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Public Works**
REPUBLIC OF SOUTH AFRICA

CONSTRUCTION WORKS: SPECIFICATIONS

GENERAL SPECIFICATION

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General Specification

(read with PW371-B)

NOTE

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SANS NUMBERING IN CONSTRUCTION STANDARDS

SANS specification: *SANS* and number, e.g.
SANS 227 burnt clay masonry units.

SANS code of practice: 1 plus four digits, e.g.
SANS 10082 Timber buildings.

SANS BS standard: *SANS* and number, e.g.
SANS 6927 Building construction - Jointing products - Sealants - Vocabulary

SANS EN standard: 5 plus four digits, slash EN plus number, e.g.
SANS 50197-1 / EN 197-1 Cement Part 1: Composition, specifications and conformity criteria for common cements.

SANS ISO standard: *SANS* and number, slash ISO and number, e.g.
SANS 140 / ISO 140 Acoustics - Measurement of sound insulation in buildings.

SANS SM (standard method): *SANS* and 5 or 6 plus three digits, e.g.
SANS 5900 Warpage and squareness of refractory bricks.
SANS 6056 Sulphide content of water.

There is no longer a distinction between a specification, a code of practice, or a standard method; they are now all referred to as *standards*.

Standards should be based on the consolidated results of science, technology and experience, and aimed at the promotion of optimum community benefits.

Units, symbols, meaning of terms

Units of measurement, symbols

The units of measurement are metric units as standardised by the "Système International d'Unités" (SI). Note that the comma is the decimal indicator in Europe and South Africa, formally adopted by the *ISO* and the *IEC* as well, and that numerals are grouped into groups of three for readability, separated by a space, e.g. 1 233,55.

The following unit symbols (not abbreviations) are used in this document:

| | | | |
|----------------|-----------------|----------------|--------------|
| °C | degrees Celsius | L | litre |
| g | gram | m | metre |
| H _z | Hertz | m ² | square metre |
| h | hour | m ³ | cubic metre |
| d | day | | |
| kN | kilonewton | mm | millimetre |
| kPa | kilopascal | MPa | megapascal |
| kW | kilowatt | t | tonne |

Meaning of terms

The following terms, highlighted in *italics* in the text of this publication, are explained as follows:

AAAMSA

Association of Architectural Aluminium Manufacturers of South Africa

according to manufacturer's instructions

the manufacturer's instructions at the time of tender

applicable standard

a national or recognised standard applicable to the works, implying that the relevant standard is a contract document, a copy of which has to be kept in the site office for reference

ARP

a Recommended Practice prepared by SSA

as specified

as specified in the Particular Specification or in the drawings or in the scope of work

BS

British Standard

CKS

Coordinating Specification prepared by SSA, mainly for the procurement of products for the use of government departments

coastal region

area between the coastline and an imaginary line 30 km inland, including the entire area of jurisdiction of any local authority falling within this region

competent person

person who is qualified by virtue of his education, training, experience and contextual knowledge to

make a determination regarding the performance of a building or part thereof in relation to a functional regulation or to undertake such duties as may be assigned to him in terms of these regulations, as further defined in SANS 10400

comply

meet specified standards

drawings

the drawings forming part of the contract documents, and any modification thereof or additions thereto delivered to the contractor during the execution of the works; drawings include schedules

EN

European Norm

IEC

International Electrotechnical Commission

Invoked standard

standard that is called upon for guidance in the proper execution of the works on site, typically national codes of practice (SANS 10 000 series), not deemed a specification nor a contract document; *invoked* implies that the relevant standard be obtained and a copy kept in the site office for reference; whether a standard is to be invoked is a decision to be taken by the specifier, depending on size, complexity and importance of the works, and on the level of sophistication of the builder

ISO

universal short name of the International Organization for Standardization, a worldwide federation of national standards bodies of which South Africa, Botswana and Zimbabwe are members and Namibia, Angola, Zambia and Mozambique are correspondent members

MOD AASHTO

an internationally accepted test to determine the density of compacted material like soil filling, expressed as a percentage of the maximum compaction of the filling at various moisture contents as determined in a laboratory

NBR

National Building Regulations

NRS

Rationalized User Specification prepared by SSA

PIESA

Power Institute of East and Southern Africa

SABS

South African Bureau of Standards

SANS

South African National Standard

specification data

data required by SANS 2001 Construction Works standards without which the specification is incomplete. *Specification data* listed in PW371 is simplified and generally accepts default values or requirements – consult Annex A of the relevant SANS 2001 standard for the complete list

NOTE: Data required by *SANS* materials and product standards, listed in Annex A of each standard as “Notes to Purchasers”, are deemed *specification data* in both parts of PW371.

SSA

Standards South Africa, a division of the SABS

suitable

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

VC

Compulsory Specification (technical regulation) prepared by *SSA*.

1 Earthworks

1.1 Site clearance

Applicable standard: SANS 2001-Construction Works Part BS1: Site clearance.

1.2 Earthworks (general)

Applicable standard: SANS 2001-Construction works Part BE1: Earthworks (general).

2 Concrete works

2.1 Structural works

Applicable standard: SANS 2001-Construction works Part CC1: Concrete Works (structural).

2.2 Minor works

Applicable standard: SANS 2001-Construction Works Part CC2: Concrete Works (minor works).

2.3 Foundations

Applicable standard: SANS 2001-Construction Works Part CM2: Strip Footings, Pad footings and Slab-on-the-ground Foundations for Masonry Walling.

2.4 Concrete floors and paving on the ground

Invoked standard when required: SANS 10109 Concrete Floors

- a) floor: direct-finished one course slab as specified below, or as designed and constructed to SANS 10109 under direction of a *competent person* (civil engineering) when specified

damp-proof under-surface membrane

- b) material: polymer film SANS 952 type C (green) 0,25 mm thick
 c) cutting: straight and square or to shape; use sharp instruments
 d) joints: minimum, lapped and sealed with pressure sensitive tape.

fabric reinforcement

- e) welded steel fabric: SANS 1024
 f) in large mats, overlap 300 mm, place near top surface
 g) do not cross over construction or day joints

preparation

- h) prepare thresholds before casting floor by casting concrete of same thickness, material and finish as specified for floor, in all door openings; thresholds to have keyways
 i) prepare for contraction, construction and isolation joints; in case of columns, place edge forms diagonally to column
 j) lay damp-proof membrane with sheet overlaps of 200 mm over entire floor area

placing

- k) place, compact, level, strike off, and wood float concrete floors to thickness, level, and/or gradient as specified

finishing

- l) direct-finish by means of delayed trowelling technique:
 - leave surface undisturbed until bleeding has ceased and surface has stiffened so that foot pressure barely indents the surface (2 – 4 hours)
 - remove bleed water and laitance
 - hand trowel using pressure, or power trowel
 - steel trowel to produce a smooth finish, or wood float to produce a slip-free surface
 - do not add water or neat cement.

surface regularity

- m) surface regularity: SANS 1055 grade II

Joints

Contraction joints:

- n) spacing and pattern: <4,5m in both directions
- o) saw joints with a mechanical concrete saw to blade width and a depth of one quarter of the slab thickness
- p) saw only after concrete has hardened sufficiently but before shrinkage cracking can occur (between 4 and 48 hours after placement depending on temperature).

Construction or day joints:

- q) cast at end of day's casting or where concreting has stopped for more than 45 minutes
- r) type: keyed, keyed-and-tied, dowelled, or reinforced butt joints as directed, or as specified
- s) keyways: trapezoidal or rounded; coat joint face of keyways with suitable debonding agent like lime wash or bitumen
- t) dowels: 16 mm diameter x 300 mm length plain round mild steel dowels to *SANS 920*, placed at mid-depth of the slab at 300 mm spacing; coat dowels for two-thirds of their length with a bond-breaking compound
- u) round off all construction joint edges to a radius of 3 mm.

Isolation or movement joints:

- v) position: where floors abut fixed structures like walls, columns, sumps or inspection chambers, or in external floors or paving at spacing <4,5 m in both directions
- w) forming: 20 mm thick compressible material like polystyrene
- x) sealing: leave joints open or seal as specified; seal with suitable elastomeric material; ream sawn joints to width and depth as required and *according to the sealant manufacturer's instructions*.

2.5 Strongrooms

Strongrooms: *SANS 10052*, of fire rating, burglar resistance and wall thickness class as specified

3 Masonry

3.1 Masonry walling

Applicable standard: SANS 2001-Construction Works Part CM1: Masonry Walling

Specification data:

burnt clay masonry units

- a) burnt clay masonry units: *SANS 227*
- class of common units: NFP for general masonry above damp-proof level to be plastered; NFX for masonry exposed to damp or in contact with the ground (e.g. foundation walls, manholes), or for fair face work
 - nominal dimensions: 222 x 103 x 76 mm, or as specified
 - nominal compressive strength: to table 1 of *SANS 2001-Construction Works Part CM1*
 - uniformity of colour and texture of face units: provide sample of 20 units
 - grade of efflorescence: normal for internal walls not exposed to damp; special for visible unplastered foundation walls, retaining walls and free-standing walls
 - limits of water absorption: 6—14%
 - limits of moisture expansion: 0,20%
 - required marking: designation on each dispatch or consignment note

concrete masonry units

- b) concrete masonry units: *SANS 1215*
- nominal compressive strength: *SANS 2001-Construction Works Part CM1* table 1
 - average drying shrinkage: normal (0,06%)
 - required marking: designation on each dispatch or consignment note

mortar

- c) sand: to *SANS 1090* when specified

reinforcement

- d) brick reinforcement in corrosive areas:
- in coastal regions: galvanized to *SANS 935* or 121, or stainless steel
 - in tidal splash zones: stainless steel
 - non-metallic ties (engineered polymer) may be used instead of stainless steel
- e) metal tie type: butterfly or modified PWD

work

- f) single leaf bond: stretcher
- g) multi leaf bond: stretcher and brickforce, or as specified
- h) reference panel: required
- i) position of control and articulation joints: as specified
- j) degree of accuracy: II

additional requirements

- k) wall ties in partial fill insulated cavity walls
- to have drip in centre of residual cavity
 - tie spacing: *SANS 10164* (2,5/m² or 600 mm vertical, 660 mm horizontal, staggered)
 - tie spacing around openings and construction joints: <300 mm vertical
- l) tie mortar cover: 15 mm minimum to outside face of mortar joint

- m) ancillary fabricated components for masonry, e.g. ties, brackets, lintels, shelves, anchors, meshwork: galvanized to SANS 121 in coastal regions
- n) clay facing units: obtain from manufacturer/supplier agreement on the following in writing:
 - the required application e.g. type of building, finish etc.
 - the degree of exposure to weather conditions, proximity to the sea etc.
 - track record of the preferred brick in the area of the building
 - an undertaking or warranty that the bricks delivered will be *suitable*
 - colour expectations in the case of face bricks
 - acceptable levels of breakage during delivery to site
- o) common solid masonry mortar joints:
 - rake out for receiving plaster
 - flush off where walls are to be bagged or fair-faced
- p) hollow masonry mortar joints:
 - do not rake out for receiving plaster.

