Specifications (NRCS) may, at the request of a property owner and after consulting with the LA, grant a deviation of an exemption from any applicable NBR relating to the strength and stability of buildings.

Prohibition of methods or materials

Section 19:
The Minister may, after consultation with the LA and the NRCS, prohibit the use by a property owner of any building method or material used in the erection of a building, if the Minister is satisfied that the method or material will be dangerous to life or property.

Exemption from liability

Section 23:
A LA and the NRCS are exempted from liability to any person for any loss, damage, injury or death in connection with any building erection approval, certificate or act performed in terms of the Act by, or on behalf of, the LA or the NRCS.

Presumption of guilt

Section 25:

If anyone is prosecuted in terms of the Act for failing to comply with the requirements of the Act as regards materials, design or workmanship, *an allegation in the charge sheet that the accused so failed, shall be sufficient proof thereof unless the contrary is proved.*

Complying with the requirements of the National Building Regulations

NBR: Part AZ4:

(1) The requirements of the National Building Regulations shall be complied with by:

(a) Adhering to the requirements of all the prescriptive regulations; and

(b) Satisfying all functional regulations by:

(i) Adopting building solutions that comply with the requirements of the relevant part of SANS 10400; or

(ii) Reliably demonstrating, or predicting with certainty, to the satisfaction of the appropriate local authority, that an adopted building solution has an equivalent or superior performance to a solution that complies with the requirements of the relevant part of SANS 10400.

(2) A competent person who is registered in an appropriate category of registration in terms of the Architectural Professions Act, 2000 (Act No. 44 of 2000), the Engineering Profession Act, 2000 (Act No. 46 of 2000), the Natural Scientific Professions Act, 2003 (Act No. 27 of 2003) or any other relevant Act and, in accordance with the requirements of regulation A19, shall prepare and submit to the local authority a rational design or rational assessment where compliance with the requirements of sub-regulation (1) is to be satisfied in terms of sub-regulation(1)(b)(ii).

(3) An approved competent person who satisfies the requirements of sub-regulation (1) in terms of sub-regulation (1)(b)(ii) in respect of a system, measure, facility, parameter or installations shall inspect and certify upon completion, in accordance with the requirements of regulation A19, the construction, erection or installation thereof.

NBR- PART A: Administration

NBR-Parts A1 to A25 provides 25 prescriptive regulations dealing mainly with the role of the local authority in applying and administering all of the National Building Regulations.

Because the NBR in Part A are prescriptive there are no corresponding “deemed-to-satisfy” standards in SANS 10400-A.

What follows in this section is a summary of the most relevant regulations A1-A25 in order to provide a South African building inspector with an understanding of the responsibilities and authority of a LA and of a BCO appointed in terms of the Act by the LA.

Extent of the powers of the LA to approve plans

NBR: A1 (1) speaks to the requirement that only registered building professionals should be involved in the designing, planning and supervision of the erection of any building, *"or the performance of any function in connection therewith…"*

Approval process for new building work

NBR: A2: Details the requirements for plans, drawings and various documents that must be submitted to the local authority for approval before building work starts:

- A site plan;
- Layout drawings, elevations and section and detail drawings,
- A fire installation drawing;
- Drainage installation drawings;
- Particulars of any existing building or structure that is going to be demolished;
- Any other plans and particulars that the local authority requires.

Competent persons

In terms of Part A, all plans must also be submitted by a "competent person" who is professionally registered in terms of the Engineering Professions Act, the Architectural Professions Act, or the Natural Scientific Professions Act.

Applications to build must also be accompanied by a declaration explaining how the applicable functional requirements are to be satisfied. This declaration must be made by a person registered with one of the built-environment professional councils - which fall under the Council for the Built Environment Act or by a competent person with the required "education, training, experience and contextual knowledge" to judge whether a dwelling will meet the functional regulations.

Appointment of professional person - Forms 1 to 3

Every application to the LA must include:

Form 1: Declaration by a person registered in a professional category of registration in terms of the one of the councils for the professions identified in the Council for the Built Environment Act, 2000 as to how the applicable functional regulations shall be satisfied;

Form 2: Application for acceptance by the LA as "an approved competent person" in terms of Regulation A19 - which requires certification regarding:

Rational design – where required;

Geotechnical investigation

Form 3: Declaration by a competent person appointed to design a component or element of a system.

Certificate of completion - Form 4

The NBR also provide a 4th form, which is to be completed by the appointed competent person once the job is complete in terms of Regulation A19.

Form 4: Certificate of completion of:

- The structural system;
- Fire protection/fire installation system;
- Energy usage in a building.

Preliminary plans and enquiries

NBR: A3: Any person who intends to erect a building may, before submitting an application in accordance with the Act, request the local authority:

- To examine any preliminary sketch plans of the building proposed to be erected and to furnish, in writing, its comments on such plans or on any particular features thereof specified by such person; or
- To furnish, in writing, its opinion as to whether any material or method or form of construction intended to be used in the erection of such building will comply with these regulations.

Additional information required by the LA

NBR: A4: The LA may require additional information regarding:

- Structural arrangement drawings showing the position, level and size of every structural member and details of structural material;
- Artificial ventilation details;
- Imposed floor loads which the building has been designed to withstand;
- Calculations used in the rational design of the proposed building;
- Adequate information regarding the subsoil of the site;
- Fire resistance ratings of structural members;
- The reinforcement of each concrete member, including details of the steel to be used;
- The various grades of concrete to be used;
- The amount of concrete cover over the reinforcement;
- Details of all joints between members
- The grades of steel of all structural steel members;
- Details of the connections between structural steel members;
- Details of corrosion protection for the steel structure.
- The grades, types and sizes of structural timber to be used;
- Details of the connections between structural timber members and connections of structural timber to foundations, walls, beams etc;
- For roof construction details of bracing, member spacing;
- Details of timber treatment.
- The strength of masonry units and the class of mortar;
- Details of all joints in masonry and between masonry and other members;
- Details of masonry reinforcement (brick force), rods, wall ties, lintels and anchors.
- The type and condition of the soil;
- The design loads to be applied to the foundations.

Test reports and certification

NBR: A4: Where a LA is not satisfied as to the adequacy or safety in use of any construction system, method, material, or product which is proposed to be used in the erection of a building, then the LA may require a test report or evaluation certificate:

This may be:

- A report issued by the SABS, or the CSIR;

- Any current Agrément certificate. A current and valid Agrément certificate shall be deemed to satisfy any LA requirements regarding adequacy or safety prescribed in the NBR.

Specifications for drawings

NBR: A5: Details what must be included on different plans, as well as the size and scale required on plans and drawings.

A5 also states what colours to use to identify different materials on plans. For instance, new masonry must be shaded red and new concrete green. All existing materials are shown in grey.

When architects, designers and engineers draw plans, they use symbols to identify certain details. These are also specified in Part A.

Specifications for site plans

NBR: A6: Site plans submitted to the local authority must show:

- Dimensions and boundaries of the site;
- Position and dimensions of building lines and servitudes;
- Registered erf number and name(s) of abutting streets to the site,
- True north and if required by the local authority the contours of the site;
- Location of municipal services and connection points;
- Location of drains, stormwater drains or surface channels;
- Location of the proposed building;
- Location of any existing buildings on the site including buildings to be demolished;
- Existing and intended points of access from any public street;
- Location of any streets, trees, street furniture or municipal apparatus or equipment.

Specifications for layout drawings

NBR: A7: Layout drawings must include the occupancy classification and as many plans, sections, elevations and other details as necessary to show:

- Foundations, floors, walls, fixed and openable windows, fanlights, louvres and other ventilating devices, artificial ventilation systems including any cooling tower or plant room, doors, stairs, roofs and chimneys;
- Sanitary fixtures
- Structural members (position, level and size of every structural member);
- Intended use and horizontal and vertical dimensions of rooms and other spaces;
- All details of facilities for persons with disabilities;
- Position, dimensions and materials for damp-proofing;
- Location, levels and size of any paved areas adjacent to the building;
- Where required by the local authority:
- Contours of the site;
- Levels of adjoining roadways and gradients of vehicle driveways;
- Levels of the floors relative to one another;
- Existing ground level and proposed finished ground level.

Plumbing installations

NBR: A8: Drawings submitted to the LA for approval must show the following detail regarding plumbing installations:

- The location and size of all plumbing installations serving a fire installation.
- Details of the drainage installation (sewer):
- Location, size and gradient of any drain;
- The location of any point of access to the drain;
- The location of any trapped gully;
- The location and details of any septic tank, conservancy tank or sewage pump;
- The location of any percolation test hole and of any French drain;
- The location of all sanitary fixtures served by the drainage system;
- The location of all soil and waste pipes leading to the sewer and all ventilating pipes or devices;
- The location of any openings (chimneys, skylights, windows, doors and air intakes) which could permit the entry of foul gas from the vents into the building;
- The location of any well, borehole or watercourse on the site.

SANS 10400 – Part P provides deemed to satisfy minimum standards for drains.

Fire protection plan

NBR; A9 & 10: Where required by the local authority, any application in respect of the erection of any building not being a dwelling house, shall be accompanied by a protection fire plan which shall clearly show any fire protection measures provided in terms of the NBR.

SANS 10400-Part T provides deemed to satisfy minimum standards for fire protection.

A10- provides symbols for detail on fire protection plans:

Escape door: ED	Escape route: ER	Feeder route: FR
Fire extinguisher: FE	Fire hydrant: FH	Foam inlet: FI
Fire main: FM	Fire pump connection: FPC	Fire stopping: FS
Heat detectors: HD	Hose reel: HR	Rising main: RM
Reflux valve: RV	Smoke detectors: SD	Sprinkler system: SS
Smoke extractor: SX	Valve: V	

Boundary beacons (pegs)

NBR: A11: Where, in the opinion of the LA, the location of any boundary of a site has not been accurately determined the LA may require the owner at own cost, to hire a land surveyor and to submit to the LA a certificate signed by such professional land surveyor:

- Identifying the boundary pegs; or beacons of such site; and
- Stating the name of the nearest cross street and the approximate distance of the nearest boundary of the site from such street.

If an owner fails to engage a professional land surveyor, then the LA may appoint a professional land surveyor to establish and point out the location of such pegs or beacons, and the LA may recover the costs from the owner.

Street levels

NBR:A12: Where a building is erected on a site abutting an existing street, the datum levels of the building must be established in accordance with the levels of the street.

Construction must fulfil designed functionality

NBR: A12: Any building, or element of a building, as constructed, must not compromise the designer's intent to satisfy a functional building regulation.

Precautions must be taken during construction to ensure that the structural system is not damaged or distorted during the construction process.

- Example: Roof trusses which are exposed to the elements and become warped and damaged before erection.
- Example: Concrete which is re-wetted and weakened on site.
- Example: Steel rebar which is allowed to rust excessively before being placed in the concrete.

Unsuitable building material

NBR: A13: Material used in the erection of a building must be suitable for the purpose for which it is to be used.

- Timber: In accordance with SANS 10400 – sizes and grades;
- All timber must be treated against termite, borer and fungus.

LA may require any material or component to be tested. LA may remove material from a building or site for testing to ensure that the material complies with the NBR.
If testing shows material is unsuitable, the LA may:

- Ban the further use of the material on the site;
- Order the removal of defective material;
- Recover the cost of the testing from the owner of the building.

Maintenance and operation of buildings

NBR: A15: The owner of any building must ensure that:

- All mechanical equipment is maintained in a safe and functional condition.
- The structural safety performance of the building is in accordance with the functional regulations of the NBR.
- The building resists rain penetration and the passage of moisture to the interior of the building.

If a building is not maintained in compliance with the above, the local authority may:

- Order the owner of the building to comply;
- Order the evacuation of any building deemed unsafe, which in the opinion of the local authority, is deemed unsafe to the occupants or users of the building.

Building control officers and LA building inspectors

NBR: A16 & A17: The minimum qualification of any building control officer appointed in terms of section 5 of the Act shall be of a standard equivalent to a senior certificate plus three years tertiary education, at an accredited educational institution, in one of the following building disciplines:

- Civil engineering;
- Structural engineering;
- Architecture;
- Building management;
- Building science;
- Building surveying; or
- Quantity surveying

BCO's and municipal building inspectors, who work under the delegated authority of the BCO, must carry a prescribed certificate of identity when performing their duties.

Control of plumbers and plumbing work

NBR: A18: No-one is allowed to perform the trade of plumbing unless he is a trained plumber or works under the adequate control of a trained plumber or approved competent person.

- Any person not being a trained and registered plumber who practices the trade of plumbing shall be guilty of an offence.
- Any trained plumber who causes or permits any person who is not a trained plumber to practise the trade of plumbing without adequately controlling the work done by such person, shall be guilty of an offence.

Appointment of a competent person for design, inspection and certification duties

NBR: A19: The owner of the building to be erected must appoint approved competent persons to undertake responsibility for the work associated with the NBR including any inspections and certifications that may be required in respect of:

- Any system or installation as may be relevant;
- A part of SANS 10400;
- A geotechnical investigation.

The local authority may exempt from the requirements of Regulation A19:

- Any building classified as minor building work;
- Any foundation to an addition/extension to a single storey building where the applicant has satisfied himself that the existing foundations are in accordance with SANS 10440-Part H.

Where any element of the:

- Structural;
- Fire protection;
- Artificial ventilation;
- Stormwater disposal or non-water borne sanitary disposal or;

- Fire installation or drainage installation system;

is the subject of a rational design, the person appointed competent person assumes responsibility for satisfying the functional regulation relating to that particular system in its entirety.

In the case of the structural system, the interaction of the various component elements will be such that the structural adequacy of all the parts of the building and the overall stability of the building is assured.

An "A19" roof certificate is issued after a registered roof inspector has verified that the installation of the roof structure is in accordance with the rational design or complied with the deemed to satisfy minimum standards of SANS 10400-Part L.

On completion of the structural, fire protection or fire installation system for which an approved competent person has been appointed, such competent person must submit to the local authority a fully completed Form 4 as contained in SANS 10400-A in respect of each such system for which such person has accepted responsibility in terms of Section 14(2A) of the Act.

Classes of occupancy

NBR: A20: The occupancy of any building must be classified according to the appropriate occupancy class:

- Occupancy classification must reflect the primary function of the building;
- If a building is divided into two or more areas not having the same primary function, the occupancy of each such area shall be separately classified.

Garages or any room or space used for the storage or processing of flammable liquids shall not be deemed to be a J1 occupancy if:

- Fuel is stored in the fuel tank of any engine, motor vehicle, boat or lawnmower;
- The quantity of liquid in such room does not exceed 40 litres.

Class	Occupancy
A1	**Entertainment and public assembly** - where people eat, drink, dance or participate in other recreation.
A2	**Theatrical and indoor sport**
A3	**Places of instruction**
A4	**Places of worship**
A5	**Outdoor sport** - where persons view outdoor sports events.
B1	**High risk commercial service** - non-industrial process with high risk of fire, fumes, or explosions.
B1	**Moderate risk commercial service** - non-industrial process with moderate risk of fire, but fumes and explosions are unlikely.
B3	**Low risk commercial service** – low safety risk
C1	**Exhibition hall** - where goods are displayed primarily for viewing by the public.
C2	**Museum**- comprising a museum, art gallery or library.
D1	**High risk industrial** – high risk of fire, fumes and explosions
D2	**Moderate risk industrial** – moderate risk of fire, fumes and explosions unlikely
D3	**Low risk industrial** – low safety risk
D4	**Plant room** - usually unattended mechanical or electrical services necessary for the running of a building.
E1	**Place of detention –** prisons and places where mentally-incapacitated people are detained
E2	**Hospital -** where bedridden people are cared for or treated because of physical or mental disabilities

E3 E4	**Other institutional (residential)** – where people who either are not fully fit, or who are restricted in their movements or their ability to make decisions, reside and are cared for. **Health care** – where people undergo personal care or medical treatment
F1 F2 F3	**Large shop** - floor area exceeds 250 m². **Small shop** - floor area does not exceed 250 m². **Wholesalers' store** - where only a limited selected group of customers is present at any one time.
G1	**Offices** - offices, banks, consulting rooms and other similar usage.
H1 H2 H3 H4 H5	**Hotel** - where persons rent furnished rooms, not being dwelling units. **Dormitory** - where groups of people are accommodated in one room. **Domestic residence** - consisting of two or more dwelling units on a single site. **Dwelling house** - a dwelling unit on its own site, including a garage any other outbuildings. **Hospitality** - where unrelated persons rent furnished rooms on a transient basis within a domestic residence or dwelling house with sleeping accommodation for not more than 16 persons.
J1 J2 J3 J4	**High risk storage** - where material is stored ,with a high risk of fire, fumes and explosions. **Moderate risk storage** - moderate risk of fire, which is not likely to give rise to fumes, or explosions. **Low risk storage** - where the material stored does not fall into the high or moderate risk category. J4 **Parking garage** - used for storing or parking of more than 10 motor vehicles.

