



Department: Public Works REPUBLIC OF SOUTH AFRICA

CONSTRUCTION WORKS: SPECIFICATIONS

PARTICULAR SPECIFICATION

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Particular Specification

(read with PW371-A)

This specification falls under the Scope of Work as defined in *Standard for Uniformity in Construction Procurement*, published by the Construction Industry Development Board (CIDB), and is based on national or international standards, where such exist.

□ NOTE TO THE COMPILER

> Make an office print-out of this part of PW371 for marking up during documentation.

> Delete irrelevant clauses and add variations or additional requirements where necessary. Do not change heading numbers – they should correllate with PW371-A.

> Choose the desired attribute or value where choices are separated with a double space-slash-double space. Delete unwanted attribute(s) or value(s). Asterisk (*) denotes the preferred attribute or value.

> The specification data for SANS 2001 standards as listed in this publication is for guidance only. See Annex A of the relevant standard for the full list of specification data, and follow instructions when required.

> Where the reader is directed to <see drawings>, ensure the relevant item is shown in the drawings.

> Dimensions presented are preferred dimensions according to the relevant SANS standard. Check availability or other dimensions with manufacturers/suppliers.

> Delete all guidance notes (framed text) on completion (click just outside frame on text box and press <delete>).

> Print out and hand in with drawings.

□ NOTE TO THE TYPIST

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> Heading 1 has autonumbering on (to keep footer text intact).

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> To update the Table of Contents, click anywhere on the table to highlight and press F9.

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1 Earthworks

1.1 Site clearance

Applicable standard: SANS 2001 – Construction Works Part BS1: Site clearance

Specification data¹:

SANS 2001 standard specifications are deemed to satisfy the provisions of SANS 10400.

SANS 2001-BS1 covers removal of vegetation, fences, guard rails and posts, litter and building rubble, boulders of size up to 0,15 m3, and surface and subsurface obstructions, and demolition and removal of structures (including their basements, if any), not directly associated with or incidental to any excavation.

□ designated area/site in which work is to be carried out: see drawings

- □ level of finished earthworks: see drawings
- □ site clearing activity numbers: ...

1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 / 11 / 12

1 removal and disposal of vegetation; 2 removal and disposal of structures by means of bulldozing; 3 demolition, breaking up and removal of buildings to ground level; 4 demolition, breaking up and removal of underground structures; 5 ditto septic tanks, soak pits; 6 ditto litter, rubble, rocks on surface; 7 removal and stacking of re-useable materials; 8 removal of asphalt layers; 9 removal of paving; 10 removal of kerbs, channels, haunching; 11 scarifying, ripping to blocks <200 mm; 12 removal of disused foulwater and stormwater drains and watermains

□ description of materials to be reused: ...

Activity 7 requires description of reuseable materials

□ depth of underground structures to be demolished: see drawings

Activity 4 requires depth of demolition of underground structures to be specified.

□ depth for ripping or excavation: see drawings

Activity 11 requires depth for ripping or excavation to be specified

□ designated sites for disposal of materials: see drawings

□ designated sites for disposal of reusable materials: see drawings

□ trees, turf, plants, bushes, shrubs and flora to be preserved and/or replanted: see drawings

Look up tree distance guidelines in SANS 10400-H Annex E.

□ topsoil: select and stockpile

Topsoil is mostly a precious commodity.

1.2 Earthworks (general)

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

Specification data:

SANS 2001-BE1 covers: excavation, filling, compaction and finishing of general excavations for buildings, bridges and structures, terracing, landscaping and private railway sidings, carried out with heavy construction equipment or light construction equipment, or by hand.

- □ topsoil: select and stockpile
- areas where surplus and unsuitable materials shall be disposed of: see drawings
- □ areas to be topsoiled: see drawings

¹ The specification data for SANS 2001 standards as listed in this publication is a selection of importance mainly for buildings. See Annex A of the relevant standard for the full list of specification data, and follow instructions when required for civil works.

- □ areas to be grassed or vegetated: see drawings
- □ degree of accuracy required : II

Relevant standards:

SANS 10400-F Site Operations.

SANS 10400-G Excavations.