3.2 Glass blockwork

materials

- a) glass blocks: BS EN 1051
- b) mortar: class II

laying

- c) bond: straight horizontal and vertical joints
- d) coat surface on which first course is laid with bitumen emulsion or similar material to permit movement of blocks
- e) reinforce every fifth horizontal joint, and vertical joints at 1 m maximum centres, with 25—65 mm wide corrosion resistant metal strips or mesh, nailed to the adjacent walls or columns, or with 6 mm diameter hot dip galvanized reinforcing rod drilled 50 mm deep into surrounding structure
- f) allow 15 mm clear space at sides and top of glass block panel; fill front of space with polyurethane backing strip and silicone sealant
- g) joints: 10 mm, strike back and smooth
- h) use a waterproof grout if wall is exposed to rain.

3.3 Stone masonry

3.3.1 Rubble

- a) natural stone: local kopieklip
- b) size: between 150 and 600 mm in section
- c) mortar: class III
- d) lay stones on their natural quarry beds
- e) joints: 25 – 50 mm wide cement mortar class II, finished 25 mm deep square recessed
- f) bond: mainly large stones to homogeneous random pattern
- g) level up tops of walls with selected long and flat stones; keep wall faces even
- h) use through stones every 1 m² in double-faced walls
- i) attachment devices where rubble walls are to be joined to brick-, block-, or concrete work: 20 x 3 L-shaped stainless steel bonding lugs shot-nailed to background at 1 m intervals and staggered
- j) reference panel: required

3.3.2 Dimension stone

- a) natural stone with high compressive strength and good durability, sourced from an acceptable local quarry
- b) pointing: rake out exposed joints 12 mm deep and fill with *suitable* grout
- c) clean down, cover up to prevent soiling during progress of remaining work, remove covering upon completion and clean down again
- d) reference panel: required.

3.4 Masonry-type facings

- a) waterproofing: coat wall face with bituminous compound before covering with facings
- b) matching when relevant: lay out slabs of natural stone to match veining, colour and texture, number each slab and fix in same relative position
- c) attachment devices: 20 x 3 mm L-shaped stainless steel bonding lugs shot-nailed to background at 1 m intervals and staggered
- d) support shelf: 100 x 100 x 8 hot dip galvanized steel continuous angle bolted to structure with 30 x 6 flat steel hangers at 1,5 m intervals
- e) grouting, fixing of cramps, engaging cramps in dovetailed metal channels secured to backing with through-bolts or cramps, adjustment in cramps, attachment of lintels and soffits, alignment of joints and facings: SANS 10073
- f) clean down, cover up to prevent soiling during progress of remaining work, remove covering upon completion and clean down again
- g) joints: 3 mm wide between panels, sealed with suitable sealant of acceptable colour – see section 7.

4 Structural timberwork

4.1 Structural timberwork (flooring)

Applicable standard: SANS 2001- Construction Works Part CT1: Structural Timberwork (flooring).

additional requirements

- a) exposed faces of sawn timber: planed, sandpapered, and arris rounded to 3 mm radius.

4.2 Structural timberwork (roofing)

Applicable standard: SANS 2001-Construction Works Part CT2: Structural Timberwork (roofing).

Specification data:

- a) pole preservation treatment marking: metal identification tag with hazard class on each pole.
- b) exposed faces of sawn timber: planed, sandpapered, and arris rounded to 3 mm radius.
- c) discontinue timber members on both sides of fire walls.

4.3 Structural laminated timber

- a) structural laminated timber: SANS 1460
- b) required marking on each piece: application, exposure class, type, appearance and finish, stress grade, e.g. S2GP5.

4.4 Timber buildings

Timber buildings: SANS 10082.

5 Structural steelwork

5.1 Structural steelwork

Applicable standard: SANS 2001-Construction Works Part CS1: Structural Steelwork

Specification data:

additional items

- a) hot dip galvanized fasteners (M8–M64): SANS 10684

variations

- b) temporary fittings and holes for lifting: to be removed or filled up where visible after installation
c) cut edges: grind smooth and straight where prominent or as indicated.

5.2 Sundry steelwork

5.2.1 material

- a) cold-formed commercial steel structural members: permitted if yield stress equals 200 MPa, tensile strength 365MPa (SANS 10162); obtain proof.
b) structural steel tubes: SANS 657 part 1, and mark-bearing
c) steel wire rope (cables) SANS 2408
d) shackles: SANS 2415
e) thimbles: SANS 2262.

5.2.2 welding

- a) all visible welds: continuous, grind smooth
b) dress all cut edges and holes to remove dross, burrs and irregularities.

5.3 Coating

- a) preparation of steel surfaces: SANS 10064

hot dip galvanizing

- b) hot dip galvanized coatings on prefabricated iron and steel products: SANS 121 / ISO1461
 - steel composition: for industrial/mining purposes: Si 0,125 — 0,30% with P < 0,02%; for architectural purposes: Si 0,03 with P < 0,01% or Si 0,15 —0,25% with P < 0,02%
c) do not bend or form articles after hot dip galvanizing

paint or varnish

- d) corrosion protection of structural steel of not less than 3 mm thickness by paint or varnish SANS 12944
 - source all paint from one manufacturer
 - paint system testing: laboratory tests to SANS 12944-6
 - discuss surface smoothness with all parties before commencing painting.

5.4 Fire protection

Protect structural steel against fire to comply with the required fire resistance as set out in SANS 10400-T table 17, as specified

5.5 Light steel frame building

Light steel frame building: SANS 517

/ rational design by competent person.

6 Insulation, sealants, seals

6.1 Thermal insulation

6.1.1 Materials

- a) required R-value/thickness: SANS 204
- b) fire performance classification of thermally insulated building envelope systems: SANS 428

rigid board

- c) expanded polystyrene (EPS) board: type regular when covered, flame retardant when exposed
- d) extruded polystyrene (XPS) board, density 32kg/m³, compressive strength 160–310 kPa depending on thickness
- e) expanded polyurethane (EPU) board: SANS 1383

fibre mats or batts

- f) fibrous thermal insulation mats or batts: SANS 1381-1

reflective foil

- g) reflective foil: SANS 1381-4

metal faced insulation panels

- h) metal faced panels bonded to an insulation core: SANS 1530 and mark-bearing

loose fill

- i) loose fill (pellets/granules): SANS 1381-2
- j) cellulose loose fill (wood based): SANS 1381-6

pipe insulation

- k) bonded preformed mineral fibre pipe sections: SANS 1445-3, mark-bearing with expected maximum service temperature and exposure conditions; provide an adequate vapour barrier to pipe sections intended for use in temperatures below ambient.

6.1.2 Installation

masonry cavity wall insulation

- a) to form a neatly arranged, continuous and uniform thermal barrier, continuous with roof/ceiling insulation
- b) handle boards with care; cut with a sharp knife or fine-tooth saw
- c) install in heights to fit between wall ties – do not prick over ties
- d) stagger vertical joints
- e) rigid board horizontal joints: square in full-fill cavity construction, shiplapped or tongue and grooved in partial fill construction
- f) full fill cavity construction:
 - cavity width: equal to required insulation thickness
 - fill with rigid insulation board or fibre batts
- g) partial fill cavity construction:
 - fill with rigid insulation board only
 - hold insulation tightly against outer face of inner leaf with suitable retaining discs or extra wire ties
 - maintain a residual cavity of >35 mm to permit moisture drainage
- h) loose fill:

- fill existing wall cavities by pumping/blowing loose fill insulation through holes drilled in outer leaf, by specialist installer; refill holes after completion to match surrounding brickwork
- i) butt insulation tight against window/door frames

masonry wall external face insulation

- j) patent system of EPS external insulation bonded and mechanically fixed to dry, sound and flat surface, finished with reinforced polymeric plaster, or as specified
- k) by registered specialist strictly to supplier instructions

non-masonry wall insulation

- l) to SANS 204

pitched roof/ceiling insulation

- m) reflective foil under roof covering: with air space of >25 mm between foil and solid surfaces and with reflective surface facing down
- n) bulk insulation: cut neatly to fit snugly between rafters
- o) keep bulk insulation clear of incandescent and halogen downlighters/transformers
- p) observe electrical and other safety issues, e.g. defect wiring, adequate lighting for workmen

flat roof insulation

- q) material: rigid EPS insulation density 32D

floor insulation

- r) under floor slab insulation (in case of in-slab heating as required by SANS 204): required when specified

pipe insulation

- s) cover insulation exposed to weather and sunlight with protective material as recommended by insulation manufacturer/supplier
- t) tightly mitre bends and tees.

6.2 Vapour barriers

- a) type and position as specified.

6.3 Sound absorption

installation

- a) to a rational design or see drawings
- b) airborne sound absorption:
- fix battens to wall
 - fill space between battens with mineral fibre mats
 - fix perforated board / spaced hardwood slats to battens

6.4 Joint fillers/sealants

6.4.1 Materials

- a) building construction jointing and sealant products vocabulary: SANS 6927
- b) compatible with surfaces and materials they come into contact with; do not use material containing bitumen or volatile material with thermosetting chemically curing sealants.
- c) life expectancy: >30 years
- d) use fungus-proof sealant in all wet areas, e.g. between ceramic wall tiles and kitchen cupboards, baths, wash-basins and shower floors

- e) two-part gun grade polysulphide sealants: *SANS 110*
- f) one part low modulus silicone rubber sealant: *SANS 1305*, type 1 for building joints
- g) one part high modulus fungus proof silicone rubber sealant: *SANS 1305*, type 2 for glazing and sanitary ware
- h) two-part polyurethane base sealant: *SANS 1077*, type 1 pouring grade, self-levelling
- i) two-part polyurethane base sealant: *SANS 1077*, type 2 gun grade, non sag
- j) preformed elastomeric compression joint seals: *SANS 1023* type 1
- k) rubber or flexible PVC waterstop seals in construction and expansion joints in concrete structures where movements of up to 15 mm is expected: *CKS 388/389*, of type, dimension and workmanship as specified in these standards
- l) backing: closed-cell expanded polyethylene cord or strip.

6.4.2 Installation

preparation

- a) joints: clean and dry
- b) insert backing strip to ensure correct sealant thickness
- c) apply correct primer to sides of joints
- d) apply bond-breaking material where required
- e) edges: mask to ensure neat and clean edges

sealing

- f) according to manufacturer's instructions
- g) fill foremost part of movement joints to thickness not less than half the width of the joint
- h) seal joints around door and window frames, movement joints, joints between walls and columns, floor joints, and other joints where sealing is indicated or to the requirements of *SANS 204*
- i) finish: neatly and smoothly to acceptable profile.

6.5 Architectural seals

- a) compatible with door/window construction and other hardware
- b) not to impede normal use of door/window

materials

- c) fasteners: as supplied with product, colour matched where visible
- d) seals: replaceable; replacement seals to be available

installation

- e) according to manufacturer's instructions.