Design population of a building

NBR: A21: This regulation provides population densities for buildings in order to ensure:

- Comfort;
- Safety – especially fire safety;
- Provision of adequate sanitary facilities

The population of any room or storey or portion thereof is the actual population, where such population is known or, where such population is not known, the design of the building should cater for the population given in the table below.

Class of occupancy of room or storey or portion thereof	**Population**
A1, A2, A4, A5	Number of fixed seats or 1 person per m² if there are no fixed seats
E1, E3, H1, H3, H4	2 persons per bedroom
E4	16 persons, but no more than 4 persons per room
H5	16 persons per dwelling unit, but not more than 4 persons per room
G1	1 person per 15 m²
J1, J2, J3, J4	1 person per 50 m²
C1, E2, F1, F2	1 person per 10 m²
B1, B2, B3, D1, D2, D3	1 person per 15 m²
C2, F3	1 person per 20 m²
A3, H2	1 person per 5 m²

Notice periods required by the local authority

NBR: A22: No on-site work to erect or demolish any building can start unless the prescribed formal notice has been given to the LA.

- 4-day notice to commence for building work;

- 10-day notice for demolition.

A 2-day notice is required for the LA to inspect building operations as follows:

- Connection of any fire installation to a communication pipe;
- Trenches or excavations must be inspected prior to the placing of concrete for any foundation;
- Drainage installations must be inspected and tested prior to backfilling or enclosing.
- Completion of the building.

Temporary buildings

NBR: A23: A "temporary building" means any building that is to be used for a specified purpose for a specified limited period of time, but does not include a builder's shed.
Before granting authorisation for temporary buildings the LA may require:

- The time period required for the temporary building;
- A site plan and layout drawings in sufficient detail to enable the LA to determine the general size, form, material of construction and use of the temporary building.
- Structural detail to determine the structural safety of the temporary building.

The LA may grant extensions to the time period for which the temporary building is allowed.
If the LA refuses to grant an extension of the time period then the owner must forthwith demolish the temporary building.

SANS 10400-A: General principles and requirements

Satisfying the requirements of the NBR

SANS 10400-A: 4.1.1: The requirements of the NBR shall be complied with by:

- Adhering to all the prescriptive regulations;
- Satisfying all functional regulations by:
    - Adopting building solutions that comply with SANS 10400;
    - Demonstrating to a LA, by means of rational design by a competent person, that an adopted building solution has an equivalent or superior performance to a solution required by SANS 10400.

SANS 10400-A: 4.2: The functional regulations contained in the NBR shall be deemed to be satisfied when the requirements in the corresponding part of SANS 10400 (shown in the table below) are complied with:

Part of the National Building Regulations		**Deemed-to-satisfy requirements**
B	Structural design	SANS 10400-B: *Structural design*
C	Dimensions	SANS 10400-C: *Dimensions*

D	Public safety	SANS 10400-D: *Public safety*
F	Site operations	SANS 10400-F: *Site operations*
G	Excavations	SANS 10400-G: *Excavations*
H	Foundations	SANS 10400-H: *Foundations*
J	Floors	SANS 10400-J: *Floors*
K	Walls	SANS 10400-K: *Walls*
L	Roofs	SANS 10400-L: *Roofs*
M	Stairways	SANS 10400-M: *Stairways*
N	Glazing	SANS 10400-N: *Glazing*
O	Lighting and ventilation	SANS 10400-O: *Lighting & ventilation*
P	Drainage	SANS 10400-P: *Drainage*
Q	Non-water-borne means of sanitary disposal	SANS 10400-Q: *Non-water-borne means of sanitary disposal*
R	Stormwater disposal	SANS 10400-R: *Stormwater disposal*
S	Facilities for persons with disabilities	SANS 10400-S: *Facilities for persons with disabilities*
T	Fire protection	SANS 10400-T: *Fire protection*
V	Space heating	SANS 10400-V: *Space heating*
W	Fire installation	SANS 10400-W: *Fire installation*
XA	Energy usage in buildings	SANS 10400-XA: *Energy usage in buildings*

Category 1 buildings

SANS 10400-A: 4.3: Category 1 buildings are a class of buildings with a floor area not exceeding 80 m^2 . Category 1 buildings have been introduced into SANS 10400 in order make buildings affordable to poorer communities,by reducing certain performance standards.

Since 2016 the following parts of SANS 10400 now allow choices to be made in the performance requirements of certain attributes for Category 1 buildings.

Category 1 buildings have comparable safety standards with other buildings, but may have different resistances to:

- Rain penetration,
- Deflection limits,
- Maintenance requirements,
- Lower levels of natural lighting

The following parts of the National Building Regulations make reference to category 1 buildings:

- SANS 10400-B: *Structural Design*
- SANS 10400-C: *Dimensions*
- SANS 10400-K: *Walls*
- SANS 10400-O: *Lighting and Ventilation*
- SANS 10400-T: *Fire Protection*

SANS 10400-A: 4.3: *Plans prepared in respect of category 1 buildings shall be annotated with the wording "Category 1 building" immediately above the title block, followed by the part, in brackets, of the functional regulations satisfied in respect of such a class of building, for example, Category 1 building (structural design and fire protection).*

Part B - Structural design

National Building Regulations: Design requirement

NBR: B1. (1) *Any building and any structural element or component thereof shall be designed to provide strength, stability, serviceability and durability under all actions which can reasonably be expected to occur in accordance with accepted principles of structural design, and so that it will not impair the integrity of any other building or property.*
(2) *Any such building shall be so designed that in the event of accidental overloading the structural system will not suffer disastrous or progressive collapse which is disproportionate to the original cause.*
(3) *The requirements of sub-regulations (1) and (2) shall be deemed to be satisfied where such building is designed in accordance with SANS 10400-B.*

Deemed-to-satisfy standards: SANS 10400-B

SANS 10400-B: 4.1 *The functional regulations pertaining to structural design contained in Part B of the National Building Regulations shall be deemed to be satisfied, subject to buildings in dolomite land complying with the requirements of 4.4, where the structural system of the building:*

> *a) Complies with the requirements of parts H, J, K, L, M and N of SANS 10400 and, in the case of timber buildings, with the requirements of SANS 10082;*
> *b) Is the subject of a rational design or a rational assessment prepared by a competent person (structures) in accordance with the requirements of 4.2;*
> *c) Is the subject of an Agrément certificate.*

Compliance with the requirements NBR B1 can be demonstrated by:

- Engaging a competent person (structures) to prepare rational designs in accordance with relevant South African national standards;
- Engaging a competent person (structures) to prepare a rational assessment which may incorporate tests that prove the fitness for purpose of the building component, or obtaining Agrément certification for the building system or component thereof.

The performance of a building as a whole should be considered first. Thereafter, the performance of each subsystem or component should be considered.

Engineers must identify the relevant risks (including naturally occurring and man-made risks associated with design, assessment, construction and maintenance processes), decide on the structural concept, and design the structural system as a whole so that the structure will be safe over its specified design life.

National standards for structural design

National standards referred to in SANS 10400-B as a reference for structural design of buildings and components of buildings are:

- **SANS 1936: 1-4:** Development of dolomite land.
- **SANS 2001-CM1**: Construction works – Part CM1: Masonry walling.
- **SANS 2394**: General principles on reliability for structures.
- **SANS 10082**: Timber frame buildings.
- **SANS 10100-1 & 2:** The structural use of concrete
- **SANS 10104:** Handrailing and balustrading
- **SANS 10160:** Basis of structural design
- **SANS 10162-4:** The design of cold-formed stainless steel structural members.
- **SANS 10163-1 & 2:** The structural use of timber
- **SANS 10164-1 & 2:** The structural use of masonry
- **SANS 10400-A:** General principles and requirements.
- **SANS 10400-H:** Foundations.
- **SANS 10400-J:** Floors.
- **SANS 10400-K:** Walls.
- **SANS 10400-L:** Roofs.
- **SANS 10400-M:** Stairways.
- **SANS 10400-N:** Glazing.
- **SANS 10162-1 &2:** The structural use of steel

Design working life of a building

SANS 10400:B: 4.2.1.1 *The design working life of a building other than a category 1 building shall be not less than 30 years in respect of the structural system and non-accessible components, and 15 years for repairable or replaceable components and materials, such as claddings, roofing materials, exterior trims, and integrated components, such as windows and doors. Category 1 buildings may have a design life of not less than 10 years in respect of*

repairable or replaceable components, provided that provision for upgrading is made at the design stage and such upgrading does not require the removal or dismantling of the existing structure and does not require highly specialized skills to be applied.

Preventative maintenance cycle

SANS 10400:B: 4.2.1.7 *The maintenance required to maintain, with an appropriate degree of reliability, the structural safety and serviceability performance of the structural system in the environment in which it is located, when subjected to normal use, shall not be excessive. The normal preventative maintenance cycle in respect of buildings other than category 1 buildings shall not be more frequent than five years.*

Damage to buildings and building components

SANS 10400:B also provides standards for the ability of buildings and building components to withstand damage from: wind, impacts, condensation, corrosion and attacks by insects and pests.

Part C - Dimensions

National Building Regulations

C1 ROOMS AND BUILDINGS

(1) Any room or space shall have dimensions that will ensure that such room or space is fit for the purpose for which it is intended.

(2) The floor area of any dwelling unit shall not be less than that necessary to provide one habitable room and a separate room containing toilet facilities.

(3) The requirements of sub-regulations (1) and (2) shall be deemed to be satisfied where the area and plan dimensions of any room or space, the room heights and, in the case of any dwelling house, the floor area comply with SANS 10400-C.

Deemed-to-satisfy standards: SANS 10400-C

SANS 10400-C:4.1: *The functional regulation contained in part C of the National Building Regulations shall be deemed to be satisfied where the dimensions of any room or space comply with the requirements of 4.2, 4.3 and 4.4.*

4.2.1: *The plan dimensions of a room or space shall be the horizontal dimensions between unplastered wall surfaces.*

4.2.2: *A floor area shall be based upon the plan dimensions but shall not include any area occupied by a built-in cabinet or cupboard or any dividing wall or partition*

Minimum floor areas

4.2.3: The minimum floor area of any habitable room, other than a kitchen, scullery or laundry shall be 6 m² with no linear dimension less than 2 m.

4.4: The overall plan area of any dwelling house shall not be less than:

- 15 m² in the case of a temporary building,
- 27 m² in the case of permanent category 1 buildings, or
- 30 m²in the case of any other permanent building.

Minimum ceiling heights

4.3: The height of any room measured from the finished floor to the underside of the ceiling, or to the underside of the lowest of any structural timber member or the roof covering shall be:

- Bedroom: 2.4 m above at least 6 m² of floor area with a clear height of at least 1.8 m at any point more than 0.75 m from the edge of the floor space.
- Any other habitable room in a dwelling: 2.4 m above at least 70% of the floor area and a minimum of 2.1 m above the remaining floor space.
- All other habitable rooms, passages, entrance halls, bathrooms, toilets, laundry and stairways: 2.1 m.

Part D - Public safety

National Building Regulations

D1 CHANGE IN LEVEL: *The protection of the edge of any balcony, bridge, flat roof of similar place shall be designed to prevent any person from falling from such balcony, bridge, flat roof or similar place.*

D2 PEDESTRIAN ENTRANCES TO PARKING AREAS IN BUILDINGS: *Where any pedestrian entrance is provided to a vehicle parking area in any building, such entrance shall be so positioned, marked or protected that no pedestrian can unintentionally walk into the path of any moving vehicle: Provided that this requirement shall not apply in respect of any building classified as H4 in terms of regulation A20.*

D3 RAMPS: *Any ramp or driveway shall be so designed that it is safe when used and is fit for the purpose for which it is intended.*

D4 SWIMMING POOLS AND SWIMMING BATHS:

(1) The owner of any site which contains a swimming pool shall ensure that access to such swimming pool is controlled.

(2) Any owner who fails to comply with the requirement of sub-regulation 1 shall be guilty of an offence.

D5 DEEMED-TO-SATISFY REQUIREMENTS

The requirements of regulations D1, D3 and D4 shall be deemed to be satisfied where change in level, the design of ramps and driveways, or access to swimming pools, as the case may be, complies with SANS 10400-D.

Deemed-to-satisfy regulations: SANS 10400-D

SANS 10400-D: 4.1: *The functional regulations contained in part D of the National Building Regulations shall be deemed to be satisfied where a change in level, the design of ramps and driveways, or access to swimming pools and swimming baths comply with the requirements of 4.2, 4.3 and 4.4, respectively.*

Changes in level

4.2.1 *Any balustrade or wall provided to protect a change in level shall comply with the requirements of SANS 10400-B.*

4.2.2 *The edge of any balcony, bridge, flat roof or similar place more than 1 m above the adjacent ground or floor level shall be provided with a balustrade or parapet wall not less than 1 m in height, unless unauthorized access of persons thereto has been excluded by a physical barrier properly erected and maintained.*

4.2.3 *In the case of an interior balcony or a mezzanine floor, such balcony or floor shall be provided with a balustrade or wall not less than 1 m in height, provided that where such balcony or floor is used for public seating in rows such height may be reduced to not less than 800 mm opposite the seating in the front row.*

4.2.4 A balustrade or wall provided as protection at a change in level:

- Occupancy E2, E3, E4, H1, H2, H3, H4 or H5: No opening that permits the passage of a 100 mm diameter ball;
- Any other occupancy: At least a handrail and one other rail midway between such handrail and the floor.

Note: Occupancy classes requiring full protection:

E2 - hospital; E3 - residential (institutional); E4 - health care; H1 - hotel; H2 -Dormitory; H3 - domestic resident (two or more dwellings on one site); H4 - dwelling house (one dwelling on its own site); H5 - hospitality - renting of furnished rooms on a transient basis.

Ramps and driveways

SANS 10400-D: 4.3: *In any building that is not a building classified as H4, or on any site on which such building is situated, any:*

a) Ramp or driveway used by motor vehicles shall have a gradient of not more than 1 in 25 within a distance of 5 m from any street boundary crossed by such ramp or driveway;

b) Ramp or driveway used by pedestrians other than those ramps or driveways provided for the use of persons in wheelchairs, shall have a gradient of not more than 1 in 8.

Swimming pools

SANS 10400-D: 4.4.1: *A wall or fence shall be provided by the owner of a site which contains a swimming pool or a swimming bath to ensure that no person can have access to such pool or bath from any street or public place or any adjoining site other than through:*

a) A self-closing and self-latching gate with provision for locking in such wall or fence, or

b) A building where such building forms part of such wall or fence.

4.4.2 *A wall or fence shall be provided in any interconnected complex which contains a swimming pool or swimming bath to ensure that no person can have access to such pool or bath from any street or public place or anywhere within the complex other than through a self-closing and self-latching gate with provision for locking in such wall or fence.*

4.4.3 *Such wall or fence and any such gate therein shall be not less than 1,2 m high measured from the ground level, and shall not contain any opening that will permit the passage of a 100 mm diameter ball.*

Part E - Demolition work

National Building Regulations

NBR: E1: DEMOLITION OF ANY BUILDING:

(*1) No owner of any site shall demolish or cause or permit to be demolished any building without the prior written permission of the local authority.*

(2) The local authority may, in granting such permission, impose any condition or requirements contemplated in sub-regulations F1(4) and (5) and regulation F2 for the safety, health and convenience of the public, and for the safety of any other building or installation which in its opinion may be affected by such demolition.

(3) No person shall at any time during the course of or after the demolition of a building leave it in a condition dangerous to the public or any adjoining property.

(4) Where a condition contemplated in sub-regulation (3) arises the local authority may serve a notice on such person requiring him to make the site safe, and if he fails so to do, the local authority may itself carry out the necessary work and recover the cost thereof from such person.

E2 SAFEGUARDING OF BASEMENTS:

Where any building is demolished to the level of the ground and such building contained a basement, the owner of such building shall provide or cause to be provided safe lateral support to the sides of such basement.

E3 PROHIBITION OF DANGEROUS METHODS:

The local authority may prohibit the use of any method to be applied in the demolition of any building where in its opinion such method will create or cause to be created any danger to any person or other building or property, and where it so prohibits it shall, on the request of the owner of such building, give its reasons, in writing, for such prohibition.

E4 GENERAL PENALTY:

Any person who contravenes any requirement of the regulations of this Part or fails to comply with any notice, condition or order issued thereunder, shall be guilty of an offence.

Deemed-to-satisfy regulations

There is no corresponding deemed-to-satisfy part of SANS 10400 for NBR Part - E - Demolition. This means that before the LA grants permission for the demolition of a building it may require a competent person to design a plan for the safe demolition, taking into account:

Public safety and damage to property

The LA will approve the demolition method. For instance blasting in a built-up suburb may be considered a danger to other buildings or to people,

Safeguarding basements

Basements may be prone to collapse during and after demolition. The owner of the property must ensure that there is safe lateral support for the sides of the basement.