To be published: SANS 2001- Construction works Part BE2: Earthworks (small works).

2 Concrete works

2.1 Structural works (SANS 2001-CC1)

Omit this part if not relevant, or SANS 2001-CC2 Concrete Works (Minor Works) is specified.

SANS 2001-CC1 covers: structural concrete in buildings and structures where the design and supervision of reinforced, prestressed and precast concrete are under the direct control of appropriately qualified engineers and technologists. Does not cover piles, harbour and marine works, and underground works in mines.

Specification data:

materials

□ strength concrete grade: see drawings

10 / 15 / 20 / 25 / 30 / 40

Omit if prescribed mix concrete is specified.

Contractor is responsible for design of strength concrete.

Strength concrete is designated by its characteristic strength followed by the size of stone used in its manufacture, for example, grade 30/19 refers to a 30 MPa mix made with 19 mm stone. Stone size has little influence on strength but does affect workability and water demand.

Grades for typical applications are

10 (plain [unreinforced] concrete strip foundations, or surface beds where the slab does not serve as the final wearing surface);

15 (plain concrete strip foundations, floors on the ground that will serve as the final wearing surface);

20 (reinforced concrete subject to non-aggressive (dry) conditions; base courses of lightly loaded floors (no trucking) and one-course domestic and office floors on the ground that will serve as the final wearing surface; landscape footpaths);

25 (general reinforced concrete construction in buildings, bridges, culverts, silos, machine foundations, slabon-the-ground foundations, unplastered walls above ground);

30 (machine foundations subject to vibration and shock; concrete roads; paving and floors on the ground to carry fork-lift trucks), precast concrete;

40 (specially watertight walls and tanks; highly stressed rc members; precast structural units; concrete subject to severe vibration and shock, abrasion and wear).

prescribed mix concrete: SANS 2001-CC2 table 5 / ...

Omit if strength concrete is specified. SANS 2001-CC2 table 5 (19 mm aggregate) and table 6 (13 mm aggregate) contains generic prescribed concrete mixes for strength grade 10, 15, 20, 25, 30, or specify bespoke requirements.

□ characteristic strength of tendon steel for prestressing: ...

- □ joint fillers, sealants, waterstops, bearings and accessories: ... / see Section 6
- □ steel joint cover plate finish: not galvanized / galvanized

off-form surfaces

□ concrete off-form surface finish (smooth-special): steel forms, uniform texture, appearance and colour

Specify special off-form and exposed aggregate surfaces only with permission: timber boards, special patterned finish (hardboard, rubber, plastic), brushed, tooled, sand-blasted or aggregate transfer. See SANS 2001-CC1 table 1.

construction joints

□ type: see drawings

construction joint / movement joint / contraction joint / expansion joint

In general, in off-form surfaces, construction joints should be shown where a day's casting starts and ends, e.g. bottom and top of slab/column.

□ joint sealing requirements: see Section 6

SANS 2001-CC1 specifies the finishing of exposed horizontal cast in situ concrete surfaces excluding industrial floors. Public ramps must have a safe gradient and frequent landings for disabled persons. Check with SANS 10400-S. See note on stairways at end of section.

- □ parts of the structure which need to be watertight: see drawings
- □ degree of accuracy required: II

precast/prestressed concrete

- □ surface finish required to precast units: special off-form / exposed aggregate / mosaic / ...
- □ prestressing particulars: ...
- □ order of loading and magnitude of load for each component of prestressing tendon: ...
- □ prestressing test requirements: ...
- □ position of lifting and supporting points, method of lifting, type of equipment and transport used in handling and erection of precastunits:...
- □ method of assembly and erection of precast units: ...
- □ design requirements for structural connections of precast units: ...
- □ degree of accuracy required: II

additional requirements

□ low-density concrete if not breeze (clinker) concrete at 800-960 kg/m³

60-160 (vermiculite) / 120-240 (perlite) / 450-720 (foamed slag) kg/m³

□ form drip joint or downstand under all exposed off-form slab edges; chamfer exposed edges of off-form columns, slabs, joints etc.; use standard plastic joint formers

2.2 Minor works (SANS 2001-CC2)

Omit this part if SANS 2001-CC1 is specified.