7 Roof covering, cladding

7.1 General

underlay

- a) reflective foil laminate: SANS 1381-4 class B (reinforced, one surface reflective), and mark-bearing
- b) polymer undertile film: SANS 952 type E (white), 0,25 mm, and mark-bearing
- c) installation: according to manufacturer's instructions.

7.2 Tile roofing/cladding

7.2.1 Materials

- a) concrete roof tiles and accessories: SANS 542 and mark-bearing
- b) clay roof tiles: SANS 632 and mark-bearing
- c) natural slate tiles: from a *suitable* quarry, with two holes per tile, drilled (not punched)
- d) fibre cement slates: SANS 803, and mark-bearing
- e) metal roofing tiles: SANS 1022, and mark-bearing
- f) accessories: to match roofing material, as supplied by manufacturer/supplier
- g) fixing materials: hot dip galvanized steel SANS 121 in inland regions, or stainless steel grade 304 in *coastal regions* or corrosive atmospheres, except for clay tiles where all fixings shall be stainless steel
 - length of nails: to penetrate battens to a minimum depth of 25mm
 - steel wire: 1,6 mm diameter, galvanized
- h) mortar for bedding and pointing: 3 sand to 1 cement, pigmented to match tiles.

7.2.2 Roof tiling

Invoked standard when required: SANS 10062 Fixing of Interlocking Roof Tiles

Invoked standard when required: Concrete Roof Tiles – Technical Manual, published by the Concrete Manufacturer's Association (CMA)

preparation

- a) install gutter brackets, metal valley linings before tiling

laying

- b) according to manufacturer's instructions
- c) abutments and verges: half tiles in case of interlocking tiles, tile-and-a-half tiles in case of plain tiles/slates
- d) hips and valleys: cut and dress tiles/slates to neat line, overhanging valley gutters by 50 mm, unless specified as butt joined to conceal the valley gutter
- e) roof overhang into gutter: 50 mm measured from eaves to inside edge of gutter
- f) avoid contact of metal roofing tiles with other metals, cement products or treated timber

roof underlay

- g) lay reflective foil underlay with reflective surface facing downwards
- h) lay underlay across rafters/beams, stretch to a sag of ± 40 mm and nail down with battens/purlins or with hot dip galvanized clout nails, or *according to manufacturer's instructions*
- i) work from eaves upwards with 150 mm minimum overlap; join lengths of underlay at their ends over one rafter space

- j) extend underlay 20mm over tilting batten or fascia board or, in open eaves, over beam-filling on exterior wall; cut neatly around chimneys, pipes, cables etc.
- k) take underlay over ridges and lap underlay on opposite side by 200 mm
- l) valley and hip underlay: lay strip of underlay along full length, beneath the main underlay in the case of valleys, over main underlay in the case of hips, and nailed to valley/hip counterbattens
- m) seal all lap joints.

7.3 Profiled sheet roofing/cladding

Applicable standard: SANS 1200-HB Cladding and sheeting

Applicable standard: SANS 10237 Roof and side cladding

7.3.1 Metal sheet

profile

- a) corrugated: 17,5 mm deep, 76 mm pitch, exposed fixing



- b) box rib (IBR) 36 mm deep, 172 mm pitch, exposed fixing



- c) interlocking box rib: >40 mm deep, <180 mm rib centres with beading rolled into trough bottom, concealed fixing, or the subject of an active Agrément Certificate



- d) rib-trough/standing seam: >32 deep, 250 mm seam centres, with beading rolled into trough bottom, concealed fixing, or



- e) the subject of an active Agrément Certificate

steel

- f) hot dip zinc coated coil sheeting: SANS 3575/SANS 14713, coating grade Z275 for rural and urban inland regions or Z600 for *coastal regions* or aggressive atmospheric conditions
- g) Aluminium/zinc alloy coated sheet: SANS 9364/SANS 14788, coating grade AZ150 for rural and inland regions or AZ200 for *coastal region* or aggressive atmospheric conditions
- h) wet-storage stain prevention of zinc-coating (white rust): oil protection required; report wet-storage stain and do not fix until inspected and/or treated
- i) required coating marking: thickness, material quality and coating thickness on the reverse side of each sheet at 1 m intervals

aluminium alloy

- j) natural mill finish aluminium alloy: SANS 903 type 3004- temper H14 or alloy A1-Mn1 or A1-Mg2
- k) required marking: thickness on each sheet

stainless steel

- l) stainless steel: grade 304

prepainted metal

- m) prepainted metal sheet: SANS 1845
- n) required prepainting marking: at 1m intervals on underside of sheet, or on delivery slip: trade name, type

7.3.2 Fibre-cement sheet

- a) fibre-cement sheet: SANS 685/9933
- b) thickness: 5 mm
- c) profile: corrugated 57 mm deep, 178 mm pitch (Big-six)

7.3.3 Glass-reinforced polyester sheet

- a) glass-reinforced polyester sheet: SANS 1150
- b) required marking: trade name, type, class, light-transmission grading, mass, weather side in case of type 1, on each sheet.

7.3.4 Polycarbonate sheet

- a) grade: sheeting grade with a co-extruded layer of UV stabilised polymer on the weathering side

7.3.5 Fasteners and washers

- a) fasteners and washers: SANS 1273.

7.3.6 Installation

Invoked standard when required: SANS 10237 Roof and Side Cladding

- a) installation: *according to manufacturer's instructions* or to an active Agrément certificate

preparation

- b) ensure that
 - roof and or wall structure is aligned and grouted
 - roof pitch is as required
 - purlins are spaced correctly
 - framework is square
 - face of framework is free of protrusions
 - adjacent building work is complete, including gutters and painting

fixing in general

- c) cold cut in preference to abrasive disc cutting; remove swarf without damaging coating

exposed fixing

- d) holes in sheets: drilled, not punched
- e) hole size: oversize to accommodate thermal movement, especially in the case of polymer sheeting
- f) corrugated metal sheets: on crests of all outermost and middle corrugations, at overhangs and at end laps on every second crest
- g) box ribbed sheets: on crest of every second and fourth rib, with side laps stitched at 900 mm centres with 6 mm diameter self-tapping screws
- h) fibre-cement roof or cladding: 7 mm diameter hot dip galvanized drive screws to wood purlins, 8 mm diameter hot dip galvanized hook bolts to steel angle purlins
- i) all screws and bolts provided with bituminous or plastic washers with hot dip galvanized steel cups

concealed fixing

- j) patent fixing with concealed clips supplied by roof sheet manufacturer, nailed or screwed to purlins
- k) allow for expansion and contraction of the sheet without straining the securing points
- l) holes in sheets: prohibited

- m) button punching, if required by manufacturer: through interlocking ribs at 150 mm either side of fixing clip and at mid-span between purlins

lapping

- n) end laps: SANS 10400-L Table 1
- o) side laps: one and a half corrugations or one rib
- p) seal side and end laps to prevent air infiltration and leakage
- q) fixing order: opposite to the direction of prevailing rain-bringing wind
- r) end laps in case of translucent sheets: >200 mm
- s) glass-reinforced polyester or polycarbonate sheets laid single width between metal sheets of similar profile may be supported on same purlins as metal sheet; in case of two or more sheets laid side-by-side: support roof sheets at <0,8 m, side cladding at <1,5 m, or *according to manufacturer's instructions*

trough ends on metal trough roofs with slopes less than 15°

- t) bend down trough ends 15 mm at eaves to form drip; bend up trough ends 30 mm at high ends to form stop-end
- u) bend with *suitable* tool (not hammer) without tearing the sheet.

7.3.7 Miscellaneous

- a) finish roof with necessary ridging, closers, upturns, downturns, drips and capillary interstices to provide a watertight and vermin and insect proof construction
- b) of similar material and fasteners as roofing

ridging

- c) for corrugated metal roof sheeting: 460 mm girth with roll-top, lapped 225 mm at heading joints and beaten into corrugations; close roll-top at bottom of hips and at gable ends
- d) for box-rib roof sheeting (lapped or interlock) and for standing seam roofing to fall >7°: 430 mm girth without roll-top, lapped 225 mm at heading joints and provided with serrated closers
- e) for standing seam roofing to fall <7°: saw or snip top 12 mm of seams and bend single-length sheet over ridge; cover cuts with rib caps set in *suitable* sealant
- f) for fibre-cement roofing: fibre cement corrugated or plain adjustable or fixed ridges; fill corrugations under plain wings of fibre-cement ridging with 1:5 cement:sand mortar

movement joints

- g) arrange sheets or cover strips, or both, over expansion joints in order that watertightness is ensured under all conditions and that joints are free to move

tolerances

- h) alignment of purlins and girts: mismatch between abutting ends <3 mm in any direction
- i) misalignment of side joints and end joints over the whole of the finished face of the sheeting and cladding, and any misalignment of the edges of fascias, ridging, etc.: <3 mm
- j) contact faces between purlin or girt and sheeting or cladding: in the same plane or, in the case of curved sheeting and cladding, in a tangential plane.

7.4 Fully-supported metal sheet roofing and cladding

material

- a) copper roofing sheet: 0,6 mm x 600 mm wide high purity cold rolled copper SANS 404/405
- b) boarding: 20/22 mm thick solid tongue-and-groove softwood to SANS 629 of genus Pinus, flooring grade, light density group, non-endmatch
- c) roofing felt: range 111 containing 80 % wool, density 333 g/m²
- d) fixing clips: 0,6 mm x 40 mm wide copper

- e) clout nails: hard drawn copper wire 2,8 mm diameter x 22 mm with barbed shank
- f) screws: brass, flat head

laying

- g) screw softwood boarding onto battens with counter-sunk brass screws
- h) nail roofing felt with butt joints onto boarding with copper clout nails
- i) lay copper sheet with both edges bent up 90 degrees to form troughs 510 mm wide
- j) form double welted standing seams in direction of fall
- k) fold into seams clips at 300 mm centres formed of same material and nailed to boarding with copper clout-head nails
- l) lay 100—120 mm wide sheet at eaves, nail to boarding with copper nails and bend down with roof covering to form drip
- m) bend sheet up at parapet walls, ventilation pipes and chimneys and counter flash with copper set in silicon sealer
- n) form gutters and spouts from copper sheet of 0,6 mm thickness; provide movement joints in gutters every 10 m
- o) fix all copper securely but do not restrict thermal movement; finish nails and screws flush when covered by copper.

7.5 Thatch roofing

- a) thickness and minimum mass of thatching: SANS 10400-L
- b) lightning protection: required (See Section 19).