Part F - Site operations

National Building Regulations

NBR: F1: Protection of the public

(1) In cases where danger or serious inconvenience to the public may ensue from the demolition or erection of a building on any site, the local authority may require that the owner of such site, before such work is commenced, shall erect a fence, hoarding or barricade to prevent the public from entering such site and to protect them from the activities on such site.

(2) Such fence, hoarding or barricade shall for as long as is necessary be retained and maintained by such owner in a safe condition, and any access to such site, and the means thereof, shall be subject to approval.

(3) No part of such fence, hoarding or barricade shall be removed without the permission, in writing, of the local authority until the work has been completed.

(4) Any person undertaking any work of erection or demolition on any site shall confine all operations in connection with such work within the boundaries of such site and shall not encroach upon or over any street or public place abutting such site, except with the prior written approval of the local authority, and subject to the conditions contained in such approval with regard to the safety and convenience of persons using such street or public place.

(5) The local authority may, before or during the erection or demolition of any building, impose any reasonable conditions in addition to the conditions and requirements contemplated in this regulation, for the purpose of safeguarding the interests of the general public, and every condition so imposed shall be observed by the owner.

(6) Any owner who contravenes or causes or permits any other person to contravene a requirement of this regulation or fails to comply with any notice served on him by the local authority ordering compliance with this regulation, or contravenes any condition contained in any approval, shall be guilty of an offence.

F2: Damage to local authority's property

(1) Where any work connected with the demolition or erection of any building may, in the opinion of the local authority, cause or have any detrimental effect on the strength, standard, safety, quality or position of any property belonging to or vested in such local authority, the local authority may require the owner of such building to pay to the local authority such deposit or give such security, as it may require to cover the costs of the repair of any damage which may be caused by such work.

(2) In the event of damage to the local authority's property being so caused the local authority may appropriate the amount of the deposit or security contemplated in sub-regulation (1) towards the costs of repairing such damage: Provided that if the amount of the deposit or security exceeds such costs, the balance shall be refunded to the owner: Provided further that if such costs exceed the amount of the deposit or security, such owner shall be liable to the local authority for the deficit.

(3) Where any deposit contemplated in sub-regulation (1) has not been lodged with the local authority, the owner of such building shall pay the cost of such repair to the local authority on demand, failing which the local authority may recover such cost from the owner in a court of competent jurisdiction.

F3: Geotechnical site and environmental conditions

(*1) Where the local authority has reason to believe that a site upon which a building is to be erected:*

(a) Is situated on contaminated land;

(b) Is situated on potentially unstable land to the extent, insofar as risk can reasonably be foreseen, that ground movements caused by land-slip, slope stability or subsidence may impair the stability of the building or part thereof or pose a threat to the safety of occupants; or

(c) Is underlain by subsoils which have the potential to cause foundation movements caused by swelling, consolidation, shrinkage or settlements and as a result may impair the stability of the building or part thereof;

it shall on receipt of an application for the erection of the building inform the applicant accordingly.

(2) On receipt of any such notification or where the applicant is aware of such conditions or they are evident, such applicant shall appoint an approved competent person to undertake an appropriate geotechnical site investigation.

(3) Such approved competent person shall, as appropriate, determine in accordance with accepted principles, methods and technical considerations, as relevant:

(a) Whether or not the erection of a building on the site under (1)(a) or (1)(b) above should be permitted, and if so under what conditions, providing full details of the measures which need to be effected to fulfil such conditions and

(b) The magnitude of any potential total and differential movements to which the building or part thereof may be subjected to, and shall report to the owner and the local authority such findings.

(4) Geotechnical investigations conducted in accordance with the requirements of SANS 10400-B in the case of dolomite lands and SANS 10400-H in the case of foundations for buildings shall in terms of F3(2) be deemed to be appropriate investigations.

(5) The measures contemplated in sub-regulations (3)(a) and (b) shall be applied in the erection of the building and the site works

F4: Preparation of the site

(1) Before any foundation is laid the area to be covered by any building shall be properly cleared of vegetable matter, tree stumps, timber and other cellulose material, debris or refuse and any material contaminated with faecal matter.

(2) Where any site upon which any building is to be erected is waterlogged, seasonally waterlogged or saturated, or where any building is to be so situated that water will drain naturally towards it, drainage shall be provided to direct such water away from such site or building to a stormwater drain or to dispose of it in some other safe approved manner.

F5: Soil poisoning

Where so required by the local authority, the soil in all areas within the site as defined in code of practice SANS 10124 shall be treated in accordance with the recommendations of SANS 10124.
(1) Buildings shall, where so required by the local authority or in areas of high termite infestation, be protected from subterranean termite activity.
(2) The requirements of sub-regulation (1) shall be deemed to be satisfied where the means of termite protection complies with SANS 10400-F.

F6: Control of unreasonable levels of dust and noise

(1) The owner of any land on which excavation work is in progress or on which any building is being erected or demolished shall take precautions in the working area and on surrounding roads and footways to limit to a reasonable level the amount of dust arising from the work or surroundings thereof.

(2) (a) No person shall during the course of any building, demolition or excavation work use any machine, machinery, engine, apparatus, tool or contrivance, which in the opinion of the local authority may unreasonably disturb or interfere with the amenity of the neighbourhood:

(i) on a public holiday or Sunday

(ii) before 06:00 or after 17:00 on any Saturday; and

(iii) before 06:00 or after 18:00 on any day other than those days contemplated in subparagraphs (i) and (ii)

(b) The prohibition in paragraph (a) shall not apply in any circumstances in which the use of such machine, machinery, engine, apparatus, tool or contrivance

(i) is urgently necessary in order to preserve the life, safety or health of any person;

(ii) is urgently necessary to preserve property;

(iii) has been authorized by the local authority; or

(iv) is necessary for the execution of work being carried out on behalf of any public authority.

(3) Any owner or person who contravenes a provision of this regulation shall be guilty of an offence.

F7 Cutting into, laying open and demolishing certain work

(1) Where the local authority on reasonable grounds, believes that any work carried out in connection with the erection of any building is not in accordance with the provisions of these regulations or any approval or authority granted thereunder, such local authority may, in order to establish whether such work is in accordance with such provision, approval or authority, by notice in writing, order the owner of such building

(a) To supply satisfactory proof that such work is in accordance with such provision, approval or authority; or

(b) To cause such work to be cut into, laid open or demolished to the extent required by the local authority; or

(c) To cause a test of such work to be carried out within such time and to such extent and by such person as it specified in such notice.

(2) (a) Where such local authority orders the owner to cause a test to be carried out as contemplated in sub-regulation (1)(c), a written report in regard to such test shall be submitted by the owner to the local authority, which report shall be signed by the person who carried out the test and which shall contain details in regard to the testing apparatus, methods and materials used in the test, the conditions under which such test was carried out and the results obtained during the test and at the conclusion thereof.

(b) Where as a result of a report contemplated in paragraph (a) the local authority is not satisfied that the work concerned is in compliance with the requirements referred to in sub-regulation (1), the local authority may, by notice served on the owner, order the owner to take such steps as it deems necessary, and within such period as is stated in such notice, to ensure that there is such compliance, or the local authority may in such notice order the owner to cause such work to be cut into, laid open or demolished as contemplated in sub-regulation (1)(b).

(3) (a) Any owner having been ordered to cause any work to be cut into, laid open, demolished or tested in terms of this regulation shall not continue with such work or with any other work affected thereby unless the local authority has authorized him, in writing, to continue.

(b) Where the local authority is satisfied that work on the affected part of the building may proceed, it shall forthwith give authorization to so proceed.

(4) Where such cutting into, laying open, demolishing or testing reveals that a contravention of the requirements of these regulations, or of any approval or authority granted by the local authority, has taken place, or if the necessity for such cutting into, laying open, demolishing or testing is attributable wholly or partly to any contravention of the proviso to sub-regulation A4(1)(b) or the requirements of regulation A22 or A25, the cost of such work and any making good subsequent thereto shall be borne by the owner, and in any other case by such local authority.

(5) Any owner who contravenes any provision of this regulation or who fails to comply with any notice served on him in terms thereof, shall be guilty of an offence.

F8 Waste material on site

(*1) Where in the opinion of the local authority, excessive rubble, rubbish, other debris or combustible waste material is allowed to accumulate on a site before or during building operations, it may, by written notice, order the owner of such site to have such rubble, rubbish, other debris or combustible waste material removed within the period specified in such notice.*

(2) Any owner who fails to comply with such notice shall be guilty of an offence and the local authority may remove the said rubble, rubbish, other debris or combustible waste material from such site and may recover the costs of such removal from the owner.

F9 Cleaning of the site

(1) Any owner or person erecting or demolishing any building shall remove any surplus material and matter arising from such erection or demolition from the site and from any other land or public street or public place affected by such material or matter during or after the completion of such erection or demolition, failing which the local authority may, by written notice, order the

owner of such building to have such surplus material and matter removed within a period specified in such notice.
(2) Any owner or person who fails to comply with a provision of sub-regulation (1) or a notice served on him in terms thereof, shall be guilty of an offence.

F10 Builder's sheds

(1) Any owner or person carrying out or performing work in connection with the erection or the demolition of any building, may erect on the site of such work such temporary builder's sheds as may be necessary.
(2) The construction and location of such sheds shall be to the satisfaction of the local authority and such sheds shall be maintained in good order.
(3) Subject to the provisions of sub-regulation (6) such sheds shall only be used for a purpose connected with the carrying out or the performance of the work referred to in sub-regulation (1).
(4) Where such sheds are not constructed, located or maintained in terms of this regulation, the local authority may serve a notice on such owner or person to move, reconstruct or repair or improve the condition of such sheds within a time specified in such notice, or if use thereof is being made other than that permitted in terms of this regulation, to cease such unpermitted use.
(5) On completion or cessation of the work referred to in sub-regulation (1) or where such sheds are no longer necessary for the purpose for which they were erected, they shall be removed from the site by the owner.
(6) Security personnel employed in connection with a building which is being or which is to be erected or demolished may be accommodated in builder's sheds, subject to such requirements and conditions as may be necessary for the safeguarding of public health and the health of such personnel and for avoiding nuisance or inconvenience to persons in the vicinity of such building.
(7) Any owner or person who fails to comply with any provision of this regulation or any notice served on him in terms thereof, shall be guilty of an offence.

F11 Sanitary facilities

(1) No owner of person shall commence or continue the erection or demolition of any building unless approved sanitary facilities for all personnel employed on or in connection with such work have been provided or are available on the site or, with the permission of the local authority, at some other place. Provided that where such facilities have not been so provided the local authority may order the cessation of such work until the required facilities have been provided, and, should such order not be complied with, the local authority may install such facilities and recover the costs of such installation from the owner of the site.
(2) Any owner or person who contravenes any provision of this regulation, or fails to comply with an order served on him in terms thereof, shall be guilty of an offence.
(3) The requirements of sub-regulation (1) shall be deemed to be satisfied where the provision of sanitary facilities complies with SANS 10400-F.

Deemed-to-satisfy regulations: SANS 10400-F

Sanitary facilities

SANS 10400-F: 4.2.1: *Sanitary facilities shall*

a) Be so sited as not to be offensive,

b) At all times be maintained in a clean and hygienic condition, and

c) Unless they are of a permanent nature, be removed immediately once such building work has been completed.

4.2.2: *Sanitary facilities shall be provided at the rate of not less than one sanitary facility for every thirty (or part of that number) of the personnel concerned.*

Soil poisoning

SANS 10400-F: 4.3: *Protection against subterranean termite activity. Where so required, a building shall be protected against subterranean termite activity by:*

a) The effective application of soil insecticides to the site in accordance with the requirements of SANS 10124; or

b) The installation of a suitable termite barrier and the implementation of suitable termite management measures in accordance with the provisions of Agrément certificate.

Stormwater disposal

SANS 10400-F: 4.4: *All stormwater disposal arrangements during construction shall comply with the requirements of SANS 10400-R.*

Part G - Excavations

National Building Regulations

G1 General stability requirement

(1) Where any excavation related to a building is carried out or is to be carried out on any site and such excavation may impair the safety or stability of any property or service, the owner of such site shall take adequate precautionary measures to ensure that the safety and stability of such property or service is maintained.

(2) While any such excavation remains open, and during the placing of any foundation within it, such excavation shall be maintained in a safe condition by the owner or person carrying out such excavation.

(3) Where the safety or stability of any property or service is likely to be impaired by such excavation, or where the depth, at any point, of such excavation is likely to be more than 3m, the owner of the site shall

(a) Obtain the prior written authorization of the local authority for such excavation; and

(b) Take the precautionary measures specified by the local authority or an approved competent person in such authorization.

(4) The owner of any site shall, at least seven days prior to the commencement of any excavation contemplated in sub-regulation (1), notify the local authority in writing of his intention to excavate.

(5) Any owner or person who fails to comply with any requirement of this regulation, shall be guilty of an offence.

Deemed-to-satisfy regulations: SANS 10400-G

SANS 10400-G: 4.1: *The functional regulation G1(1) contained in part G of the National Building Regulations shall be deemed to be satisfied where the excavation relating to a building*

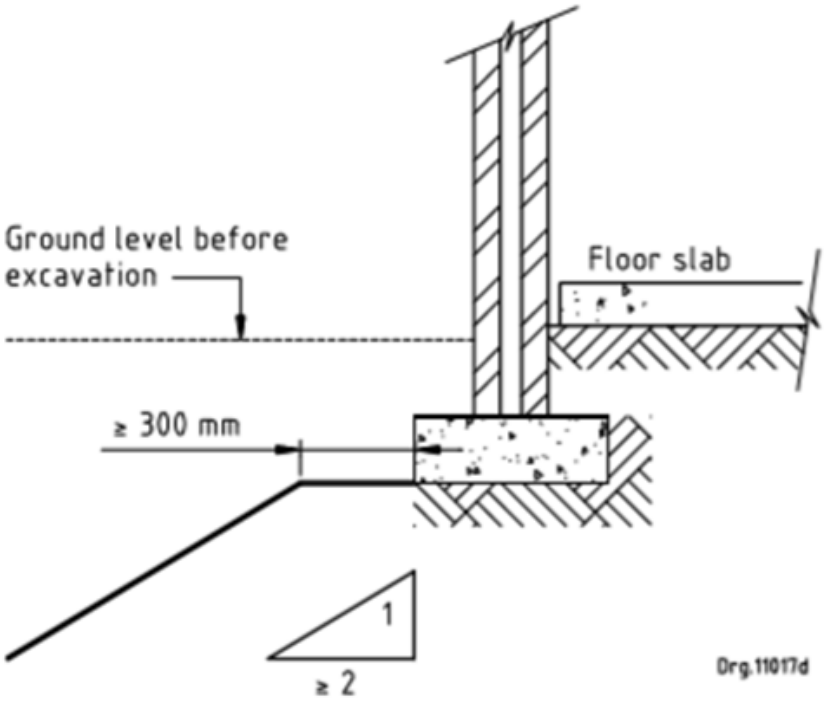
a. Is less than 3,0 m deep and complies with the requirements of 4.2, or

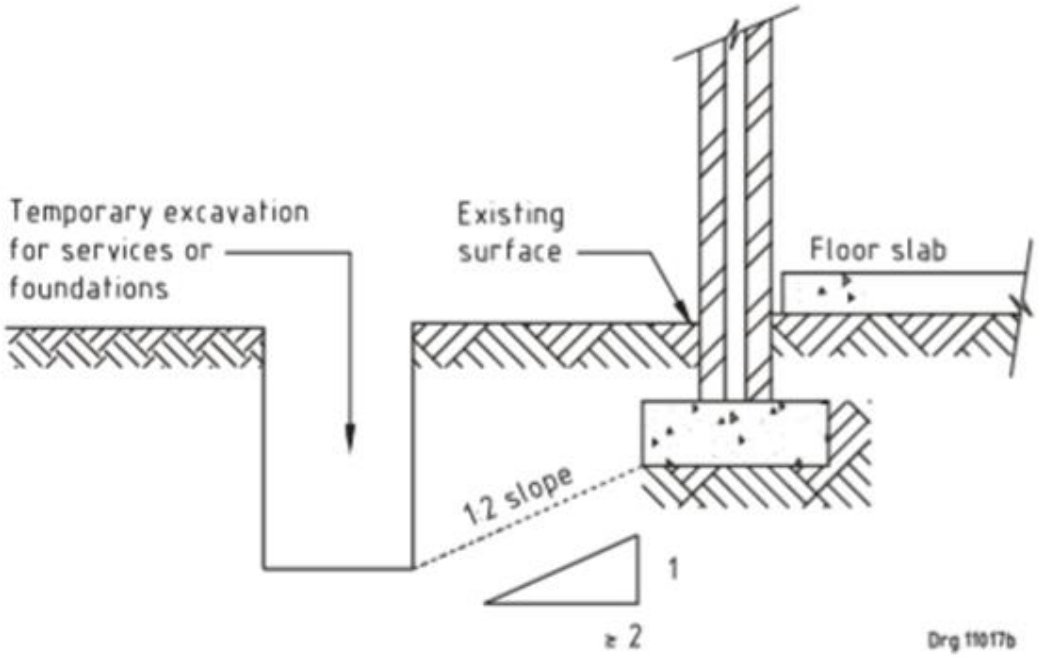
b. Is the subject of a rational design or a rational assessment (or both) prepared by a competent person (civil engineering) or competent person (engineering geology).