SANS 2001-CC2 covers concrete works in foundations, slabs, stairways, masonry walls, pipelines, manholes, latrines, conservancy tanks, septic tanks and the like where the design and supervision of plain, reinforced and precast concrete are not necessarily under the direct supervision of approved, qualified engineers and technologists and no special finishes to the concrete are required. Use SANS 2001-CC1 when special finishes are required.

Specification data:

□ horizontal surfaces that need to be non-skid: see drawings

2.3 Foundations (SANS 2001-CM2)

SANS 2001-CM2 covers construction requirements for strip footings, pad footings and slab-on-the-ground foundations to receive masonry walling, and the construction of lightly loaded concrete surface beds.

Specification data:

□ site class designation: see drawings

R / H / C / S / P / H1 / C1 / S1 / H2 / C2 / S2 / H3

R rock; H heaving (expansive) soils; C collapsible soils; S compressible sand; P fill, dolomite, marshy areas, mine waste, very soft clays. Site class designations R, H, C,S indicate that the expected range of total soil movements arising from ground movements is such that no special precautionary measures are required to minimize the effects of differential ground movements on buildings. Number denotes higher range of movement. Behaviour of P is variable and the reason for such classification should be given in brackets, e.g. P (fill).

 foundations: in accordance with the requirements of SANS 10400-H for strip footings, slab-onthe-ground foundations or modified normal construction for category of expected damage 1 or 2 / rational design by competent person

See SANS 10400-H for geotechnical and/or structural solutions for foundations on problem soils.

- construction of steps in foundations in excess of 400 mm: see drawings
- □ minimum founding depth: see drawings

Required where the geotechnical report indicates a deeper requirement than that provided for in SANS 10400-H.

additional requirements

□ protection against termites: SANS 10124.

2.4 Concrete floors and paving on the ground

industrial floors: direct-finished one course slab as designed and constructed to SANS 10109 under direction of a competent person

Direct-finished one-course concrete floors on the ground are superior to concrete bases with screed or topping, and should be used if floor is to be left as is, or if to be covered with resilient floor finishes like thermoplastic tiles or carpet.

concrete

□ concrete grade: see drawings

20 / 30

Show grades on drawings.

Default: (grade 20 for base courses of lightly loaded floors [no trucking] and one-course domestic and office floors on the ground that will serve as the final wearing surface, or grade 30 for paving and floors on the ground to carry fork-lift trucks) is acceptable.

damp-proof under-surface membrane

DPM under floor area: required / not required

Dpm normally not required under external floors.

fabric reinforcement

□ fabric reinforcement ref. no. 100 / ... / not required

□ floor/paving thickness: see drawings

Floor thickness ranges between 120 and 360 mm, depending on loading, use

placing

□ levels and gradients: see drawings

joints

□ joint sealing: left open / sealed

Joints should be sealed when the floor is used under wet conditions, or where hygiene or dust has to be controlled.

2.5 Strongrooms

□ fire rating, burglar resistance and wall thickness class: see drawings

1 / 2 / 3 / 4

Class: 1 (4h, no burglar resistance, 200 mm wall, 125 mm floor/ceiling); 2 (4h, limited burglar resistance, 300 mm); 3 (4h, medium burglar resistance, 450 mm); 4 (4h, high burglar resistance, 525 mm)

NOTE ON STAIRWAYS

The rule in SANS 10400 – M of a minimum going of 250 mm and a maximum rise of 200 mm often leads to a disregard for two other rules, i.e, "*the dimension of each step of the stairway shall be such that the sum of the going and twice the riser is not less than 570 mm and not more than 650 mm*", and "*any stairway … shall have dimensions appropriate to its use*" (NBR part M Stairways). A maximum rise of 180 and a minimum going of 280 is a more comfortable and safer proportion, and should be used in most public buildings.