7.6 Flashings

material

- a) flashings and counter-flashings: metal; reinforced liquid membrane is prohibited
- b) fibre-cement roofs: 6 mm fibre-cement apron flashing finished off with metal counter-flashing against walls, or sill or U-flashing where required in vertical cladding, all *according to manufacturers instructions*
- c) tiled roofs: steel sheet hot dip galvanized class Z275 for inland regions, or class Z600 or copper for coastal/corrosive regions, thickness 0,6 mm
- d) sheet metal roofs: material similar to roofing sheets
- e) side-wall flashings: >75 mm high, >200 mm wide or to cover > two ribs of profiled metal sheeting
- f) head-wall flashings: purpose made flashings incorporating serrated closers and poly closers to suit metal roof profile where required, manufactured to roof angle - do not bend on site
- g) counterflashings: >150 mm high, with anti-capillary fold
- h) end laps: >150 mm for flashing; >75 mm for counter flashings
- i) flashing nails: same material as flashing
- j) flashings for pipes >50 mm diameter: tapered sheet metal collar of diameter to fit around pipe, soldered or sealed to holed flange at same angle as pitch of roof
- k) flashings for pipes <50 mm diameter: tapered sheet metal collar only

fixing

- l) cut, join, lap and form sheet metal flashings, concealed gutters and valleys to roof and vertical surfaces and around protruding pipes to make a watertight finish
- m) fix flashings to walls with 75 mm long flashing nails with a 20 mm hook
 - at ends and at 400 mm centres in between
 - drive flashing nail into wall above line of flashing turn-up, and use hook of flashing nail to keep flashing in position – do not drive nail through flashing
- n) fix flashings to roof sheets at <600 mm centres or on each alternate rib

- o) lay undertile flashings under roof tiles on battens at gable, parapet or chimney walls, to discharge onto roof covering or into eaves gutters
- p) chimney gutters on high side of chimney: support gutters on *suitable* boarding; turn up 100 mm against chimneys and > 225 mm up the roof slope; lap chimney gutters onto side flashings or undertile flashings
- q) fix counter-flashings in 25 mm deep formed joints in masonry or pre-formed into concrete, keep in place with short rolls of cut-off sheet metal, and fill joint solid with 1:3 cement:sand mortar; do not puncture counter-flashings
- r) pipe flashing >50 mm diameter: fix flange to roof sheet by means of roof screws similar to those used to fix the roof sheets, or by means of pop rivets; pipe flashings <50 mm: solder collar to roof sheet; seal collars around pipe with *suitable* clamp and sealant
- s) valley linings:
 - ridging turned around, without roll for steep slopes, or with roll for low slopes
 - lap valley linings 225 mm minimum
 - discharge valley linings into eaves gutters
 - fold back valley lining sides to form open bead in the case of slate and tile covered roofs
- t) exposed verges of corrugated steel roofs: finish with roll flashing.

7.7 Fascias and barge boards

fibre-cement

- a) fibre-cement sheets: SANS 803

fixing

- b) drill, countersink and screw sheets at 750 mm maximum centres with 5 x 50 mm sherardized screws
- c) screw fascias and barge boards to purlins, tilting battens or verge battens, and into ends of roof beams; in case of purlins, build stub beams into gable walls between purlins to carry verge battens
- d) cover joints of boards with 50 mm girth x 0,5 mm thick H-profile galvanized sheet metal cover strips.

8 Waterproofing

Invoked standard when required: SANS 10021 The waterproofing of buildings.

Invoked standard when required: SANS 952 annex C: Notes on use, installation and protection of film (supplement to SANS 10021).

8.1 Materials

reinforced bitumen membrane (RBM)

- a) flexible polyester and/or fibreglass reinforced APP polymer modified bitumen membrane: BS EN 13707 or the subject of an active Agrément certificate
- b) anti-root: in all planted areas
- c) bonding: heat-fused on primed surfaces

self-adhesive plastic membrane (APM)

- d) flexible polyethylene or polypropylene film backed SBS modified asphalt/bitumen adhesive compound: BS EN 13967 or the subject of an active Agrément certificate
- e) bonding: cold applied on primed surfaces

reinforced liquid membrane (RLM)

- f) in situ reinforced liquid membrane
- g) of light colour
- h) reinforcement: non-woven needle-punched polyester or polypropylene fibre fabric with a mass of 125—150 g/m² for roofs and 95—100 g/m² for parapet walls

slip/protection layer

- i) 0,25 mm polymer sheeting: SANS 952 type C (green)

geomembranes

- j) thermoplastics sheeting: SANS 1526

cavity drainage membrane

- k) patent 0,5 mm thick polypropylene or HDPE sheet with studs 5–8 mm high at close centres to an active Agrément certificate

outlets

- l) roof outlets: patent cast iron flanged fullbore outlets with removable dome gratings, epoxy finish
- m) small balcony outlets: straight lengths of PVC pipe with chamfered ends and flanged inlets to accommodate waterproofing dressing without loss of bore or adherence
- n) shower outlets: special flanged shower outlet with trap and grating.

8.2 Preparation

substrate surfaces

- a) free of traffic and protrusions
- b) clean, smooth but not polished, even, stable and surface dry
- c) cracks in cementitious surfaces up to 0,3 mm are acceptable
- d) plywood: exposure class 1 (marine), with open butt joints
- e) sand-cement screeds when required: minimum 35 mm thick when laid directly onto concrete; minimum 50 mm thick when laid on insulation boards or slip/protection layers; 20 mm minimum as top layer on foamed-cement screeds

falls

- f) roofs: minimum actual fall including valleys: 1:80; maximum fall without precautions, including gravel protection: 10°

corners

- g) pencil rounded

parapet walls

- h) except when covered with copings with overhang, ensure tops of parapet walls slope towards roof

upstands

- i) ensure upstand beams >170 mm above waterproofed surface are provided on both sides of movement joints and at intersections with masonry walling

drips/downstands

- j) ensure drips are provided in roof slab soffits at edge of overhangs by means of ≥12 mm deep grooves or downstands
- k) in winter rainfall areas where roof slab edge is flush with external face of masonry cavity wall, ensure a continuous PVC angle drip is provided against soffit of concrete slab, centred on wall cavity

movement joints

- l) to suit membrane system

balconies

- m) ensure balconies are at a sufficiently lower level than door thresholds to allow for screed/topping, when required, and have sufficient fall to outlet(s)
- n) ensure threshold stops 15 mm short of outside face of sliding door frame
- o) do not fix balustrades or handrails on top of upstands before these are waterproofed

dpc's

- p) ensure dpc's in walls are at the termination level of waterproofing turn-ups or above the level of trafficable surface finishes

services

- q) plant, equipment, planter boxes, water features, benches etc. on roofs and balconies: install only on separate bases on completed roof waterproofing; ensure these bases do not obstruct flow of water to outlets
- r) pipes and conduits penetrating waterproofing: avoid, place in ducts; if unavoidable, do not cluster, ensure pipe(s) protrudes at 90° for > 200 mm before changing direction; provide pipes with stiff flanges screwed or bolted to substrate

outlets

- s) in position before commencing waterproofing
- t) set lower than their surroundings to prevent ponding
- u) roof outlets: set >200 mm away from upstands.

8.3 Application

- a) apply waterproofing system *according to manufacturer's instructions*, including priming procedures, to leave roof, internal wet areas like showers and plant rooms, and below-ground structures in a watertight condition
- b) slip/protection layers, blinding layers, metal lathe, ventilators etc.: as required

- c) apply basement/retaining wall waterproofing to face to be back-filled
- d) protect waterproofing after installation against puncturing

movement joints

- e) maintain movement joints in structure
- f) cap movement joints with waterproofing, or with a metal cover strip fixed to the sides to allow movement
- g) in the case of waterproofing caps, loop waterproofing into movement joint, lay backing cord in loop and cover movement joint and upstands with special expansion joint membrane.

8.3.1 system

- a) on exposed concrete roofs: 4 mm RBM
- b) on exposed timber roofs: 2 or 3 mm base sheet plus 4 mm RBM
- c) on balconies <10m²: 4 mm RBM
- d) on balconies >10m², terraces, walkways: 2 or 3 mm base sheet plus 4 mm RBM, or cementitious or acrylic RLM
- e) on parking decks: 5 mm RBM
- f) on planters: 4 mm anti-root RBM
- g) on roof gardens: 2 or 3 mm base sheet plus 4 mm anti-root RBM
- h) on concrete box gutters: 4 mm RBM
- i) on timber box gutters: 2 or 3 mm base sheet plus 4 mm RBM
- j) on parapet walls, freestanding walls: RLM
- k) rewaterproofing: 3 or 4 mm RBM
- l) on below ground surfaces, vertical or horizontal, above or below water table: 2 or 3 mm base sheet plus 4 mm RBM, or single layer APM.

8.3.2 Termination

- a) dress down waterproofing onto flanges of roof outlets
- b) turn up waterproofing against walls, chimney or extractor flues, roof lights, pipes etc. to >170 mm above roof level, or to the level of the damp proof course if present, or to above finished heights of masonry or concrete planter boxes, plant bases, steps etc where these abutt walls
- c) counter-flash turn-ups against masonry walls with the same membrane as the waterproofing, tucked into >40 mm deep preformed grooves
- d) counter-flash turn-ups against concrete walls with galvanized steel, aluminium or copper profiled cover strip bedded in a mastic sealant and mechanically fixed at 150 mm centres to the wall
- e) lap and bond waterproofing to wall damp proof courses in regions with extreme weather conditions (e.g. coastal); materials must be compatible, e.g. bituminous
- f) clamp waterproofing around pipes with suitable clamps
- g) take up waterproofing against, over the top and 50 mm down the outer edge of perimeter upstands, parapet and freestanding walls
- h) terminate below-ground waterproofing >170 mm above all finished ground levels.

8.4 Testing

- a) perform test(s) prior to application of surface finishes
- b) horizontal surfaces: a flood test of 48 hours or a spark, vacuum or air pressure test, using suitable testing apparatus
- c) vertical surfaces: a spark or vacuum test, whichever is easier.

8.5 Waterproofing surface finishes/protection

- a) allow three weeks for bituminous membranes to weather before covering

- b) not to contaminate rainwater harvesting when relevant
- c) slip/protection layer: single layer bituminous felt or double layer HDPE sheet
- d) tile, paving units or panel finish: cut neatly to fit tightly along perimeter.

8.5.1 Exposed non-trafficable areas

paint

- a) on plain bituminous systems: heavy brush or two coats of bituminous based aluminium paint SANS 802
- b) do not apply on granular finishes
- c) on other systems: *suitable* ultra-violet block as recommended by waterproofing manufacturer
- d) on acrylic or styrene/acrylic: UV block of an enriched titanium tiocide dispersion applied in two coats in cross directions

crushed stone

- e) 50 mm thick layer of light coloured non-absorbent crushed stone of 25 mm nominal size on slip/protection layer or on insulation of required thickness (SANS 204)
- f) keep stone back from outlets, gutters and water shedding edges; bond stone in these areas with a thinly applied cold dressing compound

tiled insulation panels

- g) high-density polystyrene insulation panels of required thickness (SANS 204) faced on top with 300 x 300 x 7–10 mm thick fully-vitrified ceramic tiles of light colour, set in cementitious tile adhesive or in epoxy; panel size 600 x 1 200 mm; lay panels loose with tight butt joints.