Temporary excavations

SANS 10400-G: 4.2.1: Temporary excavations must not extend below the line drawn from the bottom edge of the foundation as shown in the diagrams below.

- Surface water must be diverted away and prevented from running down the cut and causing erosion.
- The sides of excavations must comply with the safety requirements of the Construction Regulations 2014.





Top: Temporary excavations exposing existing foundations. Above: Temporary excavation in close proximity to a building.

Part H - Foundations

National Building Regulations

H1: *The foundation of any building shall be designed and constructed to safely transmit all the actions which can reasonably be expected to occur from such building to the ground and in such a manner that any local damage (including cracking), deformation or vibration do not compromise the efficient use of a building or the functioning of any element of a building or equipment within a building.*

Deemed-to-satisfy regulations: SANS 10400-H

SANS 10400-H: 4.1.1. The design of foundations must take into account:

- The geotechnical site investigations;
- The shape, size and construction of the buildings, as well as the layout and topography of the site;
- The existing, previous and future vegetation;
- Predicted movement of the ground substrate;
- The location of services, and;
- The impact of erosion.

Geotechnical site investigations

4.2.1 A competent person (geotechnical) must analyse the soil so that foundations can be designed to take into account the range of expected soil movement. Sites for single-storey or double storey type 1 masonry buildings must be classified as indicated below.

Founding material	Nature of ground	Expected range of movements - mm	Site class designation
Rock	Stable	Negligible	R
Clay (high plasticity)	Expansive	< 7.5 7.5 to 15 15 to 30 >30	H H1 H2 H3
Silts and sands	Compressible & potentially collapsible	<5 5 to 10 >10	C C1 C2
Sand and fine-grained soils (low plasticity)	Compressible	<10 10 to 20 >20	S S1 S2

Scope of SANS 10400-H foundation solutions

The deemed-to-satisfy minimum standards for foundation solutions in SANS 10400-H *apply only in respect of single-storey type 1 masonry buildings that comply with the requirements of SANS 10400-K where:*

- *The height of the wall from the floor level to the top of an external gable does not exceed 5,0 m;*
- *The span of roof trusses or rafters (or both) between supporting walls does not exceed 8,0 m;*
- *The span of concrete roof slabs between supporting walls does not exceed the dimensions given in figure 2;*
- *The dead load (self-weight) of the roof covering of roofs other than concrete slabs does not exceed 80 kg/m²;*
- *The thickness of concrete roof slabs does not exceed 225 mm if of solid construction, or the equivalent mass, if of voided construction;*
- *The height of foundation walls does not exceed 1,5 m; and*
- *The height of fill beneath floor slabs does not exceed 1,0 m.*

SANS 10400-H: 4.3 provides various foundation solutions for buildings which comply with the above. These solutions are:

- Strip footings

- Slab-on-the-ground foundations (rafts)
- Foundations for the interface between new and existing buildings

Foundations for free-standing walls

SANS 10400-H: 4.4 provides designs for foundations for free-standing walls.

Part J - Floors

National Building Regulations

J1: *Any floor of any building shall –*

- *Be designed and constructed to safely support its own weight and any actions which can reasonably be expected to occur and in such a manner that any local damage (including cracking), deformation or vibration do not compromise the efficient use of the building or the functioning of equipment supported by such floor; and*
- *Have a fire resistance appropriate to its use and where required, be non-combustible.*
- *The floor of any laundry, kitchen, shower-room, bathroom or room containing a toilet pan or urinal shall be water-resistant.*
- *Any suspended timber floor in a building shall be provided with adequate under-floor ventilation.*
- *Where any concrete floor slab is supported on ground or filling, such floor shall be so constructed that any moisture present in such ground or filling is prevented from penetrating such concrete floor slab.*

Deemed-to-satisfy regulations: SANS 10400-J

Water-resistant floors (4.2)

SANS 10400-J: 4.2: A water-resistant floor shall:

- Be constructed of concrete in accordance with the requirements of SANS 2001-CC1 or SANS 2001-CC2; or
- Comprise an impervious material, fit for its intended purpose, laid on top of, or bonded to, the flooring system, which
- Can hold any surface water in such a manner that it prevents the flooring system from deteriorating in any way until such time that the water can evaporate, be drained or be removed, and
- Can accommodate any movement in the flooring system without losing its impermeable properties

Suspended timber floors (4.3)

Suspended timber floors (not exposed to the elements) shall:

- Have floor joists which are either built into the walls with a minimum end bearing of 75 mm or bolted to walls by means of joist hangers.
- Maximum spans for joists of different sizes and grades are provided in this section..

- Minimum thicknesses of different types of timber floor are provided in this section: Tongue and groove floor boards and strip flooring, particle board and composite and plywood board..
- The clearance beneath the ground floor joists and the ground beneath must be at least 450 mm. Access must be provided for inspection purposes. Crawl space must be fitted with covers or doors that prevent entry of rain, termites (in their flying stage), reptiles and vermin.
- Ventilation of the subfloor space in suspended ground floors must be provided by means of openings spaced not more than 2,4 m apart with at least one opening within 0,75 m of each corner. The total area of ventilation openings provided shall be not less than 1 000 mm2 of unobstructed air passage per square metre of floor area. All ventilation openings shall be fitted with corrosion-resistant screening of nominal aperture that does not exceed 1,2 mm.

Part K - Walls

National Building Regulations

K1 Structural Strength and Stability

Any wall shall be designed and constructed to safely sustain any actions which can reasonably be expected to occur and in such a manner that any local damage (including cracking) or deformation do not compromise the opening and closing of doors and windows or the weather tightness of the wall and in the case of any structural wall, be capable of safely transferring such actions to the foundations supporting such wall.

K2 Water Penetration

1. *Any wall shall be so constructed that it will adequately resist the penetration of water into any part of the building where it would be detrimental to the health of occupants or to the durability of such building.*
2. *Where a building includes a basement or semi-basement, the local authority may, if it considers that conditions on the site on which the building is to be erected necessitate integrated designs for the penetration of water into such basement or semi-basement applicable to all construction elements or components thereof, require the submission of such designs for approval. Construction shall be in accordance with the requirements of the approved design.*

K3 Roof Fixing

Where any roof truss, rafter or beam is supported by any wall provision shall be made to fix such truss, rafter or beam to such wall in a secure manner that will ensure that any actions to which the roof may normally be subjected will be transmitted to such wall.

K4 Behaviour in Fire

Any wall shall have combustibility and fire resistance characteristics appropriate to the location and use of such wall.

Deemed-to-satisfy regulations: SANS 10400-K

Standards for different types of walls

SANS 10400-K: 4.2.1.1 provides the standards and dimensions for the following types of walls for which the deemed-to-satisfy standards apply:

- Single-storey buildings or the upper storey of double-storey buildings.
- The lower storey in a double-storey building;
- Infill masonry panels in framed buildings of four storeys or less;
- Free-standing boundary, garden and retaining walls (4.2.4.2);
- Balustrade and parapet walls (4.2.5)

These minimum standards stipulate that foundations must comply with SANS 10400-H and supporting members with SANS 10400-B and relate to:

- The maximum span of the roof trusses or rafters over supporting walls - 6 to 8 m, depending on the masonry units used (bricks or blocks) and the type and thickness of the wall (single leaf, collar-jointed or cavity)
- The maximum height of the walls for different applications;
- The span and thickness of concrete slabs carried by supporting walls;
- The minimum height of masonry above window and door openings (400 mm);
- The compressive strength (MPa of the masonry units);
- The class of mortar used for laying the masonry units;
- The maximum mass of the roof covering carried by the walls.

If the minimum restrictions of SANS 10400-K:4.2.1.1 are not adhered to, then a competent person (structural engineer) must design the wall.

General standards for masonry walls

4.2.1.2: Construction of masonry walls must comply with SANS 2001-CM1.
4.2.1.3: Minimum cavities in cavity walls: 50 mm; Maximum 110 mm.
4.2.1.4: Galvanised wall ties to be used within 30 km of the coast and stainless steel in tidal splash areas.
4.2.1.5: Galvanised brickforce to be used within 1 km of the coast and within 3 km of industries which discharge corrosive pollutants.
4.2.1.6: Stainless steel brickforce and rod reinforcements to be used in tidal splash zones.
4.2.1.7: Lintels to be used above all window and door openings.

Movement joints in masonry walls

There are two types of joints used to prevent wall cracks and wall failure:

- **Control joints (4.2.6):** A control joint or expansion joint is a continuous vertical or horizontal joint, left completely free of mortar and filled with elastomeric sealant to keep it watertight. Clay brick masonry expands over time. Expansion joints accommodate this expansion as the sealant compresses. Movement joint designed to permit relative movement of sections of a masonry structure or wall to occur without impairing the functional integrity of the masonry structure or wall

  The various tables in SANS 10400-K provides maximum dimensions for wall lengths and wall panels and the location of vertical control joints.

- **Articulation joints (4.2.7)** are movement joints installed in foundations, slabs and walls to prevent pressure build-up and cracking as a result of ground movement.

  4.2.7.1 Articulation joints should be located at positions where concentrations or variations in the potential development of stress might occur, such as at changes in wall height; changes in wall thicknesses; and deep chases or rebates for service pipes

Free-standing boundary, garden and retaining walls

SANS 10400-K: 4.2.4 provides minimum standards for free-standing retaining walls. A "free-standing wall" differs from the "cellular construction" of bonded walls used in a building. Free-standing walls are not structurally sound without the support of "piers". Rules for the stability of free-standing and retaining walls are provided in various tables in this section. These standards include aspects such as height, thickness, pier support and drainage.

In free-standing walls vertical control joints must be installed at prescribed spacing. These butt joints are usually installed either adjacent to piers or in the centre of a pier.

Balustrade and parapet walls

SANS 10400-K: 4.2.5 provides minimum dimensions and standards for balustrade and parapet walls. Basic rules include: Minimum height 1 m.

Corbelling

"Corbelling" is an architectural feature where a section of wall extends beyond the vertical of the supporting section of wall below. **SANS 10400-K:4.2.8:** The maximum corbel may not be more than one third of the thickness of the supporting wall.

Lintels

SANS 10400-K: 4.2.9: Provides rules and standards for the use of lintels above wall openings.

Minimum dimensions and standards for "wall beams" (reinforced masonry courses above the lintel) are also provided. SANS 10400-K refers to "wall beams" as "bed joint reinforcement"

and stipulates the minimum number of reinforced courses to be installed above lintels - depending on the type (mass) of the roof covering, the width of the opening and the type of wall and masonry units.

Detailed minimum standards are provided for the following topics for bed joint reinforcement:

- Steel reinforcing (**4.2.9.1**) - brickforce and rod.
- Bond block lintels (**4.2.9.2**) - specially shaped "bond blocks" and "U-blocks" used to accommodate steel reinforcement in block (hollow unit) walls above openings.
- Pre-cast, prestressed concrete lintels (**4.2.9.3**).
- Lintels over double garage openings (**4.2.9.4**)

Masonry arches

SANS 10400-K: 4.2.10: This section provides minimum standards for circular masonry arches with a maximum span of 2.5 m. An arch over any longer span requires rational design by a competent person.

Roof fixing

SANS 10400-K: 4.2.11 deals with the fixing of timber roof trusses or rafters to walls by means of anchoring either galvanised steel wire or galvanised steel strap ("hoop iron") into the wall at a minimum depth. The depth of the roof anchor into the wall depends on the weight of the roof covering and the spacing and pitch of the trusses.

- Light - roof sheets, metal tiles or fibre-cement slate roofs: Minimum depth: 600 mm
- Heavy - tiled, slated or thatch roofs: Minimum depth: 300 mm.

Timber-framed walls

SANS 10400-K: 4.3: Internal and external timber-framed walls and the anchoring of roofs to walls in timber-framed buildings shall be in accordance with the requirements of SANS 10082.

Fixing of roofs to concrete elements

SANS 10400-K: 4.4: Similar standards and methods as for fixing roofs to masonry walls.

Condensation

SANS 10400-K: 4.5.1 deals with issues concerning condensation on the internal surfaces of external walls within the "Southern Coastal Condensation Area" - this is a coastal area extending from Cape Town to East London.

Rain penetration

SANS 10400-K: 4.5.2 provides in Table 31 the minimum standards for the resistance of external walls to rain penetration.

Minimum standards for **non-Category 1 building**s, are provided for different wall types and wall thicknesses, including: Single leaf block walls (140 mm); single leaf brick walls (140 mm), collar-jointed brick walls (190 mm), cavity walls and timber-framed walls.

Minimum standards for **Category 1 building**s: Masonry walls not plastered (140 mm); plastered walls (minimum 90 mm); precast concrete wall (minimum 40 mm) provided that the joints between the slabs are sealed.

Rising damp

SANS 10400-k: 4.5.3: Provides for the installation of a damp proof course (DPC) in any wall of a building.

Behaviour in fire

SANS 10400-K: 4.6.1: *Walls in buildings other than single-storey **category 1 buildings** shall comply with the safety distances and fire-resistance requirements of 4.2 of SANS 10400-T:2011. Walls in single-storey **category 1 buildings** shall comply with the boundary and fire-resistance requirements of 4.57 of SANS 10400-T:2011.*

SANS 10400-T: 4.57 allows for greatly reduced minimum distances for the external walls of Category 1 buildings for H3 and H4 occupancies from the lateral and read boundaries of the site.

Cement plaster for walls

Deemed-to-satisfy minimum standards for plastering walls are not included in SANS 10400-K. Standards for cement plaster are found in **SANS 2001-EM1:** *Construction works: Cement Plaster.*

Part L - Roofs

National Building Regulations

L1 GENERAL REQUIREMENT:

The roof of any building shall be so designed and constructed that it:-

(a) Safely sustains any actions which can reasonably be expected to occur and in such a manner that any local damage (including cracking) or deformation do not compromise its functioning;

(b) Is adequately anchored against wind uplift;

c) Is durable and does not allow the penetration of rainwater or any other surface water to its interior;

(d) Does not allow the accumulation of any water upon its surface; and
(e) As part of a roof and ceiling assembly, provides adequate height in any room immediately below such assembly.

L2 FIRE RESISTANCE AND COMBUSTIBILITY

The fire resistance of any roof or roof and ceiling assembly complete with light fittings or any other component which penetrates the ceiling, shall be appropriate to its use and where necessary such roof or roof and ceiling assembly shall be non-combustible.

Deemed-to-satisfy regulations: SANS 10400-L

Roof coverings and waterproofing systems

SANS 10400-L: 4.2.1.1 *Any roof covering and waterproofing system, or part thereof, shall:*

a) Resist the penetration of rain to the extent that

1) In buildings other than category 1 buildings, any water which might penetrate the roof is of insufficient intensity to run down the inside surface of the roof, or drip onto the ceiling or floor, and

2) In the case of category 1 buildings, water which penetrates the roof is of insufficient intensity to run down the internal face of walls onto the floor or form a damp patch on the ceiling or floor;

b) Be capable of being effectively repaired in the event of being damaged, despite the aging of the materials; and

c) Resist, with an appropriate degree of reliability over its design working life when being suitably maintained,

1) Temperatures from −10 °C to +80 °C and rapid reversals of temperature of the order of 60 °C, without deterioration,

2) The effects of UV radiation without the deterioration of its essential properties,

3) The effects of condensation at the undersurface,

4) Chemical attack from common atmospheric gases and saline atmospheres in marine environments,

5) The growth of bacteria, lichens, fungi, etc.,

6) Puncturing and penetration when the roof is in use, and

7) Any reversible and irreversible movement emanating from the roof structure.

SANS 10400-L: 4.2.1.2 *Products used in roof coverings and waterproofing systems shall preserve their properties satisfactorily with normal maintenance specified by the manufacturer for at least the following periods:*

a) In systems which can be readily repaired or replaced: 10 years; and
b) In systems that are difficult to replace: 20 years.