The full range of a more comfortable and safer proportion would be (rise/going):

180/280 mm; 170/280 - 320 mm; 150/280 - 350 mm; 120/280

3 Masonry

3.1 Masonry Walling (SANS 2001-CM1)

SANS 2001-CM1 Masonry Walling covers requirements for masonry walls, materials, the laying of masonry units in unreinforced and reinforced applications, the building in of door and window frames, holes and chases, the securing of timber roof structures and the fixing of slips.

Specification data:

masonry units

Bricks and blocks are collectively termed *masonry units*, whether solid or hollow. A block has dimensions which satisfy any one of the following conditions: a length of 300–650 mm, width of 130–300 mm, or height of 120–300 mm.

□ type: burnt clay / concrete

□ masonry units: SANS 2001-CM1 clause 4.1.1.3

Omit if masonry units to SANS 227 and SANS 1215 are specified.

SANS 2001 CM1 clause 4.1.1.1 states "Masonry units shall comply with the requirements of either 4.1.1.2 (SANS 227 and SANS 1215) or 4.1.1.3". Clause 4.1.1.3 is a generic description, which may be more practical in areas where bricks to SANS 227 are unobtainable. Specify to clause 4.1.1.3 only with permission.

burnt clay masonry units (SANS 227*2)

Omit if requirements of SANS 2001-CM1 clause 4.1.1.3 are acceptable.

□ nature of face unit: hollow / solid / contractor's choice

□ class of face units: FBS / FBX / FBA

Class E bricks are any class of masonry unit produced for structural or load-bearing purposes in face or nonface work, and is supplied to an agreed compressive strength e.g. FBSE2, where the number equals the nominal compressive strength in megapascals.

nominal dimensions: 222 x 103 x 76 mm

See SANS 227 for modular sizes, e.g. 190 x 90 x 90 mm.

□ colour of face units: ...

concrete masonry units (SANS 1215*)

Omit if requirements of SANS 2001-CM1 clause 4.1.1.3 are acceptable.

- □ nature of unit: hollow / solid
- \Box colour of face units: ...
- □ nominal dimensions: 190 x 90 x 90 / 290 x 90 x 90 / 390 x 90 x 190 / 390 x 190 x 190 mm

mortar

□ sand: SANS 1090*

Omit if default (clause 4.1.4.1) is acceptable.

Clause 4.1.4.1 states that "Sand shall either comply with all of the following requirements or, if required in terms of the *specification data*, the requirements of SANS 1090 for mortar sand (natural or manufactured)"

mortar class: II

² Asterisk (*) denotes the preferred attribute or value.

Class I mortar is *suitable* for highly stressed masonry, e.g. multi-storey loadbearing buildings; class II is *suitable* for normal loadbearing applications, including parapets, balustrades, retaining structures, freestanding and garden walls, and walls exposed to severe dampness; class III mortar (not mentioned in SANS 2001-CM1) is *suitable* for lightly stressed bearing walls where exposure to dampness is not severe, or for renovation to unburnt clay masonry walling.

pigments for mortar: ...; colour: ...; other requirement(s): ...

reinforcement

□ prestressing steel (hot-rolled bars or high tensile steel wire and strand) : ...

Provide particulars or omit if not required.

NOTE on metal wall ties: SANS 204 requires masonry walls enveloping habitable portions of the building fabric in all climatic zones to be cavity or insulated cavity walls. Note that existing wire tie types may not be able to be centred centrally <u>and</u> conform to the minimum embedment rule of 50 mm. Note that crimp wire ties are not for use on cavity walls.

work

□ face work jointing: struck* / flush / recessed / drip

Struck (half-round) joints are denser with better resistance to water penetration. Flush joints require careful cleaning of face work. Face work includes fair face work.

face work pointing shape, colour: ...