8.5.2 Pedestrian traffic areas

topping

- a) ≥50 mm concrete topping on slip/protection layer with sealed isolation joints against fixed objects

tiles on screed

- b) ≥50 mm thick screed to SANS 2001-Construction Works Part EM2 on slip/protection layer; fix tiles in tile adhesive with sealed joints against fixed objects

tiles on waterproofing

- c) on bitumen systems: bed tiles in bitumen and stone chip key
- d) high-density polystyrene insulation panels of required thickness (SANS 204) followed by precast concrete tiles, size as specified, loose laid with tight butt joints

paving slabs on insulation panels

- e) 600 x 600 x 50 mm precast concrete paving slabs SANS 541 laid loose on high-density polystyrene insulation panels of required thickness (SANS 204) with tight butt joints

paving slabs on adjustable pads

- f) 600 x 600 x 50 mm precast concrete paving slabs SANS 541 laid on patent adjustable underlay pads to keep tiles 20 – 40 mm clear of waterproofing; joints between slabs: 5 mm, left open; paving surface: level or to follow gradient as specified.

8.5.3 Vehicular traffic areas

asphalt premix

- a) 50 mm compact layer of asphalt premix laid directly on to waterproofing
- b) ensure premix and waterproofing are compatible

brick/concrete pavers on sand bed

- c) brick or concrete pavers laid on 25 – 30 mm sand bed (see Section 21)

concrete paving

- d) 75 mm in situ concrete paving on protection/slip layer (see Section 2)

8.5.4 Basement, retaining walls

- a) before backfilling, protect waterproofing with covering
- b) install agricultural drain encased in stone and wrapped in geotextile membrane below level of basement floor and to fall to stormwater system, or as specified
- c) backfill with clean filter sand except where cavity drainage membrane is installed, in which case backfill with excavated material.

9 Ceilings, linings, partitions, access flooring

9.1 Brandered ceilings

9.1.1 Branders, grounds

timber branders, grounds

Applicable standard: SANS 2001-Construction Works Part CT2: Structural Timberwork (roofing)

Additional requirements

d) size, and span (truss or beam spacing):

| Truss or beam spacing | Dimensions, mm | |
|--------------------------------------|----------------|------------|
| | Soft wood | Eucalyptus |
| 6.4 mm gypsum ceiling board | | |
| <1000 | 38 x 38 | 32 x 32 |
| 1000 – 1200 | 38 x 50 | 38 x 38 |
| 1200 – 1400 | 50 x 75 | 38 x 50 |
| 4 or 6 mm fibre-cement ceiling board | | |
| <1050 | 38 x 38 | 32 x 32 |
| 1050 – 1500 | 38 x 50 | 38 x 38 |

- e) where roof trusses or beams are spaced at more than the required spacing for the intended brandering size: increase brandering size, or support brandering by means of 38 x 114 mm sawn softwood ceiling joists hung between and parallel to trusses or beams on 38 x 38 mm hangers from 38 x 76 mm runners fixed at 1 500 mm centres at right angles and on top of tie-beams of trusses or on top of beams, or at right angles in between tie beams/beams
- f) grounds for wall linings to masonry or concrete walls: 38 x 25 mm, fixed with suitable frame anchors
- g) fix branders at right angles to roof trusses/beams and at centres *according to ceiling board manufacturer's instructions*
- h) fix brandering away from walls for fixing of coved cornices when relevant
- i) install supporting timber where heavy light fittings are to be suspended
- j) level out, starting from lowest point, using timber wedges where necessary

steel branders

- k) patent hot dip galvanized steel sheet lipped channel brandering system including suspension brackets with adjusting slot
- l) size or span: 1 200 mm maximum or according to manufacturer's instructions
- m) nail or screw suspension bracket to side of timber truss/beam
- n) level out by means of adjusting slot
- o) perimeter trim: as specified.

9.1.2 Fibre-cement and gypsum board brandered ceilings

fibre-cement board

- a) fibre-cement ceiling board: SANS 803, 6 mm thickness
- b) brander spacing: 600 mm

gypsum board

- c) gypsum board: SANS 266, 6,4 mm thickness
- d) brander spacing: 400 mm (300 when plastered)

storing and handling

- e) store boards inside a building on a damp-proof membrane or a timber platform
- f) handle boards vertically by two men

cornices

- g) gypsum coved cornice: SANS 622
- h) polystyrene core coved cornice: paper covered

fixing

- i) according to manufacturer's instructions
- j) use longest board lengths possible
- k) pattern when visible: arrange boards symmetrically about room, at right angles to brander, with cut boards along walls, or to pattern as specified
- l) lay fibre-cement boards ripple face down to hide nail heads
- m) nail boards to timber brander with 38 mm hot dip galvanized clout nails or 32 x 2,5 mm diameter hot dip galvanized serrated ceiling nails at 150 mm centres
- n) screw boards to timber brander with 25 mm drywall screws when surface is to be plastered
- o) screw boards to steel brander with 25 mm drywall screws at 150 mm centres
- p) joints where ceiling is to be plastered: close butted and taped
- q) provide movement/control joints through ceiling as follows or as specified
 - a clean break of 15 mm through the complete ceiling structure and finish
 - in interior ceilings at <15m intervals and total area <225 m²
 - in exterior ceilings at <9m and total area <81m²
 - where ceiling framing changes direction
 - to coincide with structural joints
- r) nail and/or glue cornices to brander and walls; fix wood cornices to walls with *suitable* frame anchors; mitre corner joints, splay all heading joints; join fibre-cement cornices with H-profile jointing strips.

plaster boards

- s) ensure building is enclosed before ceiling boards are fixed
- t) plaster entire ceiling with 3 – 6 mm patent lightweight plaster on same day as board has been erected
- u) finish plaster to smooth polished surface.

9.1.3 Wood board brandered ceilings, lining

- a) thickness: to suit span and density

tongue and groove board

- b) tongue and groove wood board: SANS 1039

wood strip, trim

- c) hardwood: SANS 1099

plywood

- d) 3-ply: SANS 929, of exposure class, veneer species, grade etc: as specified

fixing

- e) secret nail tongue and groove boards with lost head oval wire nails; stagger all end joints
- f) nail strip and plywood with panel pins
- g) finish edges with wood cornice/trim of similar species and grade
- h) fix wall boards to grounds to prepared wall surfaces at centres to suit board thickness and layout
- i) where sound absorption insulation is placed between grounds, cover full surface with black shade cloth before fixing boards

hatches

- j) material, pattern: to match ceiling.

9.1.4 Hatches

- a) near equipment needing regular maintenance

timber hatch in timber brandered ceiling

- b) trim 650 x 650 mm minimum clear opening in ceiling, with 38 x 100 mm sawn softwood trimmers spiked to beams or trusses
- c) form hatch frame of brandered as for ceiling
- d) form trap door of brandered and ceiling board as for ceiling
- e) fillets to carry trap door in closed position: 50 x 13 mm hardwood nailed or screwed to ceiling around hatch opening; mitre corners
- f) hang trap door with one pair 75 mm steel hinges screwed to frame, so that trap door can open 180 degrees on to top of ceiling brandered, when specified

steel hatch in timber or steel brandered ceiling

- g) 0,6 mm pressed steel ceiling trap door, hinged to open 180 degrees onto ceiling, in 25 x 25 x 3 mm T-profile steel frame
- h) clear opening: >650 x 650 mm
- i) screw frame to ceiling brandered.

9.2 Suspended ceilings**performance**

- a) fire resistance in minutes, tested to SANS 10177
- b) airborne sound insulation rating: SANS 717/10218
- c) deflection requirements: to South African Building Interior Systems Association (SABISA).
- d) structural performance requirements: safely support all anticipated loads, e.g. luminaires, smoke detectors, air grilles, wind loads, point loads

board

- e) mineral fibre board: EN 13964

suspension fittings

- f) patent suspension fittings of cold-formed hot dip galvanized steel T's, hold down clips, suspension rods and hooks, suspension clips, T suspension plates, lipped wall angles, shadowline wall angles and wall channel trim

installation

- g) according to manufacturer's instructions
- h) not before the building is enclosed, plasterwork has dried out, and services are in position and tested

- i) handle boards with clean gloves
- j) arrange grid symmetrically about rooms, with cut boards along walls, with straight joints in both directions, or to pattern as specified; edge perimeter infill units minimum size: half standard board width or length
- k) suspend main tees from structure by hot dip galvanized mild steel strapping or 2 mm diameter hot dip galvanized wire or by patent suspension rods or hooks combined with spring clips and suspension plates
- l) clip cross tees into main tees at the end of each board
- m) use fixers suitable to structural soffit: expanding anchors into concrete; bolts through holes in steel or with clips; screws to sides of timber into top third of beam/rafter/joist; shot nailing is prohibited
- n) level out to degree of accuracy: II
- o) hold down ceiling boards with patent hold-down tags or wedges
- p) provide extra hangers for light fittings, sound systems, air conditioning vents etc. as required

9.3 Partitions, linings

performance

- a) structural requirements: *SANS 10160*
- b) wall deflection requirements: South African Building Interior Systems Association (SABISA)
- c) required fire resistance in minutes: *SANS 10177*
- d) required sound insulation grading: *SANS 717/10218*.

9.3.1 Materials

boards

- a) gypsum plasterboard: *SANS 266*
- b) fibre cement board: *SANS 803*

studs and tracks

- c) metal studs and tracks: hot dip galvanized steel with wall thickness and size complying with the structural requirements of the installed system
- d) timber studs: *SANS 10082*: for load-bearing or non-load-bearing walls as required

aluminium extrusions

- e) extruded aluminium sections: alloy 6063 or 6261 in temper T5 or T6, of wall thickness and strength to meet the structural requirements
- f) anodizing: *SANS 1407*

powder coating

- g) powder coating: *SANS 1274*
- h) by applicators approved by the specified powder manufacturers

glass

- i) glass: *SANS 1263/50572*
- j) required marking in case of safety glass: permanently on each pane, visible after installation.

9.3.2 Drywall partitions, light weight internal walls

Frame system clad with gypsum or fibre cement board, doors, glazing, trims, skirtings etc. as specified.

9.3.3 Demountable partitions

Patent system complete with studs, braces, door and glazing frames, apertures, trims, skirtings, etc. as specified.

9.3.4 Cubicle partitions

Patent system complete with stiles, panels, doors and accessories, etc. as specified.

9.3.5 Operable partitions

- a) patent operable partitions consisting of full-height panels of 75 x 1200 mm, hung on tracks and manually operated to be stackable
- b) frames: aluminium alloy
- c) panels: medium density fibreboard backed with sound insulation materials
- d) hinges: recessed
- e) seals: all round each panel to achieve the required sound insulation

9.3.6 Installation

- a) according to manufacturer's instructions
- b) drywall linings to walls:
 - screwed to timber or steel grounds, or
 - glued to masonry or concrete walls without grounds.