SANS 10400-L: 4.2.1.3 *Accumulated hail on roofs after moderate hail storms shall not cause water to penetrate the interior of the building.*

Minimum roof pitches

SANS 10400-L: 4.2.2: This section provides the minimum root pitches for different types of roof coverings:

- Metal and corrugated fibre-cement sheeting (depending on end laps): 11° to 26°
- Long-span sheets (metal and fibre cement): 3° to 5°.
- Fibre-cement slates (with underlay): 11°.
- Fibre-cement sales (no underlay): 17°.
- Concrete and clay tiles and shingles (with underlay): 17°.
- Concrete and clay tiles and shingles (no underlay): 26°.
- Metal tiles (with underlay): 11°. (When metal tiles are used over an existing roof the existing roof slope may be maintained).
- Metal tiles (no underlay): 15°.
- Natural slate (with underlay): 20°.
- Natural slate (no underlay): 30°.
- Thatch: 45°.
- Thatch at dormer windows: 35°.

Roof lights

SANS 10400-L: 4.2.3: Deemed-to-satisfy standards provide for the maximum opening area (0,6 m^2) and UV and hail resistance for roof lights (skylights).

Drainage and waterproofing of flat roofs

SANS 10400-L: 4.3.1.1: Flat roofs must have a minimum fall to gutters, outlets or edges of 1:80.
SANS 10400-L: 4.3.1.3: Penetrations should as far as possible be kept away from low points in the roof and at least 200 mm from upstand beams and walls.
SANS 10400-L: 4.3.1.6: A suitable step shall be formed between internal and external areas to prevent the ingress of water to the interior of the building. The height of the step should take account of the requirements for falls to outlets or gutters, finishes and waterproofing systems.

Gutters and downpipes in flat roofs

SANS 10400-L: 4.3.2:

- Unless designed by a competent person gutters draining a flat roof should only be located along the perimeter of the roof.
- Outlets (“full-bores”) should be set flush with the top of the concrete or recessed into the timber decking.
- Minimum distance of outlets from upstands and parapet walls - 500 mm.
- Minimum distance of outlets from expansion joints - 1 m.

Upstands and drips on flat concrete roofs

SANS 10400-L: 4.3.3.1 *Unless the expansion joints are designed by a competent person (built environment) to accommodate the flow of water over such joints, twin kerb upstand-type joints (see figure 3) shall be installed over expansion joints in concrete roofs, which shall be located away from outlets.*

4.3.3.2 *Upstand beams of height not less than 170 mm shall be provided in concrete roofs at all intersections between the masonry walling and the roof surface. Corner fillets that have horizontal and vertical dimensions of not less than 75 mm shall be provided at such intersections.*

4.3.3.3 *Drips shall be provided beneath all concrete roof overhangs.*

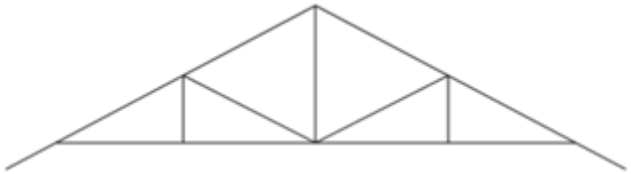
Waterproofing systems for flat roofs

SANS 10400-L: 4.3.4 *A waterproofing system shall be installed on top of a flat roof by a competent person strictly in accordance with the manufacturer's instructions such that the roof remains watertight for a period of at least five years without any maintenance other than the cleaning of gutters, downpipes and surfaces. Such competent person shall satisfy himself that the materials selected are appropriate for the application, taking into account the degree of exposure of the waterproofing, the protection to the material provided, and the area in which the building is located.*

Deemed-to-satisfy regulations for timber roof structures: SANS 10400-L

SANS 10400-L: 4.4.1 This deemed-to-satisfy minimum standard applies only to:

- Softwood timber trusses of the Howe type.



- Trusses which are fully triangulated.
- Trusses used in gable-to-gable construction without any hips or valleys. (Rational design by a competent person is required if the roof design incorporates hips or valleys).
- Have roof pitches within the following limits:
    - Tiles and slates - between 17.5° and 35°.
    - Metal or fibre-cement sheets - between 15° and 30°.
    - Metal tiles - between 15° and 30°.
- Are only supported at the heel joint, or at the intersection of a web member and the bottom chord and at no other intermediate position.
- Have rafters with a maximum pitch of 26° and purlin beams/rafters with a maximum clear span of 8 m.

All other timber roof structures must be designed by an engineer.

SANS 10400-L: 4.4.1.1.2 Softwood timber roof and ceiling assemblies which are compliant with SANS 10400-L must:

- Be constructed in accordance with SANS 2001-CT2;
- Bear the SABS grade stamp;

SANS 10400-L: 4.4.1.1.3: Within designated municipalities (coastal areas) the timber must be treated agaInst the effects of rot, fungus and insect attack.

Spacing of trusses, rafters, purlins and battens

SANS 10400-L: 4.4.1.1.4: *The spacing of trusses, rafters and purlins or battens for the different roof coverings shall be in accordance with the manufacturer's instructions, or in accordance with table 4.*

Wall plates

SANS 10400-L: 4.4.1.1.5 *Trusses, rafters and purlin beams shall be supported on wall plates of minimum size 38 mm × 76 mm or similar flat bearing surfaces which are levelled and positioned so as to ensure that the ends of such members are vertically aligned. Alternatively, trusses, rafters and purlin beams shall be supported on hangers twice bolted to walls with masonry anchors. Hangers joining timber to timber shall be either nailed in each hole with 32 mm long clout wire nails or bolted with 12 mm diameter bolts in the holes provided.*

Anchoring of roof trusses

SANS 10400-L: 4.4.1.2.5 *Roof trusses shall be tied down to the supporting walls and columns by means of a galvanized steel strap or galvanized steel wires which are built into the walls.*

Bracing of roof trusses

SANS 10400-L: Figures 17 (a & b), 18, 19, 20, 21,22 show different configurations of truss bracing:

- Top chord bracing (diagonal for tiled roofs and herringbone for sheeted roofs);
- Bottom chord bracing - by means of continuous runners.
- Purlins (for sheeted roofs) and battens (for tiled and slated roofs) provide additional and essential top chord bracing.
- Battens nailed to the bottom chords to carry the ceilings, provide additional and essential bottom chord bracing.

Purlin rafters and purlin beams

SANS 10400-L: 4.4.1.4.1 *Where pitched trusses or rafters are not used to support the roofing sheets, purlin beams or purlin rafters shall be in accordance with tables 8 and 9 and erected at the required pitch (see figure 25).*

Purlin beams and purlin rafters are members which double as purlins. This form of construction is only applicable to sheeted roofs

Water tanks and hot water geysers

SANS 10400-L: 4.4.1.2.10 *Wherever possible, water tanks and hot water geysers shall be supported on timber bearers on internal walls. Where there are insufficient internal walls to support these bearers, the hot water tank or geyser may be supported on trusses by using a timber platform constructed in accordance with figure 24.*

Splicing of battens and purlins

SANS 10400-L: 4.4.1.5

- Battens and purlins must be continuous over at least 3 rafter (two rafter bays)
- Battens must be nailed to the rafter with 75 mm wire nails.
- Purlins must be fixed to the rafter with hurricane clips, wire or swing clips.
- Battens must be butt-jointed when joining and either skew-nailed to the rafter or spliced in close proximity to the rafter by means of a connector (metal or timber).
- Purlins must be mitred at 45° at the splice, skew-nailed through the splice and joined by means of a connector (timber or metal).
- Batten (joints) and purlin and batten splices must be staggered so that there is not more than one joint/ splice in the same bay in three consecutive battens/purlins.

Ceiling assembly

SANS 10400-L: 4.4.1.6 provides the standards for brandering (38 X 38 mm pine) to support the ceiling must be installed in accordance with SANS 2001-CT2.

- Brandering at maximum centres of 450 mm.
- Cross-brandering at maximum centres of 900 mm.

Deemed-to-satisfy regulations for thatched roofs: SANS 10400-L

SANS 10400-L: 4.4.2 Pole structures for thatched roofs shall be in accordance with SANS 10407.

Fire resistance and combustibility

SANS 10400-L: 4.5.1 *The fire resistance of any roof or ceiling assembly (or both), complete with light fittings or any other component which penetrates the ceiling, and the degree of non-combustibility of such assembly shall comply with the relevant requirements in SANS 10400-T and SANS 10400-V, as applicable.*

4.5.2 *No part of the roof or ceiling assembly, made of wood or any other combustible material, shall pass through a separating element of a building (in accordance with the requirements of SANS 10400-T).*

Part M - Stairways

National Building Regulations

GENERAL REQUIREMENT:

M1: *Any stairway, including any wall, screen, railing or balustrade to such stairway, shall:*

(a) Be capable of safely sustaining any actions which can reasonably be expected to occur and in such a manner that any local damage (including cracking) or deformation do not compromise its functioning;
(b) Permit safe movement of persons from floor to floor;and
(c) Have dimensions appropriate to its use.

FIRE REQUIREMENT:

M2: *A stairway contemplated in regulation M1 shall comply with the relevant requirements in Part T of these regulations.*

Deemed-to-satisfy regulations: SANS 10400-M

For stairways in public buildings where SANS 10400-S (Facilities for persons with disabilities) and SANS 10400-T (Fire protection) apply, then SANS 10400-M must be read in conjunction with Part S and Part T.

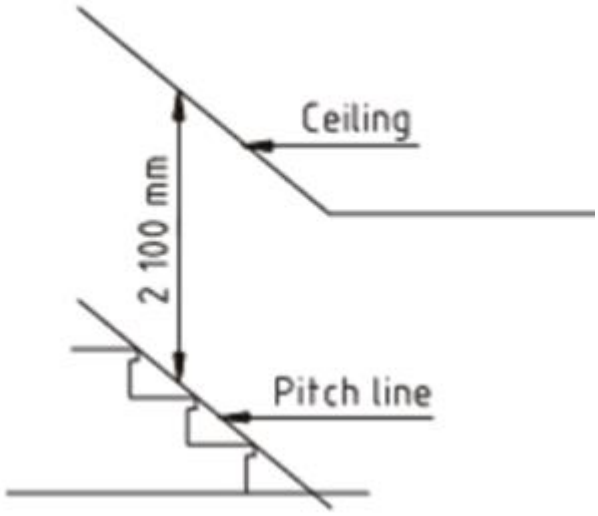
- Part S reduces the rise of the step (as indicated in this part), increases the width of stairways and the length of landings. It also has a requirement that solid risers should be used where stairs overlap the next lower tread, and another that specifies the need for handrails on both sides of the stairway
- Part T increases the standard width of stairways as indicated in this part, disallows the use of spiral stairways, and requires solid risers for all buildings except those defined in Part A as D4 (a plant room that contains mechanical or electrical services that are necessary for the running of a building, and are usually left unattended).

Dimensions of stairways

SANS 10400-M provides the following dimension standards for stairways.

- There must be sufficient headroom above any stairway: at least 2,1 m measured vertically from the pitch line of the staircase
- Stairs need to be wide enough for safe use, usually not less than 750 mm (see drawing below)
- The going (depth of the tread) must be at least 250 mm (see drawing below)

SANS 10400: M: 4.2.1 *The headroom at any point on any stairway shall be not less than 2,1 m, measured vertically from the pitch line, and the width of any stairway, measured to any enclosing wall or balustrade, shall be not less than 750 mm.*



Minimum headway 2 100 mm

4.2.2 *Any landing serving two flights in the same straight line shall:*

a) Have a length of not less than 900 mm, and

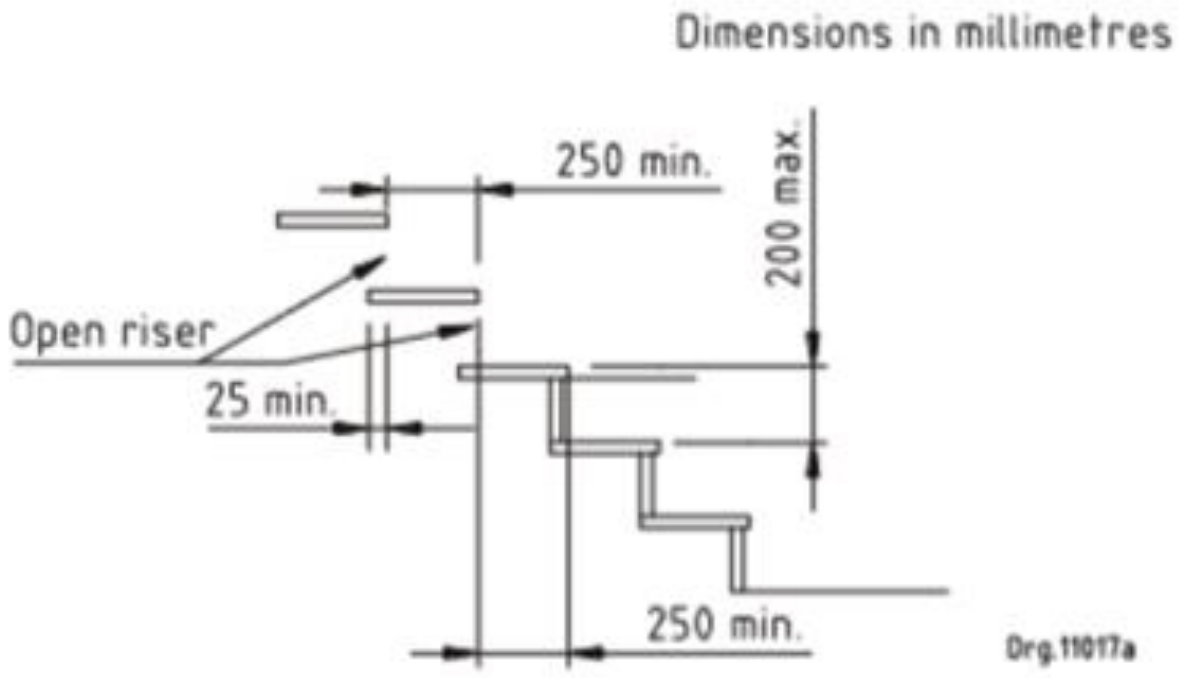
b) Have a width of not less than that of such flights.

4.2.3 *No flight of stairs shall have a vertical rise greater than 3 m between landings.*

4.2.4 *No door shall open onto a stairway unless such door opens onto a landing and the width of such landing is not less than that of such door. The position of the door relative to the landing and its direction of opening shall be such that it does not obstruct the flow of persons on the stairway when in the fully open position.*

4.2.5 *The rise of any step shall not exceed 200 mm.*

4.2.6 *The going and width of any tread shall be not less than 250 mm, provided that where the stairway does not have solid risers, each tread shall overlap the next lower tread by not less than 25 mm.*



Dimensions of treads and risers on a stairway. 200 mm maximum height of a riser; 250 mm minimum width of a tread. Note the minimum 25 mm overlap of the treads where there is an open riser

Tolerances in stairway dimensions

A maximum variation (tolerance) of 6 mm in the dimensions of the risers and goings of the treads in any one flight of stairs is 6 mm. This is to prevent the risk of falling on a stairway - because the human brain assumes even steps and the user is likely to stumble or fall if the steps are uneven.

SANS 10400:M: 4.2.7 *The variation in the dimensions of the risers and the goings of the treads in any one flight shall be not more than 6 mm, provided that this requirement shall not be construed as prohibiting the use of tapered treads in the same flight as non-tapered treads.*

Prevention against falling

If a flight of stairs is more than three risers high, it could be dangerous, especially if toddlers and old people use it. This is why it is essential to have some sort of protection to prevent falling.

This barrier must be at least 1 m high and may consist of:

- a secure wall
- a screen of some sort
- railings or a balustrade

Other issues include “openings”. If a child can fall through a gap in the railings, or if someone falls and their leg or foot gets stuck in the gap, it could end up really badly. The opening

specification is similar to that which relates to swimming pool fencing: it shouldn‟t allow anything with more than a 100 mm diameter to pass through it.

Handrails are also an important element. If a flight of steps continues for more than about five risers, there should be a handrail of some sort. And any sort of handrail MUST be securely fixed to the wall, screen, railing, balustrade or whatever! In some instances, for example when the stairs are wide (more than 1,1 m), it might be necessary to have a railing on either side.

If a screen is made of glass, it is vital that the glass used complies with the relevant SANS.

Stairways for the disabled

National Building Regulation S1 (1) (a) requires most buildings, with the exemption of the list of occupancies below, to provide stairway facilities to accommodate the disabled:

Masonry stairways

SANS 10400-M:4.4: Provides deemed-to-satisfy standards for the use of lintels and concrete in masonry stairways. Also references SANS 2001-CM1 and SANS 2001-CC1 & 2. Rational design is required for any masonry stairways which do not satisfy these minimum requirements.

Timber stairways

SANS 10400-M: 4.5 provides deemed-to-satisfy for a maximum width of 1.2 m of timber stairways in residences (H3 and H4), Minimum dimensions for stringer beams and timber treads are provided:

- Stringer beams: At least 48 mm x 225 mm; Grade 5 timber
- Timber Treads: At least 36 mm thick.

Any timber staircase which does not satisfy these minimum requirements must be designed by a structural engineer.