Pointing is the raking out of brickwork joints 20 mm deep, then filling with mortar, usually coloured. Joint faces can be left flush, projecting, or shaped in the same way as jointing.

multi-leaf wall bond: stretcher and brickforce / English bond (header course every second course) / collar-jointed bond

SANS 2001-CM1 specifies collar-jointed walls as default. Collar-jointed walls have a narrow cavity (<25 mm) between the leaves (the collar joint) which is filled solid with mortar or grout as the work progresses (not to be confused with *grouted cavity* construction where the cavity is wider and filled with concrete). Collar-jointing is intended for walls that require an effective thickness equal to the actual overall thickness of the wall. The success of this construction depends heavily on proper supervision. Collar-jointing is not mentioned in SANS 10249 Masonry Walling.

position of control and articulation joints: see drawings

additional requirements

wall type: see drawings

single leaf / multileaf / cavity / insulated cavity / grouted cavity / sealed multileaf

Sealed multileaf walls (outside face of inner leaf treated with a bitumen sealer) may be used in place of cavity walls in areas of prolonged, heavy, wind-driven rains, or where wall is faced with masonry-type facings (see *Masonry-type facings*)

□ special shape face bricks: see drawings

single bullnose / double bullnose / single cant / double cant

□ lintels in face work: see drawings

bed joint reinforced masonry / prestressed concrete lintels / galvanized steel / wood

For timber lintels see Section 4.

□ cavity reveals around windows/doors: open / closed / see drawings

In energy rated buildings, at cavity reveals around openings, cavity insulation should continue up to window or door frames to prevent thermal bridging, therefore "open".

A bituminous damp-proofing type may be required where bituminous waterproofing is to be bonded to damp-proofing – see Section 8.

3.2 Glass blockwork

glass blocks

□ nominal dimensions: ...

- □ surface pattern: ...
- □ opacity: ...
- □ colour: ...

3.3 Stone masonry

Loadbearing stone masonry. For stone cladding see Masonry-type facings.

□ type: rubble / dimension stone

3.3.1 Rubble

Rubble (koppieklip) is stone with irregular faces as found in nature on or near surface.

□ bedding of stones: set in mortar / dry set, with smaller stones to achieve stability.

Dimension stone 3.3.2

□ stone type: freestone / granite / marble / slate / cast stone

Freestone (makklip) is building stone soft enough to be cut with tools and uniform enough to be carved in any direction, typically sandstone.

□ face dressing: plain / polished / rusticated / vermiculated / boasted / drafted margin

□ shape and size: square sawn in modular rectangular sizes / ...

- □ bond to homogenuous pattern: random coursed / regular coursed
- □ jointing: flush / keyed
- □ pointing colour: ...

3.4 Masonry-type facings

SANS 10073 The Safe Application of Masonry-type Facings to Buildings was withdrawn in May 2011 and "replaced" by SANS 10400-K Walls which does not yet touch on this important subject.

Thin panel cladding, e.g. marble, should be rail-fixed, leaving a cavity between facing and backing. The advantages of this system are avoidance of staining of the stone face, more reliable support, faster erection, smaller joints and less dependency on skilled labour. Consult specialist stonework contractors.

Facings wholly dependent on fixing to the backing with proprietary adhesive only may lead to failure.

□ facing type: precast concrete / natural stone / burnt clay units / concrete units of design, size, colour and finish: ...

Joints should be sealed to prevent ingress of water and to provide for thermal and structural movement.

Relevant standards

SANS 993Modular co-ordination

SANS 10021 The waterproofing of buildings (in the case of facings this depends on climatic region, facing material and backing).

SANS 10073 The safe application of masonry-type facings to buildings (withdrawn).

SANS 10145 Concrete masonry construction.

SANS 10164 The structural use of masonry.

SANS 10249 Masonry walling.

SANS 10400-H Foundations.

SANS 10400-K Walls.

SANS 10400-M Stairways.

SANS 10400-P Drainage.

4 Structural timberwork

4.1 Structural timberwork (flooring) (SANS 2001-CT1)

SANS 2001-CT1 covers the installation of suspended timber floors in buildings to be constructed for occupancy class H3 (domestic residence) and H4 (dwelling house) buildings, as described in SANS 10400-J Floors, and that have a distance that does not exceed 7 m between supports, and a beam/joist spacing that does not exceed 600 mm. Modify to make this part of SANS 2001 applicable for the installation of suspended timber floors designed for other occupancies or for greater dimensions between beams or supports. For wood floors on solid substrates see Section 13.

Specification data:

softwood timber joists

□ type: solid / laminated

cross section: see drawings

Omit if default description (to SANS 10400-J) is acceptable.

hangers, masonry anchors

□ size/strength: ...