9.4 Raised access flooring

Invoked standard when required: SANS 10021 The waterproofing of buildings

Invoked standard when required: SANS 952 annex C: Notes on use, installation and protection of film (supplement to SANS 10021)

raised access flooring

- a) raised access flooring: SANS 1549
 - fire resistance in minutes: SANS 10177
 - sound insulation grading: SANS 717/10218.

installation

- b) according to manufacturer's instructions.

10 Windows, doors, curtain walls, skylights, solar control

10.1 Performance

Unless specified otherwise, the following performance standards are required to be met:

mechanical performance

- a) mechanical performance of windows, doors, curtain walls and skylights in respect of wind action (deflection and structural strength), water penetration, air penetration and operation within the confines of the perimeter of the main frame, irrespective of the framing material: SANS 613
- b) design wind pressure: SANS 10160
- c) atmospheric temperature range: between -10°C and 35°C
- d) plastic, shrinkage and creep deflection of floor slabs: as specified

thermal performance

- e) U-value and Solar Heat Gain Factor, including permissible air leakage: SANS 204, or as supplied by the glazing manufacturer as verified according to the test method ASTM C 1199 and ISO 9050 for U-values, and given in NFRC / SAFIERA 100-2004 for SHGC values, or be custom product assessed from suppliers, manufacturers, industry associations (including their online resources), and from competent assessors, who must have assessed the products in the manner prescribed by SAFIERA, or be the subject of a rational design by a *competent person*.

fire resistance

- f) fire resistance: as specified

sound insulation

- g) sound insulation: as specified.

10.2 General requirements

- a) fittings to be removable after windows have been glazed

burglar bars

- b) solid mild steel or aluminium alloy of pattern as specified
- c) kink bars at peg stays or latches where required

insect screens

- d) metal gauze screen frames: pressed steel with baked enamel finish, or extruded aluminium with natural anodised finish, filled with 1,5 x 1,5 mm mesh fibreglass gauze
- e) screens to outward opening sections:
 - attach to inside of window frame with studs or clips in such a way as to be readily removable
 - with sliding or hinged sections so as to allow access to opening stays and fasteners from the inside
 - screens to top-hung ventilators may be hinged for access to fasteners
- f) screens to inward opening sections and louvres:
 - deeper frames to allow opening of window/louvre, of a heavier gauge metal
 - fix to window frames with screws or rivets
- g) pivot type windows:
 - screen frames in two sections, one on outside and one on inside, with gap between

sections filled with suitable rubber flashing fixed in a way as to be easily renewable

building in

- h) fix frames upright, square and free from warp
- i) use lugs provided with the frame
- j) screw and plug where lugs cannot be built in or covered up
- k) brace door jambs with timber while building in
- l) fill space between backs of pressed steel door frames and wall solid with mortar
- m) prevent damage and staining of aluminium frames by wrapping with paper or plastic or covering with light tack tape; leave wrappings in place until all rough trades are finished
- n) avoid direct contact between aluminium and other metals or wet concrete by applying a separating coat of bituminous paint

inspection

- o) view scratches and blemishes on aluminium or coatings at a distance of three metres under normal and reasonable lighting conditions.

installation

- p) install according to manufacturer's instructions where applicable
- q) service units at completion and leave in perfect working order.

10.3 Steel frame units

Factory finish: prepared to *SANS 10064* and primed with zinc phosphate *SANS 1319* inland, or hot dip galvanized to *SANS 121 / SANS 14713* in the *coastal region* or corrosive atmospheres.

10.3.1 Hot-rolled steel framed units

- a) hot-rolled mild steel framed units: *SANS 727*
 - weather bars: 1,6 mm thick to bottom of opening-in and vertically pivot hung ventilators, and to bottom of all opening out ventilators where they occur above other ventilators
 - frames: one piece construction except where to be coupled with standard coupling mullions and/or transoms
 - kicking plates: 1,6 mm steel plate fixed with metal beads
 - sills: fit outward opening doors with sills of door framing section (stepped), but inward opening doors with metal ties welded to frames, for embedding in thresholds (flush)

10.3.2 Cell windows

police type

- a) purpose made to forms, sizes and construction as shown on type *drawings POL 27/2* and *27/4*, including window frames of standard residential window sections with sashes hung on purpose made hinges, including pull handles, wing grip turn buttons and manganese steel bars set between window sections and/or into the core of hollow sections
- b) manganese steel bars: Y-steel with manganese content, heat treated to surface hardness of 50 on the Rockwell C scale with not less than 2 mm penetration on all four surfaces; no welding is allowed near the manganese bars during any stage of manufacture
- c) fixed screens: provide each window with a fixed mesh screen welded into a mild steel angle section frame fixed to walls with clamps bolted to wall, with bolt head welded to clamp after tightening
- d) factory finish: manganese steel bars are to be prepared and primed only (not galvanized) before set in position

correctional services type

- e) as for police type except that manganese steel is to have a surface penetration hardness of between 55 and 63 on the Rockwell C scale on all four surfaces, and no fixed screens are required.

10.3.3 Pressed steel clisco type window frames

Pressed steel clisco type window frames: SANS 1311

10.3.4 Pressed steel door frames

- a) pressed steel door frames: SANS 1129

additional clauses

- b) frames for continuous power floated floors without screeds or toppings to be suitable for surface placing without damage to the floor and without compromising proper building in of the frame or the fitment of standard doors
- c) steel thickness half wall width: 1,2 mm; steel thickness single rebate full wall width and frames for double swing doors: 1,6 mm
- d) frames for double swing doors: jambs with V-shaped centres to fit rounded edges of doors, and plain heads or transoms, holed and prepared to receive top centres of spring hinges
- e) buffers: two rubber buffers on lock side rebate of every frame.

10.3.5 Pressed steel door and frame combination

- a) doors: 1,2 mm pressed steel with 40 mm edge, > two V-shaped vertical ribs over full door height, and three horizontal rails
- b) frame: single rebate pressed metal door frame: SANS 1129
- c) lock box: 1,6 mm pressed steel
- d) hinges: 1 pair 100 mm steel.

10.4 Cold-rolled steel frame units

- a) patent cold-rolled tubular steel profile frame with integrated fittings and gaskets
- b) galvanized to 200g/m² and prepainted to ASTM D3663 for PVDF fluorocarbon, or AAMA 605.2.92 for baked organic coating..

10.5 Aluminium frame units

- a) AAAMSA certified as to performance, glazing, surface finishing, hardware, fasteners, product certification and, when required, energy rating.
- b) anodising: SANS 999.
- c) powder coating: SANS 1796, minimum thickness for all areas: 0,06 mm.

10.5.1 Windows and glazed doors

Aluminium framed windows and glazed doors: as specified.

10.5.2 Skylights

- a) obtain a *competent person's* certificate on design loading compliance
- b) sloping glazing to have an overhang if shedding rainwater on significant vertical surfaces
- c) glazing bars to allow for water penetration and effective drainage to outside
- d) condensation: to be removed through guttered weep system
- e) screws and fixing bolts: covered with plastic head caps.

10.5.3 Curtain walling

Curtain walling: as specified.

10.6 Adjustable glass louvre windows

- a) standard: *CKS 413*
- b) operation: manual or remote control as specified
- c) for glass see Section 17
- d) fix louvre frames in fixed window frames with stainless steel or chromium plated brass dome-head screws
- e) fix after window frame has been painted, when relevant
- f) service louvres at completion and leave in perfect working order.

10.7 Wood frame units

- a) hardwood: *SANS 1099*, clear grade, of species as specified, for exterior or interior units
- b) softwood: *SANS 1783-3*, clear grade, of species as specified, for interior units only
- c) joints (structural): mortise and tenon
- d) rebated frames: shaped out of solid wood – lay-on door or casement stops are prohibited
- e) haunches: provide top rails of door frames with bevelled haunches for building in
- f) glazing beads: mitre corners; tack lightly in place before delivery
- g) lugs: 500 x 32 x 1,6 mm hot dip galvanized steel lugs for building in, twice screwed to the outside of frames at 300 mm from bottom and top and intermediately at not exceeding 900 mm apart
- h) dowels: provide bottom ends of door frame stiles with one 10 mm diameter steel dowel for building into thresholds
- i) in the case of exposed frames, shape bottom rails and beads to shed rainwater outwards; provide drips to head and bottom rails; provide capillary breaks around opening sections
- j) prepainting: one coat wood primer to backs of frames before building in.

10.8 PVC-U frame units

- a) PVC-U window and door frames for external use: *SANS 1553*.

10.9 Polymer concrete frame units

- a) polymer material: unsaturated polyester (UP) resin: *SANS 713*
- b) to comply with minimum safety, heat distortion and compressive strength requirements.

10.10 Wood doors

- a) wood doors: *SANS 545* and mark bearing
- b) required marking on edge or top of each door: manufacturer, exposure class, performance class; in case of flush doors, position of coat rails ('CR') and closer blocks ('CB')

flush panel doors

- c) edge finish: concealed

additional clauses

- d) batten doors for external use, or framed panel and glass doors for external or internal use: 44 mm thick, of hardwood (including doors to be painted), mortise and wedge tenoned, with the tenon showing on the outside edge of stiles; middle rails in such a position that a mortice lock will not destruct the tenon joint
- e) single swing double doors: with rebated meeting stiles
- f) weather bar with drip: required to exposed exterior doors
- g) veneer on pairs of doors: to match in grain and colour
- h) performance rating stamp on door: do not remove until inspected in the hung position

sealing

- i) seal doors, or knot and prime, on all four edges immediately after delivery on site (if not prefinished)

hanging

- j) timing: delay hanging of doors until all wet trades are done
- k) distortion or out-of-plumbness of frames: check and report before hanging door
- l) trimming: leave clear space of 2 mm (+0 mm -1 mm) above and along sides, and 6 mm (+0 mm -3 mm) under door; take off equal amounts from each side, top and bottom of flush doors when fitting; to reduce height of panel or framed doors, take off from bottom only
- m) sealing: paint or seal trimmed edges before hanging.

10.11 Fire doors and fire shutters

- a) fire doors and fire shutters: SANS 1253
- b) installation: SANS 1253 Annex E.

10.12 Garage doors**up-and-over garage doors**

- a) solid door panel of steel or wooden framework clad in weather boarding, tipping upward into horizontal open position; balanced by springs.

sectional overhead doors

- b) curtain of hinged panels sliding upwards and inwards in channel guides; balanced by springs.

10.13 Roller shutter doors

- a) curtain of interlocking slats or grilles running in channel guides from a spring loaded barrel, mounted overhead on steel support brackets; assembly bolted or welded to the building structure
- b) automatic operation to be supplied with light, safety reverse, manual override, and remote control
- c) electrical operation to include remote push button starter, limit switch assembly, emergency hand operator in event of power failure, electromagnetic brake.