Part N - Glazing

National Building Regulations

TYPE AND FIXING OF GLAZING

N1 (1) *Any material used in the glazing of any building shall be of a secure and durable type and shall be fixed in a manner and position that will ensure that it will:*

(a) Safely sustain any wind actions which can reasonably be expected;

(b) Not allow penetration of water to the interior of the building; and

(c) Be apparent, in the case of clear glazing, to any person approaching such glazing.

(2) Class, plastics and organic coated glass shall be selected in order to provide, in the case of human impact, a degree of safety appropriate in relation to

(a) The position of the glazed area; and

(b) The number and likely behaviour pattern of persons expected to be in close proximity to such glazed area.

Deemed-to-satisfy regulations: SANS 10400-N

Any material used for glazing in buildings must be secure and durable so that it:

- Safely sustains expected wind actions;
- Does not allow water to penetrate the interior of the building
- Is obvious to anyone who approaches the glazing.

SANS 1O400-N: 4.2.1 *Glazing materials shall comprise either glass that complies with the requirements of parts 1 to 5 of* ***SANS 50572****, or polycarbonate sheeting.*
4.2.2 *Glazing shall comply with all the requirements of* ***SANS 613*** *for wind and impact loads as determined in accordance with the requirements of* ***SANS 10400-B*** *by a competent person (structures).*

Factors to take into account:

- The position of the glazing,
- The number of people who are likely to be able to access the glazed door or window,
- The probable behaviour patterns of anyone that is likely to get close to the glazed area.

Different types of glass

- Monolithic annealed glass,
- Patterned annealed and wired glass,
- Laminated annealed safety glass,
- Toughened safety glass.

Safety glazing

SANS 10400-N: 4.4.1 *The performance of safety glazing material shall be in accordance with the requirements of SANS 1263-1 and the individual panes of safety glazing material shall be permanently marked by the installer in such a manner that the markings are visible after installation.*
4.4.2 Safety glazing materials must be used where:

- Doors and sidelights form part of any entrance - up to 2.1 m from the floor;
- A window with a sill height of less than 500 mm;
- A window with a sill height of less than 800 mm where there is a danger of human impact;
- A bath or shower enclosure;
- Glazing in any wall or balustrade adjacent to a stairway, ramp, landing, pathway, patio, veranda or balcony;
- Sloped or horizontal glazing applications;
- A mirror on a cupboard door less than 800 mm from the floor;
- Glazing around swimming pools;
- Glazing used in internal partitions

Part O - Lighting and ventilation

National Building Regulations

Natural lighting and ventilation

NBR O1 (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 sub-regulation (1) shall be deemed to be satisfied where the lighting and ventilation are in accordance with SANS 10400-O.

Artificial lighting

NBR O1 (3) (a) *Notwithstanding the provision of any openings for natural light in accordance with sub-regulation (2) any room contemplated in sub-regulation (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.

Artificial ventilation in workplaces

NBR O1 3(b): *Notwithstanding the provision of openings for natural ventilation in accordance with sub-regulation (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 sub-regulation (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.

Natural lighting in dwellings and residences

NBR O2: 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 sub-regulation O1(1).

Approval of artificial ventilation systems

NBR O3: No person shall without the 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.

Design of artificial ventilation systems

NBR O4: *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.*

Artificial ventilation plant

NBR O5 (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 sub-regulation (1) shall be deemed to be satisfied where the design, location and protection of such plant comply with SANS 10400-O.

Testing of artificial ventilation systems

NBR O6 (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.

Fire requirements

NBR O7: *In addition to the requirements of this Part, lighting and ventilation shall be provided to comply with Part T of these regulations.*

Deemed-to-satisfy requirements: SANS 10400-O

The SANS 10400-O deemed-to-satisfy requirements for natural lighting depends on:

- The size of the glazed openings to the exterior of a building in relation to the interior space in which the openings are located;
- The concept of a “zone of space” - which is an unobstructed area outside the opening.

Size of glazed openings

SANS 10400-O: 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 m2, whichever is the greater.

Zone of space

SANS 10400-O: 3.27: "Zone of space" means *volume of open air outside an opening in an external wall, or a portion of such an opening.*

SANS 10400-O: 4.2.1.2 provides an explanation as to how the volume of "open air" is to be determined.

- "Open air" is air which is space unobstructed by objects which would restrict light entering through the opening.
- The size and position of the obstruction determine the deemed-to-satisfy minimum requirements for the zone of space. SANS 10400-O: 4.2.1.2 provides information for the calculation of the size of the zone of space under different scenarios.
- Buildings and other obstructions outside of the openings limit the zone of space. Where there is no such obstruction the zone of space is measured to the boundary line of the property.

Reasons for inadequate ventilation include:

- High temperatures which could be dangerous to either the safety or health of those using the room,
- Dust, gases, vapour, "volatile matter" or "hazardous biological agents" that might be dangerous to health or safety, or the purpose for which the room is used may make natural ventilation unsuitable or inadequate.

Part P - Drainage

SANS 10400-P: 3.2.3 & 4 defines a "drain" and a "drainage installation" as an underground system, outside of a building, vested in the owner of the property, which: *Is intended for the reception, conveyance, storage or treatment of sewage, and may include sanitary fixtures, traps, discharge pipes, drains, ventilating pipes, septic tanks, conservancy tanks, sewage treatment works, or mechanical appliances associated therewith.*

In other words, in the language of the NBR, a drain or drainage installation refers to a system for receiving, conveying, storage or treatment of sewage.

Drains receive sewage from the sanitary fixtures and either:

- Convey this sewage into the sewer system owned by the LA; or
- Store this sewage in a conservancy tank for removal by the LA; or
- Treat this sewage onsite using a septic tank and soakaway (French drain).

National Building Regulations

Compulsory drainage of buildings

NBR P1

(1) (a) Where in respect of any building a suitable means of disposal of water-borne sewage is available the owner of such building shall provide a drainage installation.

(b) Where there is no such means of disposal, sewage shall be disposed of in accordance with Part Q of these regulations.

(2)(a) *Where a sewer is or becomes available for the drainage of such building the owner of such building shall, at his own cost, lay, alter or extend any drain serving such building to terminate at a location and level as prescribed by the local authority for the connection to such sewer.*

(b) In the case of any existing building the local authority shall serve a notice, in writing, upon the owner stating the period within which the connection contemplated in paragraph (a) shall be made.

(3) Where a connecting sewer has been provided to any site the owner of such site shall cause all sewage discharged from any building on such site to be conveyed by a drain to such connecting sewer.

(4) Where the owner of such building fails to lay, alter or extend any drain in terms of sub-regulation (2) the local authority may lay, alter or extend such drain and recover the costs thereof from the owner: Provided that the local authority shall, before carrying out such work give not less than 14 days notice to such owner of its intention to carry out such work.

(5) Any owner who fails to comply with any requirement of sub-regulation (1) or (2), shall be guilty of an offence.

Design of drainage installations

NBR P2 (1) *Any drainage installation in any building shall be so designed and constructed that:*

(a) An adequate number of sanitary fixtures is provided in relation to the population and class of occupancy of such building;

(b) Such installation is capable of carrying the design hydraulic load;

(c) Such installation is capable of discharging into any common drain, connecting sewer or sewer provided to accept such discharge;

(d) All components and materials used in such installation are watertight;

(e) No nuisance or danger to health will be caused as a result of the operation of any such installation;

(f) Any drain in such system is of such strength, having regard to the manner in which it is bedded or supported, that it is capable of sustaining the actions to which it may normally be subjected and that it is, where necessary, protected against any drainage;

(g) All sanitary fixtures are so located that they are easily accessible to those persons they are intended to serve;

(h) Any necessary inspection, cleaning and maintenance required, may be performed through the means of access provided.

Control of objectionable discharge

NBR P3 (1) *No person shall cause or permit sewage discharged from any sanitary fixture to enter:*

(a) Any stormwater drain, stormwater sewer or excavated or constructed watercourse;

(b) Subject to the National Water Act, 1998 (Act No. 36 of 1998), any river, stream or natural watercourse whether ordinarily dry or otherwise; or

(c) Any street or other site.

(2) No person shall cause or permit stormwater to enter any drainage installation on any site.

(3) The local authority may by notice in writing order the owner of any site to execute, at his own cost, any precautionary measures required by the local authority to prevent such entry contemplated in sub-regulation (1) or (2), as the case may be.

(4) No person shall, without the written permission of the local authority, discharge or cause the discharge of any water from a swimming pool, fountain or reservoir, either directly or indirectly, onto any public street or public place, or onto any site other than onto the site upon which such swimming pool, fountain or reservoir is situated.

(5) Any person who contravenes or permits the contravention of any requirement of this regulation or fails to comply with a notice served on him in terms of sub-regulation (3), shall be guilty of an offence.

Industrial effluent

NBR P4 (1):

(a) Where any person has obtained approval to discharge into any drain any liquid or solid matter, other than soil water or waste water, and where any additional drainage and other installations including storage, pretreatment and metering installations are required by the local authority as a condition of such approval, such person shall submit any plans and other details of such installations required by the local authority.

(b) The installations contemplated in paragraph (a) shall be constructed in accordance with the relevant requirements of these regulations and shall be maintained in good working order.

(2) Any person who constructs an installation contemplated in sub-regulation (1) other than in accordance with such approval, shall be guilty of an offence.

Disconnections

NBR P5 (1) Where any soil fixture is permanently disconnected from any soil pipe, or where any soil pipe is permanently disconnected from any drain, the owner shall seal the opening to such pipe or drain in such a manner that such disconnection will not be a danger to health.

(2) Where any drain is permanently disconnected any remaining part shall be sealed by the owner of such drain.

(3) When any drainage installation is disconnected from a connecting sewer the local authority shall be notified, in writing, by the owner thereof within 30 days from the date of such disconnection.

(4) Any person who contravenes any requirement of this regulation, shall be guilty of an offence.

Unauthorised drainage work

NBR P6 ***(1)*** *Unless authorized by the local authority:*

(a) No person shall in any manner interfere with any sewer or connecting sewer;

(b) No person shall break into or interfere with any part of a drainage installation other than for the purpose of repair and maintenance.

(2) Any person who carries out or permits the carrying of any unauthorized work contemplated in this regulation, shall be guilty of an offence.

Inspection and testing of drainage installations

NBR P7 (1) *Any drain, discharge pipe or ventilating pipe shall be so installed as to be capable of withstanding the test pressures contemplated in rule PP26 or PP27, as the case may be, contained in SANS 10400-P and such tests shall be carried out in the presence of the building control officer of, or other officer duly authorized by, the local authority.*

(2) Any equipment, material or labour required for any inspection or any testing contemplated in Part P of these regulations shall be made available by the person installing such pipe or drain.

(3) No person shall put into use any drainage installation before such installation has been inspected, tested and passed by the local authority as complying with these regulations.

(4) Any person who contravenes the requirement of sub-regulation (3), shall be guilty of an offence.

Deemed-to-satisfy standards: SANS 10400-P

Rational design

SANS 10400-p: 4.1 The drainage installation must be designed by a competent person using the principles of SANS 10400-P for the design, installation and testing the system.

Materials, pipes, fittings and joints

SANS 10400-P: 4.2 The drainage installation must remain watertight under:

- Normal working conditions;
- Be able to withstand an internal water pressure of 50 kPa and an external water pressure of 30 kPa without leaking.

Sanitary fixtures

SANS 10400-P: 4.3 Sanitary fixtures, including waste pipes, must be made of impermeable, non-corrosive materials with a smooth inner surface.

- Sanitary fixtures must discharge through a water trap (seal);
- The water supply outlet must be at least 20 mm above the floor-level rim of the fixture.
- Any clothes or dish washing machine which is permanently connected to the drainage installation must also discharge through a trap.
- Any waste disposal system, other than a domestic system, shall discharge to through a grease trap into the drain.
- Any toilet pan shall be served by its own flushing device.
- Urinals must have a flushing device or a trap whereby the urinal is fully drained after each use.
- Toilet pan connectors must have a smooth inner surface and not be of the concertina type.

Provision of sanitary fixtures and drain capacity

SANS 10400-P documents detailed minimum deemed-to-satisfy drain sizes and drain configurations which depend on the population of the building and therefore the number of sanitary fixtures required to serve that population.

SANS 10400-P: 4.11.1 *The number of sanitary fixtures to be provided in a building shall be based on the population for which such building is designed, and such population shall be calculated in terms of Regulation A21 (see SANS 10400-A), provided that*

SANS 10400-P: 4.15 *The following requirements shall apply with regard to the sizing of a drain:*

a) The nominal diameter of a drain shall not in any case be less than 100 mm;
b) The hydraulic load carried by a drain shall not exceed the number of fixture units given in table 14 for a given diameter and gradient of drain; and
c) Where, due to the slope of the ground, a drain is required to be laid at a gradient steeper than 1 in 5, the hydraulic load carried by the drain shall not exceed that given in table 14 for a gradient of 1 in 5.

Venting of drains

All drains must be vented to avoid negative pressure within the drain and the subsequent syphoning of water seals from the sanitary fixture traps. SANS 10400 provides detailed deemed-to-satisfy minimum requirements for venting drain systems serving buildings of differing complexity.

Access to the drainage installation

SANS 10400-P: 4.19.1 *The following requirements shall apply with regard to access to a drain:*

a) A drainage installation shall be so designed and constructed as to permit adequate access to the interior of any pipe in such installation for the purposes of inspection, testing and internal cleaning.
b) Where a discharge pipe enters the ground, adequate means of access to the interior of the pipe shall be provided within 2 m above the point of entry.
c) Where a drain or discharge pipe passes through a room which is used as a kitchen, pantry, or for the preparation, handling, storage or sale of food, the means of access to the drain or pipe, for cleaning purposes, shall be situated outside such room, provided that this requirement shall not apply in the case of the waste pipe serving a waste fixture contained in such room.

d) The access opening to a drain or discharge pipe installed within a building shall be covered by an adequately screwed or bolted airtight cover.
e) A rodding eye or manhole shall be installed
1) Where there is a change in direction of the drain that exceeds 45°, provided that where any bend which has a centre-line radius of not less than 600 mm is installed, the rodding eye may be omitted for not more than two such changes of

up to 90° each between any two rodding eyes required in terms of (2), (3) and (4),

2) At any point within 1,5 m of the connection of the drain to a connecting sewer, septic tank or conservancy tank, provided that an inspection eye shall be installed immediately downstream of such point,

3) At the highest point of the drain, and

4) At such intervals along the drain that no rodding distance is more than 25 m measured along the line of the drain from a rodding eye, or other permanent means of access to such drain.

f) The rodding eye shall

1) Join the drain in the direction of flow at an angle of not more than 45°, be continued up to the ground level and be adequately supported; and

2) Be adequately marked and protected

Conservancy tanks, septic tanks and French drains

SANS 10400-P: 4.8

- Conservancy tanks must:
  - Have a capacity as prescribed by the LA;
  - Be provided with a means of access for cleaning;
  - Be sited so that there is easy access for pumping out the tank - but not less than 2 m from the property boundary or other structure;
  - Be vented at the building;
  - Masonry conservancy tanks must be designed by a competent person (sanitary) or meet the minimum standards set out in **SANS 10400-P: 4.8.3.**
  - Masonry conservancy tanks must be constructed above the water table.
- Septic tanks shall:
  - Discharge into French drains;
  - Have a minimum capacity of: 1,5 m^3 where the tank serves a single dwelling house or dwelling unit and 5,1 m^3 serving any other building;
  - Have a capacity calculated in terms of Annex C of SANS 10400-P;
  - Be covered with a layer of soil at least 150 mm thick.
  - Be provided with a means of access for emptying and cleaning.
  - Deemed-to-satisfy requirements for masonry septic tanks are provide din SANS 10400-P: 4.8.5.
  - Prefabricated septic tanks must be in accordance with SAN 52566-1.
-
- **SANS 10400-p: 4.8:** A French drain must:
  - Be constructed and located so as not to cause pollution of any spring, stream, well or other source of water which may be used for drinking or domestic use.
  - Be at least 3 m from any boundary of the site.
  - Be positioned so that the foundations of adjacent buildings are not affected by the discharge.
  - An in-situ percolation test as per SANS 10400-P: 4.25 must be conducted before a French drain is installed.

- No French drains are allowed if the ground has a percolation rate in excess of 30 minutes.
- French drains may not be deeper than 1,8 m and parallel French drains must not be closer than twice their depth from each other.
- Pipes discharging into French drains must be open-jointed or perforated.

Part Q : Non-waterborne means of sanitary disposal

National Building Regulations

Means of disposal

NBR Q1 *Where water-borne sewage disposal is not available other means of sewage disposal shall be permitted by the local authority: Provided that:*

(a) It stores, conveys, processes and disposes of human body wastes and wastewater in such away that the pathogens, pollutants and contaminants associated therewith do not compromise the health and safety of the original user or others; and

(b) In the case of chemical or toilet a satisfactory means is available for the removal and disposal of sewage from such closets.