Omit if default description in SANS 2001-CT1 (hangers: 4,0 kN; masonry anchors: 10 dia x 45 mm length, 2,5 kN) is acceptable.

softwood flooring boards

Omit this part if default description in SANS 2001-CT1 is acceptable. NOTE SANS 629 withdrawn 2012 without replacement. Most req'd data kept except marking.

□ softwood flooring boards:

- □ genus: Pinus / Cedrus / Podocarpus / Cupressus
- □ nature: solid / laminated
- □ grade: clear flooring / select flooring / flooring
- □ density group: light / heavy

Density group: light (400-550 kg/m³); heavy (550 kg/m³, for example squash court floor boards)

cross section: see drawings

Omit if default (50 – 140 x ≥22 mm) is acceptable. Also 33 mm thickness.

- □ length: >1 800 mm when square sawn at ends, >600 mm when matched
- □ finger joints: not prominent

Omit if default (prominent) is acceptable.

hardwood strip flooring

NOTE SANS 281 Hardwood block and strip flooring withdrawn 2009 without replacement.

□ species:...

□ dimensions: ≥460 x 57 – 90 x ≥20 mm

additional requirements

- □ hardwood species: ...
- □ hardwood prefinish: required / not required
- exposed faces of sawn structural timber: planed, sandpapered, and arris rounded to 3 mm radius.

4.2 Structural timberwork (roofing) (SANS 2001-CT2)

SANS 2001-CT2 covers the construction of timber roof assemblies in buildings. It includes the manufacture of bolted trusses that are designed in accordance with the requirements of SANS 10400, the erection of prefabricated timber trusses, the erection of rafters and purlin rafters, the fixing of purlins and battens, and the fixing of brandering to roofing members to support ceilings that comprise gypsum plasterboard, fibre-cement board or similar boards

Specification data:

softwood roofing timber

- □ type: solid / laminated
- □ cross section, grade: see drawings / to SANS 10400-L Roofs / to standard ...

roofing poles ("fence poles" SANS 457)

"fence" poles are normally used for roofs. See also "transmission" poles below

□ roofing pole type: softwood SANS 457-2 / hardwood SANS 457-3 / to standard ...

□ top diameter (thin end, colour-coded) : see drawings

50-79 (red), 80-99 (yellow), 100-119 (blue), 120-139 (white), 140-159 (orange), 160-179 (green), 180-199 (black) mm; ditto posts: 145-174, 175-199, 200-230 mm.

hangers, clips, masonry anchors

□ size/strength: ...

Omit if default requirements (hangers: 4,0 kN; hurricane clips: 1,2 kN; masonry anchors: 10 dia x 45 mm length, 2,5 kN) are suitable.

additional clauses

□ truss type: monoplanar prefabricated rational design to SANS 10243 or SANS 1900 / lapped and bolted within scope of SANS 10400-L/10243

In case of lapped and bolted trusses, show all member sizes and connection details on drawings. SANS 10243 provides guidance on the manufacture, erection and bracing of timber roof trusses. SANS 1900 covers a rational design prepared by a *Competent Person* and inspected by such a person during installation.

□ "transmission" poles, diameter: softwood poles SANS 753 / hardwood poles SANS 754

Omit if "fence" poles to SANS 457 as required by SANS 2001-CT2 are acceptable. "Transmission" poles to SANS 753/754 should only be used when high strength is specifically required. See SANS 753 for lengths, minimum top diameter of poles.

□ gang planks: two 150 x 38 mm softwood grade S5, nailed onto tie beams where shown on drawings / nailed onto tie beams of two adjoining trusses on both sides of geysers

Gang planks for walking/crawling in roof space, when required.

timber lintels type and size: see drawings

softwood / hardwood / structural laminated timber / composite structural plywood web and solid timber flanges; grade: 5 / 7 / 10

4.3 Structural laminated timber (SANS 1460)

material: see drawings

softwood (Pinus) / hardwood (Eucalyptus) / board (fibreboard, plywood, composite board)

- □ exposure class: 1 (exterior), 2 (semi-exterior), 3 (humid interior), 4 (dry interior)
- □ type: G (stocklam) / C (customlam)
- □ appearance and finish: rough-sawn (R), fine-sawn (F), planed (P), sanded (S), smoothed (G), coated (C), special (X)
- □ stress grade: 5 / 7 / 10 / 14
- □ fire retardant treatment: required / not required

 \Box cross section: see drawings.