10.14 Strongroom/record room doors, ventilators**strongroom and vault doors**

- a) strongroom and vault doors: SANS 949
- b) required marking: manufacturer's name on outside of door; door category on inside of door.

fire-resisting record room doors

- c) fire-resisting record room doors: SANS 1015
- d) required marking: "FIRE RESISTANT ONLY", manufacturer's door number

ventilators for strongrooms

- e) double ended steel telescopic ventilator sleeves of <127 x 127 mm internally and *suitable* for wall thickness, fitted with baffle plates and flame proof wire gauze screen; face plates < 225 x 225 mm on both sides, the outer face plate fitted with drop shutter mechanism operating from a fusible metal plug; sleeves and baffle plates not less than 2 mm thick

installation

- f) bolt strongroom door(s) to walls with lugs provided
- g) in openings formed in walls after plastering has been completed

- h) according to manufacturer's instructions
- i) grout in solid with class I mortar
- j) door to clear finished floor by 25 mm
- k) build in ventilator(s) into openings formed in the walls in class I mortar, grouted in solid.

10.15 Solar control

Solar control devices: as specified.

11 Plaster, screeds, toppings, terrazzo

11.1 Plaster

11.1.1 Cement plaster

Applicable standard: SANS 2001-Construction Works Part EM1: Cement Plaster.

Specification data:

- a) sand: SANS 1090
- b) admixtures: not permitted

additional items

- c) form drip ledges on the exposed bottom edge of slabs and lintels
- d) maintain full width structural joints through plaster
- e) score plaster surfaces to be tiled.

11.1.2 Gypsum plaster

- a) hardwall gypsum skimming plaster: proprietary retarded hemi-hydrate finishing plaster
- b) application: to supplier's instructions
- c) do not mix gypsum-based plaster with plaster made with common cement.

11.1.3 Lime plaster

- a) lime: SANS 523
- b) mix: consult SANS 523 annex C.

11.1.4 Insulating plaster

- a) aggregate of low density: SANS 794, density 800 – 960 kg/m³ (clinker), or as specified
- b) mix: 1:9 or according to supplier's instructions
- c) low-density foamed mixes by specialist suppliers: prohibited without permission.

11.1.5 Barite plaster

- a) plaster grade barium sulphate (BaSO₄)
- b) mix: one part cement to two parts sand to three parts barite by mass
- c) thickness: 15 – 30 mm.

11.1.6 Accessories

expanded metal

- a) expanded metal: SANS 190, hot dip galvanized in external plaster, stainless steel in corrosive atmospheres
- b) angle rounded corner protection: 1 500 x 1,0 x 35 mm girth strip

11.2 Screeds, toppings, terrazzo

Invoked standard when required: SANS 10109 Part 2 Finishes to Concrete Floors.

11.2.1 Materials

cement and aggregate

- a) cement for screeds: SANS 50197-1 type CEM I or CEM II
- b) cement for toppings: SANS 50197-1
- c) cement extenders: SANS 1491

- d) aggregate for screeds: concrete sand (not a plaster sand) passing through a 5 mm sieve; where a smooth surface is required, concrete sand may be blended with plaster sand in the proportion of 4:1
- e) aggregate for toppings: aggregate from natural sources: SANS 1083

| Nominal aggregate size, mm | Minimum thickness of topping, mm |
|------------------------------------|----------------------------------|
| 6,7 | 25 |
| 13 | 40 |
| ¼ thickness of topping, maximum 19 | >40 |

- f) aggregate for terrazzo: marble aggregate consisting of equal parts of sizes ranging from 3 to 4 mm and 4 to 6 mm

proprietary surface treatments

- g) form: dry shakes, coatings or screeds as specified
- h) colouring pigment: BS 1014 or BS EN 12878

joint sealants

- i) sealants: see Section 6

mesh reinforcement

- j) welded steel fabric for reinforcement of topping when specified: SANS 1024, of fabric reference number 193 or 245

water

- k) water for mixing: drinking water

edge, dividing, feature strips

- l) see Section 16.

11.2.2 Mix

screed

- a) 1 part cement to 3½ parts sand, or 50 kg (one bag) cement to 130 L sand (two wheelbarrows)
- b) mixing: by hand or preferably by forced-action mechanical mixer for 3 minutes
- c) use within 45 min.

topping

- d) mix proportions of specified grade may be arrived at by a process of mix design or by the use of recognised tables of trial mixes with South African aggregates

terrazzo

- e) 1 part cement to 2 parts marble aggregate

consistency

- f) slump: 40 – 50 mm as measured by the standard slump test SANS 5862

colouring pigment

- g) application: mix with dry cement, or add to freshly laid surface as a dry shake

11.2.3 Preparation

- a) ensure all piped services are in position in base; do not bury services in topping or screed
- b) ensure base concrete is hard and strong, free of cracks and reasonably accurate to required level; expose clean hard concrete by chipping if necessary and remove all dust, preferably using an industrial vacuum cleaner
- c) wet surface for four hours before laying, only if concrete is absorptive; remove free water before grouting (test concrete for absorptiveness by pouring a cupful of water onto the surface; if water is absorbed within a few minutes, suction warrants that the surface should be wetted; if not, do not wet)
- d) prepare bay forms for toppings to coincide with joints in base
- e) ensure edge/dividing/feature strips are in position.

11.2.4 Laying

- a) make up grout by mixing about ½ L water per kg cement, or a proprietary bonding agent, and brush over surface 10 to 20 minutes before applying screed or topping; apply bonding agent *according to manufacturer's instructions*; use within 30 minutes of mixing
- b) spread mix, compact, and lightly wood-float to required thickness

screed

- c) lay guide strips of screed mix to establish levels
- d) lay screed in panels as large as possible in one operation without intermediate joints
- e) lay screeds not to be covered with a floor finish in panels not exceeding 9 m² or to acceptable pattern
- f) screed thickness: 25 – 50 mm
 - on stair treads: 20 mm
 - on stair risers and skirtings: 10 mm
 - on flat concrete roofs to receive waterproofing: minimum thickness 40 mm and to fall
- g) exposed salient angles: round to 20 mm radius

topping

- h) establish levels by means of bay forms
- i) cast bays in chequerboard fashion in panels not exceeding 9 m² or cast continuously and saw contraction joints as described under JOINTS
- j) topping thickness: 25 – 40 mm
- k) mesh reinforcement: place as close to the upper surface as is permissible

terrazzo

- l) spread screed mix, compact and lightly wood float to 25 mm thickness as described under Screed; set edge/feature/dividing strips into screed to form panels not exceeding 1 m², or to pattern as specified; while screed is still plastic, spread and compact terrazzo mix in bays to thickness of 15 mm and trowel to level surface.

11.2.5 Finishing

screeds and toppings

- a) ordinary finish: leave surface as finished by wood floats to smooth or non-slip finish
- b) hard finish
 - bull-float immediately after levelling before any excess moisture or bleed water appears on the surface
 - leave finish undisturbed for two to four hours (longer in cold weather), remove bleed water and laitance on surface
 - float again, and steel trowel until desired texture is obtained

- use power trowels if areas are large
 - finish with carpet-faced floats or soft brushes or broom to desired texture
- c) do not add water or dry cement at any stage; do not trowel too soon; avoid over-trowelling

pigmentation

- d) integral application: lay mix in two thicknesses in one operation, the lower unpigmented thickness brought up to 6 mm of the finished level, and the upper pigmented thickness laid with the required amount of pigment mixed with the dry cement before adding water
- e) dry shake application: dry-shake pigment to the final surface and trowel in to an acceptable finish and pattern

grinding and polishing

- f) grind surface after four days by wet mechanical process until aggregate is fully exposed and surface is even and smooth or non-slip as required
- g) grind small or awkward surfaces by hand with carborundum stone
- h) wash clean.

11.2.6 Joints

isolation joints

- a) against walls, columns or other fixed objects
- b) 20 mm wide through full thickness of topping, screed or terrazzo
- c) to coincide with isolation joints in base

intermediate sawn contraction joints

- d) in continuously cast unreinforced topping only
- e) saw halfway through topping thickness with concrete saw
- f) form panels not exceeding 9 m², or to pattern as specified
- g) arris-round top edges of joints with a radius of 3 – 5 mm

patent movement joint systems

- h) patent movement joint system with flexible inserts when specified
- i) fix through pre-drilled holes using cross-head stainless steel screws and plugs at 300 mm centres on both sides of joint.

Joint sealing

- j) seal joints with a suitable elastomeric material when specified
- k) joints subjected to heavy traffic: fill with a *suitable* semi-rigid epoxy

11.2.7 Surface regularity

- a) degree of surface regularity: II (SANS 10155) 5 mm along a 3 m straight-edge in any direction, and gradual, or as specified
- b) deviation of floor finish from datum level: ±15 mm and gradual; less near door openings or other defined areas where levels must be accurate.

11.2.8 External thresholds

- a) remove one masonry course of foundation wall over width of door opening
- b) place metal edge strip against exposed surface bed
- c) cast concrete topping grade 20 threshold between reveals, sloping away from door, or lay precast threshold
- d) finish threshold with a non-slip finish or 75 mm wide reeding, stopped 100 mm from threshold ends.

11.2.9 Edge strips

- a) see Section 16 for hardware
- b) under internal doors
 - where floor finish changes material or pattern
 - so placed that floor change is not visible when door is closed
 - top edge of strip to be level with finished floor
- c) under external doors
 - top edge level with finished internal floor
 - with external exposed threshold 5 mm lower.

11.2.10 Skirtings

- a) 75 mm high of same material as floor finish and in same operation
- b) hollow rounded at junction between floor and skirting, top edge level with slightly rounded edge
- c) to project 10 mm from face brick and bagged wall surfaces, 5 mm from face of plastered walls, and flush with tiled wall surfaces.

11.2.11 Curing

- a) cure finish for at least seven days by
 - uniform application of a liquid membrane-forming compound complying with AASHTO M148 type 1-D or type 2 to manufacturer's instructions, or
 - ponding water on surface, or
 - covering with sand which is kept moist, or
 - covering with plastic sheeting
- b) extend curing time in cold weather when ambient temperature falls below 10°C.

11.2.12 Inspection, testing and repair

- a) inspect screed or topping as late as possible in the construction program
- b) test adhesion of screed or topping to base by tapping surface with a hammer or end of a rod; hollow sound indicates lack of adhesion
- c) isolate rejected panels by sawing with a mechanical concrete saw in an acceptable pattern, remove and relay, using the same procedure as above, starting with preparation of the base.

11.2.13 sealing

Seal floor surface as specified.