Permission for a pit toilet

NBR Q2 *No person shall construct any pit toilet without the permission of the local authority.*

Construction, siting and access

NBR Q3 (1) *Any such other means of sewage disposal shall be so constructed, sited and provided with access that the health and convenience of persons using such means shall not be adversely affected.*

(2) The number of sanitary receptacles shall be adequate for the population of the building served by such receptacles.

(3)(a) The requirements of sub-regulation (1) shall be deemed to be satisfied where the design and construction, siting of, and access to such other means of sewage disposal complies with SANS 10400-Q; Provided however that where a local authority is of the opinion that the nature of the means of sanitary disposal is such that it is essential for such installation to be the subject of an approved rational design prepared by an approved competent person, such local authority shall, in writing, notify the owner of such building of its reasons for the necessity for such design and may require such owner to submit for approval plans and particulars of a complete installation based on such design.

(b) The requirements contained in sub-regulation (2) shall be deemed to be satisfied where the number of receptacles is in accordance with the requirements for the provision of sanitary fixtures contained in regulation F11 or P2, as the case may be.

Deemed-to-satisfy: SANS 10400-Q

SANS 10400-Q provides minimum standards for the disposal of sewage where water-borne sewage disposal is not an option. Deemed-to-satisfy standards are provided for two methods of non-waterborne sewage disposal:

- Chemical toilets
- Ventilated pit toilets

In both cases standards are also provided for the closet to house the sanitary fixture.

Closets

SANS 10400-Q: 4.2.1 *A closet shall be constructed with a floor, walls and a roof of material adequate for its purpose, and such closet shall be provided with a door or other means which shall ensure privacy of the occupant of such a closet.*

4.2.4 provides minimum internal dimensions for a closet: Width: 800 mm; height 1 900 mm; length (door opening outwards): 1 100 mm; length (door opening inwards): 2 000 mm.

Chemical toilets

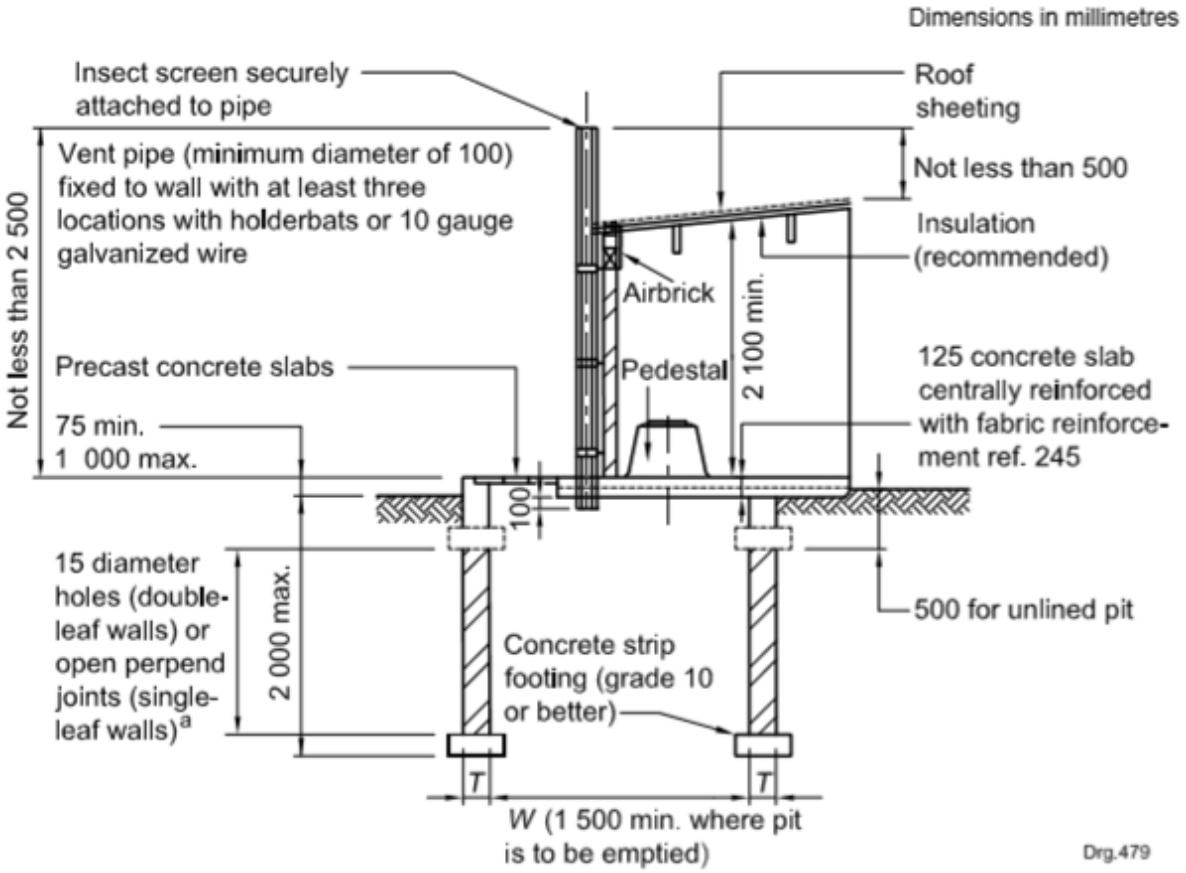
A chemical toilet is a toilet with a fixed pan, the excreta from which pass into a tank where they are acted upon by chemicals which sterilize and break them down.

SANS 10400-Q 4.3 *A chemical toilet shall be provided with a seat and a receptacle of such height that a space of not more than 25 mm is left between the underside of such seat and the top of the receptacle. The aperture in such seat shall be at least 25 mm less in every diameter than the corresponding diameter of the top of such receptacle and such aperture shall be fitted with a self-closing, fly-proof lid.*

Ventilated pit toilets

A ventilated pit toilet (VIP toilet) toilet which comprises:

- A pit into which the excreta fall and from which the liquid fraction seeps into the surrounding ground. Alternatively the pit may be lined with masonry and concrete if occasional emptying of the pit is feasible;
- A slab which covers the pit and which has two holes, one for the excreta to fall through and one for the vent pipe;
- A superstructure which provides privacy and which prevents light from entering the pit;
- A pedestal seat and seat cover;
- A vent pipe which removes odour from the pit; and
- A fly screen at the top of the vent pipe which prevents flies from entering the pit through the pipe and prevents flies that have entered the pit through the pedestal from leaving through the vent pipe.



SANS 10400-Q: 4.4 provides minimum deemed-to-satisfy standards for siting, construction and ventilation of VIP toilets. VIP toilets may be equipped with either a pedestal or a squatting plate (if acceptable to the local community). Both types should be fitted with a lid.

Part R - Stormwater disposal

National Building Regulations

Stormwater disposal requirement

NBR R1 (1) *The owner of any site shall provide suitable means for the control and disposal of accumulated stormwater which may run off from any earthworks, building or paving.*

(2) Such means of stormwater disposal may be in addition to or in combination with any drainage works required in terms of regulation F4(2).

(3) The requirements of sub-regulation (1) shall be deemed to be satisfied where such means of stormwater disposal is provided in accordance with SANS 10400-R: Provided that where a local authority is of the opinion that the conditions on any site render it essential for stormwater disposal to be the subject of an acceptable rational design prepared by an approved competent person, such local authority shall, in writing, notify the owner of such site of its reasons for the necessity for such design, and may require such owner to submit for approval plans and particulars of a complete stormwater control and disposal installation for such site and for any building erected thereon, based on such design.

NBR R2 (*1) These regulations shall not be construed as requiring the installation in any building of any roof gutter or downpipe where other suitable means has been provided to ensure the disposal or dispersal away from such building of rainwater from the roof of such building.*
(2) The regulations in this Part shall not apply to any site used exclusively for the erection of any dwelling house or any building appurtenant thereto: Provided that where, due to special site features, the discharge of stormwater from such site may cause significant damage, the local authority may require compliance with regulation R1.

Deemed-to-satisfy standards: SANS 10400-R

Stormwater disposal

SANS 10400-R: 4.2.2.2 *Major and minor stormwater systems shall be designed for design flood recurrence intervals of 50 years and 2 years, respectively.*

- A major stormwater system caters for severe infrequent storm events.
- A minor stormwater system caters for frequent storms of a minor nature.

SANS 10400-R: 4.2.2 provides minimum gradient and stormwater pipe sizes in order to ensure sufficient velocity of stormwater to minimise siltation of the system and to facilitate maintenance.

Stormwater and buildings

SANS 10400-R: 4.2.1.1 *Stormwater emanating from the roof, paving or area in the immediate vicinity of a building shall not cause damage to the building interior, structure, or structural elements, or accumulate in a manner that unduly inconveniences the occupant.*

4.2.1.2 *Stormwater disposal arrangements shall:*

a) Not result in the undercutting of foundations due to erosion or flooding,

b) Drain away from buildings, as far as possible, under the action of gravity and not accumulate against or in close proximity to external walls,

c) Make provision for the drainage of sites that are waterlogged or seasonally waterlogged, and

d) Be capable of being readily cleaned and maintained.

Valleys and gutters

SANS 10400-R: 4.2.1.3 *Valleys and gutters shall be sized either in accordance with the requirements of 4.3, or in terms of a rational design prepared by a competent person (civil engineering).*

4.3.1 *Any roof, eaves or valley gutter shall have a cross-sectional area of not less than that given (below) for the rainfall region in question.*

Rainfall region	**Internal cross-section of valley or gutter per m² of roof plan area**
Summer rainfall	140
Year-round rainfall	115

Winter rainfall	80

4.3.2 *The internal cross-sectional area of downpipes shall be not less than 100 mm²/m² of roof plan area served by such downpipe, or 4 400 mm².*

Stormwater disposal in interconnected complexes

SANS 10400-R: 4.2.2.1 *Stormwater disposal arrangements in interconnected complexes shall, in addition to complying with the requirements of 4.2.1, be designed by a competent person (civil engineering) to comply with the following requirements:*

a) The stormwater emanating from storms which are likely to occur at different recurrence intervals shall, with an appropriate degree of reliability and within the parameters established in 4.2.2.2 to 4.2.2.8, be controlled, safely routed and discharged from interconnected complexes without unduly eroding land, unsurfaced roads or water courses, contaminating water resources or compromising environmentally sensitive areas identified in environmental impact assessment reports.

b) Stormwater structures shall, with an appropriate degree of reliability, perform within established parameters in terms of

1) Design hydraulic load, and

2) Maintenance (ease of access for cleaning and self-cleaning velocities).

Part S - Facilities for persons with disabilities

National Building Regulations

Application: NBR S1

(1) Facilities that accommodate persons with disabilities shall be provided in any building except the following:

(a) Any building of which the whole of the ground storey comprises one or more occupancies classified in terms of regulation A20 as B1, B2, D4, H4, J1 or J2;

(b) Any building classified as H1 in terms of regulation A20 where such building has less than 25 bedrooms and it can be reasonably proven that it is not possible to include wheelchair access in certain aspects of the design; and

(c) Any storey above ground floor level of a building classified as H3 in terms of regulation A20 and not provided with a lift.

Facilities to be provided: NBR S2

(1) In any building contemplated in regulation S1 requiring facilities for persons with disabilities:

(a) Persons with disabilities shall be able to safely enter the building, use all the facilities subject to the provisions of sub-regulation (3) within it and leave it;

(b) There shall be a means of access suitable for use by persons with disabilities, from the main and ancillary approaches of the building to the ground storey; via the main entrance, and any secondary entrance;

(c) There shall be a means of egress suitable for use by persons with disabilities from any point in a building to a place of safety in the event of an emergency;

(d) Any lift installation that is provided shall be capable of serving the needs of persons with disabilities who are likely to be using the building; and

(e) Any commonly used path of travel shall be free of obstacles which limit, restrict or endanger the travel of persons with disabilities, or which prevent persons with disabilities from accessing the facilities provided in the building and the presence of such obstruction shall be made evident in a suitable manner to persons with impaired vision; and

(f) A suitable means of access shall be provided to any auditorium or hall situated in any building and such auditorium or hall shall, in relation to its seating capacity, be provided with sufficient open space to accommodate a reasonable number of people who use wheelchairs or other assistive devices.

(2) Where parking for more than 50 motor vehicles is provided in or in connection with any building having a means of access contemplated in sub-regulation (1), adequate parking space shall be provided for the parking of motor vehicles used by persons with disabilities and a suitable means of access shall be provided from the parking area, whether such parking area be inside or outside such building, to the ground storey of such building

(3) Where, in terms of regulation P1, toilet facilities are required and the building is one requiring facilities for persons with disabilities in terms of regulation S1, an adequate number of such facilities shall be suitable for use by persons with disabilities: Provided that toilet facilities shall not be required in any such building classified as H3 in terms of regulation A20.

Legislation and persons with disabilities

Other than the National Building Regulations and Building Standards Act other legislation which also provides a framework in which access to buildings for persons with disabilities include:

- The Constitution of South Africa: Prohibits discrimination against the disabled;
- The Employment Equity Act: The stated purpose is to achieve equal opportunity in the workplace;
- The Occupational Health and Safety Act: Addresses safety issues for both employees with disabilities and for disabled persons visiting the workplace;
- The Promotion of Equality and Prevention of Unfair Discrimination Act: Prohibits unfair discrimination against any person on the grounds of disability.

Deemed-to-satisfy standards: SANS 10400-S

Signage

SANS 10400-S: 4.2.1 Facilities that are included in a building specifically for use by persons with disabilities, such as wheelchair-accessible parking spaces, wheelchair-accessible toilets, and platform or stair lifts, shall be indicated by the international symbol for access (see figure 1) and

shall comply with 4.2.2 and 4.2.4. The international symbol shall be exhibited 

a) At the main entrance of, and at any other suitable position in, a building, and

b) In suitable positions to indicate to persons with disabilities the route to the exit of such facilities.

Parking

SANS 10400-S: 4.3.1 *For employee parking, at least one parking space shall be accessible for persons with disabilities.*

4.3.2 *In addition to the requirement of 4.3.1, where provision has been made within a building, or on the site on which such building is erected, for the parking of more than 50 motor vehicles,*

a) At least one parking space per 25 parking spaces (or part thereof) and at least 20 % of the parking spaces at rehabilitation and medical facilities shall be provided for parking of vehicles used by persons with disabilities;

b) The parking spaces provided for vehicles used by persons with disabilities shall be of a suitable length, shall be at least of the dimensions shown in figure 2, and shall be situated on and accessed from a surface that is not steeper than 1:50;

c) Any parking space provided for vehicles used by persons with disabilities shall be located within 50 m of an accessible entrance;

d) Any parking space provided for vehicles used by persons with disabilities shall be clearly demarcated as being intended for the use of persons with disabilities only;

e) Entry and routing to any parking space designated for persons with disabilities shall be provided with a clear height of at least 2,4 m and shall allow for the entry of vehicles suitable for use by wheelchair users, particularly those that have a hoist to carry the wheelchair on top of the car.

Ease of access for the disabled:

SANS 10400-S: 4.4.2 to 4.16 provides minimum standards for the disabled for the following:

- Turning space allowance for wheelchairs (4.4.2.);
- Unobstructed paths of travel (4.4.3);
- Stable and slip resistant floor and ground surfaces (4.5);
- Doorways which permit wheelchair access (4.6);
- Lever-type door handles maximum 1 m from the floor (4.6);
- Ramps and handrails for changes in level (4.7,8,10);
- Requirements for stairways in addition to SANS 10400-M and SANS 10400-T (4.9);
- Access to passenger lifts (4.11);

- Toilet facilities for the disabled (4.12);
- Facilities in auditoriums, grandstands and halls (4.13);
- Controls, switches and power points (4.14);
- Warning signals must be both audible and visible (4.15);
- Minimum standards for lighting (4.16).

Part T - Fire protection

National Building Regulations

General requirements for fire protection: NBR T1

(1) Any building shall be so designed, constructed and equipped that in case of fire:

(a) The protection of occupants or users, including persons with disabilities, therein is ensured and that provision is made for the safe evacuation of such occupants or users;

(b) The spread and intensity of such fire within such building and the spread of fire to any other building will be minimized;

(c) Sufficient stability will be retained to ensure that such building will not endanger any other building: Provided that in the case of any multi-storey building no major failure of the structural system shall occur;

(d) The generation and spread of smoke will be minimized or controlled to the greatest extent reasonably practicable; and

(e) Adequate means of access, and equipment for detecting, fighting, controlling and extinguishing such fire, is provided.

(2) The requirements of sub-regulation (1) shall be deemed to be satisfied where the design, construction and equipment of any building complies with SANS 10400-T: Provided that where any local authority is of the opinion that such compliance would not comply with all the requirements of sub-regulation (1), such local authority shall, in writing, notify the owner of the building of its reasons for its opinion and may require the owner to submit for approval a rational design prepared by an approved competent person.