Relevant standards: SANS 1288 Preservative treated timber. SANS 1900: Monoplanar prefabricated timber roof trusses (nail-plated). SANS 10005: Preservative treatment of timber. SANS 10043:The laying of wood floors. SANS 10082: Timber buildings. SANS 10096: Manufacturing of finger-jointed structural timber. SANS 10163 The structural use of timber. SANS 10243 The design, manufacture and erection of timber trusses. SANS 10400-J Floors. SANS 10400-L Roofs.

SANS 10400-M Stairways.

SANS 10400-T Fire Protection.

5 Structural steelwork

5.1 Structural steelwork (SANS 2001-CS1)

SANS 2001-CS1 covers structural steelwork for buildings and other structures, excluding bridges, offshore structures, mobile equipment (stackers, reclaimers, draglines, cranes, etc.), mine shaft steelwork (buntons and guides) and mining conveyances, but does not cover roof and side cladding, or the detailed aspects of sundry items such as handrails, ladders, steel flooring and the like, neither does it cover protection of steelwork against corrosion or fire.

Specification data:

- □ class and grade of fasteners: ...
- □ format of drawings: ...

State in which format and to which standards each category of drawings shall be prepared.

- □ hole sizes for holding-down bolts in excess of 36 mm diameter: ...
- □ connections to allow movement: ...
- □ requirements for machining: ...
- □ requirements for non-destructive tests on welds: ...

5.2 Sundry steelwork

5.2.1 Material

cold-formed structural steel (SANS 10162)

□ commercial quality steel: permitted if yield stress equals 200 MPa, tensile strength 365MPa; obtain proof.

Cold-formed profiles are often made from commercial quality steel of which the yield stress is seldom less than 210 MPa.

structural steel tubes SANS 657-1

- □ coating: uncoated / hot dip galvanized coating SANS 32 quality B
- □ size/profile: see drawings

Size/profile: 21, 27, 32, 34, 38, 42, 48, 51, 60, 76, 89, 102, 114, 127, 140, 152, 165, 178, 219 mm ø (general purpose); 20 x 20, 25 x 25, 30 x 30, 40 x 40, 50 x 50, 60 x 60, 70 x 70, 80 x 80, 90 x 90, 100 x 100, 115 x 115, 120 x 120, 135 x 135, 140 x 140, 150 x 150, 160 x 160, 175 x 175, 180 x 180 mm (square); 40 x 20, 50 x 30, 60 x 40, 80 x 40, 90 x 50, 100 x 50, 100 x 60, 120 x 60, 120 x 80, 140 x 90, 150 x 100, 160 x 80, 180 x 100, 200 x 100, 200 x 120, 220 x 140, 250 x 150 mm (rectangular)

corrosion resistant (weathering) steel

Corrosion resistant steel also known as COR-TEN, a registered trademark of USX Corporation. Corrosion resistant steel is weldable. Available in sheet (<2,0 mm) and strip (2,5 – 6,0 mm). Consult Mittal Steel.

□ grade: 1 / A

steel wire rope (cables)

- Class: 6 x 7 / 6 x 24 / 6 x 37 / 8 x 19 mm
- □ diameter: 6 / 7 / 8 / 9 / 10 mm.

5.3 Coating

□ type: hot dip galvanising / prepainting / hot dip galvanising and prepainting (duplex system)

Other coating types on steel are vitreous enamel, plastic or protective tape.