12 Tiling

12.1 Materials

ceramic wall and floor tiles

- a) ceramic wall and floor tiles: SANS 1449
- b) porcelain tiles, fully vitrified: SANS 13006 group B1a, water absorption $\leq 0,5\%$
- c) moisture expansion limit: $<0,06\%$ for external floors, and for internal floors in wet and/or cold areas
- d) scratch hardness on the MOHS scale: >4 for walls; >7 for floors
- e) required marking on tile and/or packaging: trade name, country of origin, group, dimensions, class of resistance of glazed tiles to acids and alkalis, surface abrasion resistance of glazed tiles

stone tiles

- f) natural stone: from a South African quarry
- g) cast stone: BS 1217

concrete tiles

- h) precast concrete tiles: SANS 541
- i) terrazzo tiles: precast concrete with a terrazzo facing: BS EN 13748

mosaic

- j) tesserae glued to brown paper or water-resistant synthetic mesh fabric in squares of about 300 x 300 mm

profiled and decorative tiles

- k) skirting, dado, bullnose and other profiled or decorative tiles: as specified.

accessories

- l) movement joint strip: of depth that allows fixing to the substrate or background
- m) stair nosing and movement joint strip: with polyurethane or PVC infills.

adhesive

- n) proprietary adhesive BS EN 13007, of *suitable* type
- o) adhesive and associated systems: from one manufacturer

grout

- p) proprietary grout: BS EN 13007 of *suitable* type and colour
- q) use epoxy grout in areas where hygiene is important.

12.2 Tiling

Invoked standard when required: SANS 10107 Design and Installation of Ceramic Tiling

preparation

- a) complete all adjacent rough construction work and install and test all services in background before commencing tiling work
- b) examine backgrounds, remedy defects and allow to dry to equilibrium moisture content; remove dust, loose matter, efflorescence and laitance
- c) in the case of smooth and dense concrete: key surfaces with a priming agent as recommended by the adhesive manufacturer prior to application of the adhesive
- d) set out field, border and pattern, when relevant

bedding

- e) bed tiling units in adhesive *according to tile and/or adhesive manufacturer's instructions*
- f) use white tile adhesive for white marble or marble with a delicate colour
- g) bed field tiles with straight joints in both directions, or as specified
- h) cut wall field tiles only along edges and bottom of field
- i) continue floor patterns through openings connecting areas with similar tiling
- j) internal sills where walls are tiled: joints to coincide with wall tile joints when of similar material
- k) external sills
 - lay tiles symmetrically about opening, with cut tiles at sill ends
 - to slope and projection as specified
 - tuck tiles under and behind drip in wood or aluminium window frames, and under leg of steel window frame
 - bed window frame lugs solid in mortar – do not remove or bend
- l) lay shower thresholds sloping towards shower
- m) return wall tiling into reveals of openings.

12.3 Jointing

joint width

- a) consistent throughout
- b) pressed ceramic tiles:
 - internal: 2 mm
 - internal for large format wall tiles: >3mm, regardless of any instruction from the tile manufacturer
 - external: >3 mm
- c) extruded floor tiles: 6 – 10 mm
- d) terrazzo tiles: 1,5 – 3 mm
- e) stone tiles: butt-joined

joint depth

- f) at least equal to thickness of tile but >6 mm

grouting and pointing

- g) grout joints of width <3 mm; point wider joints
- h) apply proprietary grout mixes *to manufacturer's instructions*
- i) use epoxy compound or acid-proof cement mortar if tiles are specified as acid-proof
- j) work grout into joints with a squeegee until joints are filled flush with surface
- k) tool joints to level surface slightly below tile edge.

12.4 Movement joints

in situ movement joints

- a) form by a temporary filler strip that is removed when tiling is sufficiently firm, leaving a clean and straight open joint
- b) seal with an elastomeric material – see Section 6

preformed compression joint strip

- c) PVC or metal angle edges with *suitable* flexible infill
- d) extend to substrate and key into adhesive bed or fix through pre-drilled holes using *suitable* fixers as tiling proceeds
- e) level with, or slightly below, floor surface

- f) do not use in areas where hygiene is important

isolation (perimeter) joints

- g) isolation joint width: 10 mm
h) form around perimeter of floor, columns, kerbs, steps and plant bases
i) form joint adjacent to skirting in areas where hygiene is important
j) seal with an elastomeric material – see Section 6

intermediate joints

- k) to same width as grouted tile joint
l) position:
 - at 3 m centres maximum externally, or internally in wet areas or in areas where large thermal movement or vibration is expected
 - at 10 m centres maximum internally in areas of up to 500 m² of floor
 - at 5 m centres maximum internally in areas exceeding 500 m² of floor
 - over supporting walls or beams on suspended concrete or timber floors
 - where different background materials meet

m) adjust spacing to coincide with structural features like columns
n) seal with an elastomeric material – see Section 6

structural joints

- o) joint width: same as structural joint width in substrate
p) to align with structural joints in the substrate or background
q) in the case of structural joints in substrates or backgrounds being irregular, not straight, or not coinciding with that of the tiling: obtain a decision as to its treatment
r) seal with an elastomeric material – see Section 6

12.5 Cleaning

- a) sponge tiled surface with water and polish with clean, dry cloth
b) do not use acid cleaners, scouring powder or abrasive cleaning materials
c) protect absorbent floor finishes (for example quarry tiles) with an application of non-slip wax polish or *suitable* proprietary sealer.

13 Floor coverings, wall linings

13.1 Preparation

- a) complete all building operations that may damage the floor or lining before laying flooring or lining
- b) ensure embedded pipes, conduit, cables etc. are in position and tested
- c) ensure substrate is dry and clean; in case of porous or dusty base, apply primer to improve bond between base and adhesive when relevant
- d) rectify any defects in base; apply levelling or smoothing compounds only to repair minor surface irregularities, and *according to manufacturer's instructions*
- e) ensure edge/dividing/feature strips are in position when specified (see section 16)
- f) ensure sufficient acclimatisation period for the material, when relevant.

13.2 Materials

primers and adhesives

- a) primers, adhesives, additives, patching and repair compounds and waterproofing compounds shall be low-VOC proprietary products supplied by one manufacturer, suitable for the job at hand, compatible to the floor covering and substrate, applied in accordance with the manufacturer's instructions
- b) adhesive shall be single-pack elasticised adhesive or an adhesive as recommended by the manufacturer.

13.3 Thermoplastic and similar flexible covering

Invoked standard when required: SANS 10070 The Laying of Thermoplastic and similar Flexible Floor Covering Materials

13.3.1 Materials

- a) semi-flexible vinyl tiles *SANS 581*
- b) flexible vinyl flooring: *SANS 786*
- c) linoleum sheeting or tile: as specified
- d) rubber sheeting or tiles: recycled rubber of density between 800 to 1500 kg/m³, of light colour and of thickness, size, and texture as specified
- e) accessories: skirtings, trim, nosings etc. as specified.

13.3.2 Laying

- a) according to manufacturer's instructions
- b) set out pattern as specified; continue pattern through door openings connecting rooms with similar flooring
- c) weld joints in sheet flooring

finishing

- d) clean and polish floors with two coats polymer floor dressing *SANS 1042*.

13.4 Wood flooring, solid and laminate, on solid substrates

Invoked standard when required: *SANS 10043* The installation of wood and laminate flooring.
Traffic class when relevant: as specified.

13.4.1 Materials

- a) unpack solid wood panels, store dry and under cover, allow free air circulation to bring panels to equilibrium moisture content

solid wood strip, block, parquet, mosaic

- b) density: >640 kg/m³ at moisture content of 12 %
- c) strip to be tongued, grooved and end-matched
- d) block dimensions: face width 57—90 mm, length 200—500 mm, thickness >20 mm
- e) parquet flooring: >6 mm thick

faced plywood or fibreboard

- f) factory assembled in panels of random lengths, and in widths up to 300 mm depending on species
- g) thickness: not less than 18 mm when laid on battens
- h) edges: tongue and grooved to produce a tight sliding fit and a flush joint on face side of strip, and end-matched

decorative melamine laminate

- i) decorative melamine laminate flooring: EN 13329
- j) thickness: 8 mm
- k) *suitable* for floating application to a fully supporting substrate
- l) provided with patent interlocking system
- m) built-in insulating underlay: when specified

adhesive

- n) single-pack elasticised adhesive or an adhesive as recommended by the manufacturer

battens

- o) battens: sawn softwood timber to comply with SANS 1783-4, size 40 x 20 mm minimum thickness
- p) battens for sprung floors: 50 x 50 mm laminated softwood

damp proof membrane

- q) over-slab damp proof membranes shall be new polymer film SANS 952 class C (green) or an Agrément certificated polyethylene sheet at least 0,2 mm thick.

movement joints

- r) patent movement joint strip: see Section 16.

13.4.2 Installation

preparation

- a) ensure partitions are in place before floating floors are laid

installation in general

- b) not over underfloor heating without written approval of the flooring manufacturer and/or the installer
- c) lay panels or strips in same direction as angle of light incidence; where this is not important, lay parallel to longest side of room
- d) continue pattern through door openings connecting rooms with similar flooring
- e) movement joints: allow 20 mm clear space against all fixed objects including door frames, and every 10 m in both directions
- f) stop or cut back plaster finish on walls short of finished floor level when required to ensure skirting covers the joint

nail down

- g) lay damp-proof membrane over concrete substrate on the ground; lap sheets by 300 mm
- h) fix battens at 400 mm centres to substrate except in case of sprung floors where battens are to be laid floating on *suitable* resilient pads
- i) fill space between battens with cement:sand mix when underfloor heating is installed
- j) secret-nail flooring strips to battens through the tongue at an angle of 45°; header joints may occur in the spaces between battens, provided that each length of flooring is nailed to at least two supports; header joints to be random staggered

glue down

- k) spread adhesive evenly on substrate with a serrated trowel
- l) place panels accurately on setting out lines
- m) tap firmly in position within open time of adhesive

floating

- n) lay damp-proof membrane over concrete substrate on the ground; lap sheets by 300 mm
- o) lay foam underlay as recommended by manufacturer over entire floor area
- p) join panels with patent click jointing system; random stagger end joints
- q) use manufacturer's accessories for intermediate joints, movement joints, skirtings, split-level treatments, nosings, and marrying to other flooring materials

finishing solid flooring

- r) when relevant, ensure adhesive has completely cured before starting sanding operations
- s) sand with mechanical floor sander in one operation (fine only) to smooth and even surface
- t) finish untreated wood floors with one coat clear wax polish

finishing faced plywood or fibreboard panels

- u) prefinished panels: clean down
- v) panels having to be sanded: make absolutely certain of the process before attempting this work, and obtain prior permission.

13.5 Textile flooring

Invoked standard when required: SANS 10186 The Installation of Textile Floor Coverings.

Invoked standard when required: SANS 13746 Textile Floor Coverings – Guidelines for Installation and Use on Stairs.

Invoked standard when required: SANS 2424 Textile floor coverings – vocabulary.

13.5.1 Materials**textile flooring**

- a) textile flooring (pile construction): SANS 1375
- b) textile flooring (needle punched construction): SANS 1415

carpet underlays

- c) carpet underlays: SANS 1419, with fire and location grade similar to floor covering grade

accessories and fixing materials

- d) as recommended by carpet manufacturer
- e) stair nosings to have distinct colour difference from carpet
- f) use non-flammable contact adhesive where fire ratings are critical.