Offences: NBR T2

(1) Any owner of any building who fails to -

(a) Provide sufficient fire extinguishers to satisfy the requirements of sub-regulation T1(1)(e), or who installs fire extinguishers that do not comply with the relevant South African national standard, or who fails to ensure that such fire extinguishers are installed, maintained and serviced in accordance with SANS 10105; or

(b) Maintain any other provision made to satisfy the requirements of sub-regulation T1(1)(e), shall be guilty of an offence.

(2) Any person who causes or permits any escape route to be rendered less effective or to be obstructed in any way which may hinder or prevent the escape of any person from a building in the case of fire or any other emergency shall be guilty of an offence.

Deemed-to-satisfy standards: SANS 10400-T

SANS 10400-T provides extensive detail for fire prevention in different types of buildings and fire resistance standards for different building components. "Fire resistance" is defined (**3.42**) as the *shortest period for which a building element or building component complies with the requirements for stability, integrity and insulation when tested in accordance with* ***SANS 10177-2***

The minimum standards for fire prevention in buildings are covered in SANS 10400-T in the following numbered sections of the standard:

- Regulations relating to **safety distances** between buildings depending on the fire resistance of the externals walls. (**4.2**);
- When there are **different occupancies in the same building** (**4.3**);
- **Divisions in buildings.** Maximum undivided floor areas are regulated by the type of occupancy; by the nature of goods stored in the division and whether or not a fixed automatic fire extinguishment system has been installed (sprinklers, fire hoses)(**4.4**);
- **Fire resistance (performance) of elements or components of a building.** Fire resistance is measured (tested) in minutes. (**4.5**);
- **Fire resistance of occupancy-separating and division-separating elements** (**4.6**);
- **Fire stability of structural elements or components** (**4.7**);
- **Tenancy-separating elements** (**4.8**). Separating elements between tenancies must have a fire resistance of between 30-60 minutes - depending on the occupancy;
- **Partition walls** in any occupancy must have a fire resistance of 30 minutes (**4.9**). A partition wall is a non-structural internal wall that extends to the ceiling and is constructed for the purpose of subdividing a space
- **Garage connected to a dwelling (4.9.2):** *In any building classified as H3 or H4:*
  a) Any separating element (wall and floor) between any garage that is not large enough to be classified as J4 and any habitable room shall have a fire resistance of not less than 30 min and the wall shall extend to the underside of the roof;
  b) Any door between such garage and any such room shall have a fire resistance of not less than 30 min and such doorway shall require a threshold of not less than 10 mm; and.
  c) No combustible roof components shall penetrate the separating element dividing the space between the garage and the habitable room.
  4.9.3 *Any solid timber door constructed with double rebated joints, that have a thickness of not less than 40 mm, shall be deemed to comply with the requirement of 4.9.2 for a rating of 30 min.*
- **Protection of openings** (windows) between divisions in a building by means of a projection between the openings (**4.10**);
- S**uspended floors** (**4.11**). No suspended floor in any building may be of combustible material except for H3 (residential) and G1 (office) maximum 2-storey buildings or H4 (dwelling) unless the floor has ground below or a concrete slab, not more than 50 mm below the floor;
- **Fire stops within roof spaces and roof assemblies and coverings** including thatch (**4.12**);

- **Safety distances for thatched buildings (4.12.2) and for lapas -** less than 20 m^2;
- **Lightning protection for thatched roofs (4.12.2.5);**
- **Ceilings** - no combustible material to be used as ceilings, except in occupancies E4, H3, H4 and H5 (**4.13**);
- **Floor coverings:** Limitations on combustible materials used as floor coverings - including carpets, timber and plastics (**4.14**)
- **Internal finishes:** Limitations on combustible internal finishes such as wall lining or other decorative finish except in H4 occupancies (**4.15**);
- **Provision of escape routes** (**4.16**) - every building must have one or more escape routes in the event of fire; specific rules apply depending on the complexity and population of the building;
- **Exit doors (4.17)**: Rules for the size, number and location of exit doors depending on the complexity and population of the building;
- **Escaping from a burning building (4.18 to 4.30)**: Rules for feeder routes, emergency routes, dimensions of components of escape routes, width of escape routes, basements, stairways and other changes of level along escape routes, ventilation of stairways in an emergency route, pressurization of emergency routes and components, openings in floors, external stairways and passages, lobbies, foyers and vestibules, marking and signposting, provision of emergency lighting;
- **Fire detection and alarm systems (4.31);**
- **Fire-fighting equipment (4.32 to 4.38):P**rovision and maintenance of fire-fighting equipment, installations and fire protection systems, water reticulation for fire-fighting purposes, hose reels, hydrants, automatic sprinkler and other fixed extinguishing systems, portable fire extinguishers and mobile fire extinguishers;
- **Fire-stopping of inaccessible concealed spaces (4.39);**
- **Protection in service shafts (4.40);**
- **Smoke control (4.42);**
- **Air-conditioning systems** and artificial ventilation systems must be designed to prevent the spread of fire (**4.43**);
- **Lift shafts and lifts (4.44 to 4.47)**;
- **Stage and backstage areas (4.48);**
- **Seating arrangements in auditoriums or halls and on grandstands (4.49);**
- **Parking garages (4.50)**;
- **Operating theatres and intensive, high or critical care units (4.51)**;
- **Installation of liquid fuel g pumps and tanks(4.52);**
- **Bulk storage of petroleum (4.5**;
- **Dangerous goods (4.53.2-3):** Warehousing and signage for dangerous goods, to be in accordance with SANS 10263-0;

Access for fire-fighting and rescue purposes

SANS 10400-T: 4.54.1 *No building shall be erected on a site unless such site is provided with access for the purposes of fire fighting and rescue from such building by the fire services of the local authority.*

4.54.2 *All buildings shall be provided with access to their interior for rescue and fire-fighting purposes by such services.*
4.54.3 *The requirements of 4.54.2 shall not apply to any portion of a building which is to be used for the purposes of a normally unoccupied strong room, record room or security vault.*
4.54.4 *Any escape door shall be clearly identified from the exterior of the building.*
4.54.5 *The number of each storey shall be indicated inside an emergency route on any access door.*

Part U - Refuse disposal

National Building Regulations

Provision of storage areas for refuse: NBR: U1

Any building, excluding a dwelling house, in which refuse is or will be generated shall be provided with an adequate storage area for refuse containers.

Access to refuse storage areas: NBR: U2

The location of any area contemplated in regulation U1 shall be such that access thereto from any street for the purpose of removing the refuse, is to the satisfaction of the local authority.

Refuse chutes: NBR: U3

Where any refuse container receives refuse from any chute such chute shall be designed and erected so as to be safe in operation.

Deemed-to-satisfy requirements: NBR- Part U

There are no corresponding deemed-to-satisfy standards in SANS 10400 for NBR-Part U

Part V - Space heating

National Building Regulations

Design, construction and installation of space heating systems: NBR V1

(1) Any system of space heating in any building shall be so designed, constructed and installed as to operate safely and any flue, flue pipe or chimney used in such system shall be so designed as to safely remove any smoke or noxious gases produced by such system.
(2) The requirements of sub-regulation (1) shall be deemed to be satisfied where the design and construction of any flue pipe, chimney, hearth or fireplace complies with SANS 10400-V.

Deemed-to-satisfy requirements: SANS 10400-V

Design, construction and installation of space heating systems: NBR V1

(1) Any system of space heating in any building shall be so designed, constructed and installed as to operate safely and any flue, flue pipe or chimney used in such system shall be so designed as to safely remove any smoke or noxious gases produced by such system.

(2) The requirements of sub-regulation (1) shall be deemed to be satisfied where the design and construction of any flue pipe, chimney, hearth or fireplace complies with SANS 10400-V.

Chimneys

SANS 10400-V: 4.3.1 *A chimney which is within or is attached to a building shall comply with the following requirements:*

a) It shall be designed and erected from non-combustible materials and in such a manner that it will not cause a fire hazard to adjacent material.

b) It shall not be installed in a shaft or duct in which services which might be adversely affected by heat are to be situated.

c) Combustible material, such as a timber floor joist, trimmer or roof truss, shall not be built within 200 mm of the inside of a chimney.

4.3.2 *Where in a dwelling house or dwelling unit the walls of a chimney are made of masonry units, such walls shall be of solid masonry, and where such walls are less than 190 mm thick, such chimney shall be lined in accordance with 4.3.4, provided that such walls shall not be reduced to less than 90 mm in thickness.*

4.3.3 *Notwithstanding the requirements of 4.3.2, the thickness of a chimney wall in a building covered by a combustible roof shall be not less than 190 mm.*

4.3.4 *Where a chimney is provided with a flue lining, such lining shall be made of material which will withstand any action of the flue gases and will resist, without cracking or softening, the temperatures to which it might be subjected, and it shall extend throughout the full height of such chimney.*

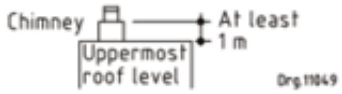
4.3.5 *Where a chimney has either a laterally unsupported height greater than 4 m or a laterally unsupported height greater than four and a half times its minimum lateral dimension, it shall be designed in accordance with the requirements of SANS 10400-B.*

4.3.6 *The height of a chimney outlet shall be not less than:*

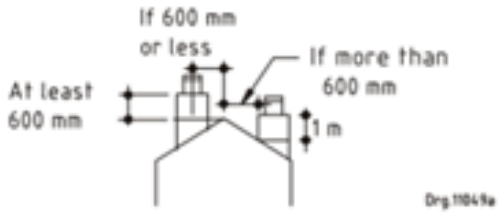
a) 1 m above the highest point of contact between such chimney and the roof, provided that where a roof has an angle of slope on both sides of a ridge of not less than 10° from the horizontal and the centre line of the flue of the chimney is not more than 600 mm from the ridge, the height of such chimney outlet shall be not less than 600 mm above such ridge;

b) 1 m above the highest point of a window or roof light capable of being opened or a ventilation inlet situated in a roof or external wall where the horizontal distance from the nearest point of such window, roof light or opening to a vertical line through the centre of such chimney outlet is less than 2,3 m; and

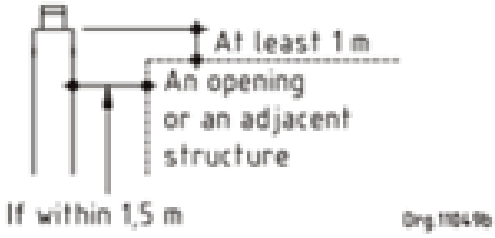
c) 1 m above the eaves level in the case of a chimney which does not pass through the roof of a building but is within 1,5 m of the nearest wall of such building, provided that at a gable end of such building, such chimney shall extend not less than 600 mm above the highest point of such gable end.



a) Roof pitch less than 10°



b) Roof pitch 10° or more



c) Opening or adjacent structure

Hearths and fireplaces

SANS 10400-V: 4.4.1 *Every fireplace used for the burning of solid fuel shall have a hearth made of noncombustible material of adequate thickness.*

4.4.2 *Such hearth shall extend not less than 500 mm in front of the grate or fire basket and not less than 300 mm beyond each side of such grate or fire basket.*

4.4.3 *No timber floor joist or trimmer or any other combustible material shall be built into a hearth.*

Part W - Fire installations

National Building Regulations

Fire installations: NBR W1

All approved fire installations shall be connected to a communication pipe supplied by the local authority: Provided that such local authority may, subject to any conditions it may consider necessary, allow such fire installation to be connected to

(a) Any approved alternative source of supply; or

(b) Any source of non-potable water where such water is not to be used for domestic or any other purpose which, in the opinion of such local authority, might give rise to a health hazard.

Supply of water: NBR: W2

Water shall not be taken from a supply system for use in any fire installation, unless:

(a) An application has been made to the local authority for the supply of such water and such application has been granted; and

(b) The use of such water and such fire installation complies with any conditions imposed by the local authority.

Design of fire installations: NBR: W3

In any fire installation:

(a) Adequate and suitable connection and means of measuring water pressure shall be provided;

(b) So many isolating valves shall be provided to control the flow of water to the installation, and to such points within the installation, as the local authority may require; and

(c) The quantity, pressure and rate of flow of water shall be adequate for the supply of any hose reel, hydrant or sprinkler system connected thereto.

Deemed-to-satisfy requirement: NBR: W4

The requirements of regulation W3 shall be deemed to be satisfied where any fire installation complies with SANS 10400-W: Provided that where a local authority is of the opinion that it is essential for the fire installation to be the subject of an acceptable rational prepared by an approved competent person, such local authority shall, in writing, notify the owner of such site of its reasons for the necessity for such design, and may require such owner to submit for approval plans and particulars of a complete fire installation, based on such design design prepared by an approved competent person, such local authority shall, in writing, notify the owner of such site of its reasons for the necessity for such design, and may require such owner to submit for approval plans and particulars of a complete fire installation,based on such design.

Deemed-to-satisfy requirements: SANS 10400-W

SANS 10400-W: 4.1 *The functional regulation W3 contained in part W of the National Building Regulations (see annex A) shall be deemed to be satisfied where*

a) fire installations comply with the requirements of 4.2, 4.3, 4.4 and 4.5,

b) a supply of water is provided in each division for the effective operation of the number of hose reels, hydrants and sprinkler heads that are required in accordance with SANS 10400-T and which may be operated or come into operation simultaneously, and

c) the fire installation is either

1) the subject of a rational design prepared by a competent person (wet services) or a competent person (fire engineering) in accordance with the general principles and requirements contained in SANS 10252-1 and, if relevant, SANS 10287, or

2) in accordance with the requirements of 4.6 where the area in which the building is located is serviced by a fire brigade, contains no sprinkler system, and serves not more than three fire hydrants in a division.

- A fire hose reel is an emergency piece of equipment available for use by the occupants of buildings to contain the fire until the fire brigade arrives to take over.
- A fire hydrant is provided for use by the fire brigade to allow the firefighter to get as close as possible to the fire and to connect his hose reel to a fire hydrant to fight the fire. The fire brigade will then boost the fire hydrant system to the pressure which they need to fight the fire.
- The local authority does not guarantee the pressure or supply of water and can only indicate what the residual pressure at a water connection should be. Accordingly, the owner should assess the risk or secure his water supply by means of on-site storage facilities.

Communication pipe

SANS 10400-W: 4.2 *A fire installation shall be connected to a communication pipe provided by the local authority and located at a position and depth as determined by such local authority.*

Water meter

SANS 10400-W: 4.3 *Where so required by the local authority, provision shall be made in a fire installation for the supply and installation, by the local authority, of a water meter. Such meter and any related valve(s) shall not significantly restrict the flow of water.*

Isolating valves

SANS 10400-W: 4.4 *An isolating valve shall be fitted in a fire installation at a position that is not more than 1,5 m inside the boundary of the site, and shall be clearly marked as such.*

Fire pump connections

SANS 10400-W: 4.5.1 *In any fire installation:*

a) Any pipe which serves any hydrant or an automatic sprinkler installation, shall be provided with a twin pumping connection; and

b) Any pipe fitted with one or more fire-pump connections, unless such pipe discharges directly into a storage tank, shall be fitted with a pressure gauge reading up to 2 500 kPa and a non-return valve so located as to shut off automatically the direct supply of water from the local authority system to such installation whenever and for so long as any such fire pump connection is in use.

It is not necessary to provide a pumping connection to any pipe serving only hose reels.

4.5.2 *Any pumping connection shall be:*

a) Situated in a readily accessible position outside the building at ground level,

b) Mounted on the face of the building in an accessible position, and

c) Clearly marked as such.

Part XA - Energy usage in buildings

National Building Regulations

Energy usage in buildings: NBR XA1:

Buildings shall be designed and constructed so that they are capable of using energy efficiently while fulfilling:

(a) User needs in relation to vertical transport, if any, thermal comfort, lighting and hot water; or

(b) Have a building envelope and services which facilitate the efficient use of energy appropriate to their function and use, internal environment and geographical location.

Hot water supply: XA2

Hot water heating requirement: at least 50% of the annual average hot water heating requirement shall be provided by means other than electrical resistance heating including but

not limited to solar heating, heat pumps, heat recovery from other systems or processes and renewable combustible fuel.

Deemed-to-satisfy standards: SANS 10400-XA

Deemed-to-satisfy minimum standards

- A competent person must demonstrate that the building has a theoretical annual energy consumption and demand less than or equal to specified values, or
- The orientation of the building is in accordance with SANS 204;
- The fenestration is in accordance with the requirements of Regulation XA or SANS 204;
- The roof assembly is in accordance with Regulation XA or SANS 204. All roofs will require insulation of some form or another
- The regulations apply to all buildings except industrial buildings, storage facilities and parking garages; The conductance and solar heat gain of each storey in a building must be checked;
- 50% of the annual hot water requirement must be heated by means other than electrical resistance.