SANS 121 provides for one set of coating thickness only – see NOTES at end of Section. Thicker (25%) coatings may be requested without affecting specification conformity. The primary influencer on hot dip galvanized coating is the steel composition. See SANS 14713 for design guidelines.

hot dip galvanising

The Hot Dip Galvanizers Association South Africa (HDGASA) is the industry representative body.

significant (architectural) surfaces: see drawings

NOTE on appearance of galvanized coatings

SANS 121:

"The primary purpose of the galvanized coating is to protect the underlying iron or steelwork against corrosion. Considerations related to aesthetics or decorative features should be secondary. Where these secondary features are also of importance it is highly recommended that the galvanizer and customer agree the standard of finish that is achievable on the work [in total or in part], given the range of materials used to form the article. This is of particular importance where the required standard of finish is beyond that set out in this section. It should be noted that 'roughness' and 'smoothness' are relative terms and the roughness of coatings on articles galvanized after fabrication differs from mechanically wiped products, such as galvanized sheet, tube and wire. It is not possible to establish a definition of appearance and finish covering all requirements in practice.

The occurrence of darker or lighter area (e.g. cellular pattern or dark grey areas) or some surface unevenness shall not be cause for rejection: also wet storage stain (white or dark corrosion product – primarily basic zinc oxide – formed during storage in humid conditions after hot dip galvanising) shall not be cause for rejection, providing the coating thickness remains above the specified minimum value."

- □ sample: required / not required
- □ special pre-treatments: ...
- □ special coating thickness: ...
- □ any after treatments: ...

□ method of site repair and maximum allowable size of repair: ...

Omit if default (repair by either zinc metal thermal spraying, zinc rich epoxy or a *suitable* zinc rich paint, provided that the repaired surface receive an additional 30 μ m over and above that required in terms of the specification; HDGASA recommends a practical repair area of ± a R5 coin) is acceptable.

□ architectural work to be packaged: required / not required

paint or varnish

SANS 12944 covers the following suitable surfaces for painting: uncoated steel; thermally sprayed with zinc, aluminium or their alloys; hot dip galvanized; zinc-electroplated; sherardized; prefabrication primed; other painted surfaces. Part 2 deals with the principal environments and the corrosivity of these environments to which steel structures are exposed: atmospheric corrosivity category: C1 very low / C2 low / C3 medium / C4 high / C5-I very high (industrial) / C5-M (marine); immersed category for water and soil: Im1 (fresh water) / Im2 (sea or brackish water) / Im3 (soil). Part 5 deals with paint systems.

paint system: alkyd / chlorinated rubber / PVC / acrylic / epoxy / ethyl silicate / polyurethane / bitumen

Protective paint systems not covered: powder coating; stoving enamel; heat-cured paints; linings of tanks; products for the chemical treatment of surfaces.

5.4 Fire protection

The yield strength of steel is halved at temperatures exceeding 550°C. Consider placing columns outside building.

□ protection of structural steel against fire: see drawings

reinforced concrete grade 25 / solid masonry / sprayed vermiculite-cement/perlite-cement / metal lath and plaster

Relevant standards:

SANS 1921 Construction and management requirements for works contracts.

SANS 10094 The use of high-strength friction-grip bolts.

SANS 10162 The structural use of steel.

SANS 14713 Protection against corrosion of iron and steel in structures – zinc and aluminium coatings – guidelines.

HDGASA code of practice no 1-1990 The Surface Preparation and Application of Organic Coatings to New, Unweathered Hot Dip Galvanized Steel (Sheet and Section) Excluding In-line Coil Coatings.

HDGASA code of practice no 2-1990 Specification for the Performance Requirements of Coating Systems Applied to New Unweathered Hot Dip Galvanized Steel (Sheet and Section) excluding In-line Coil Coating (Duplex Systems).

NOTES on hot dip zinc coating thickness and service life:

Consult the Hot Dip Galvanizer's Association of South Africa (HDGASA) for determination of high corrosivity areas.

All hot dip galvanising specifications state the minimum *suitable* coating thickness and not average coating thickness. The thickness actually achieved varies with steel composition and thickness of steel, and can range from the minimum up to >50% greater. As life expectancy predictions are normally based on the minimum coating thickness, they are usually conservative.

Hot dip galvanized coating on structural steel should in most cases provide a service-free life of 40 - 50 years. This is determined by dividing the minimum achieved coating thickness taken on the thinnest steel component by the corrosion rate per year for the location in question (see table).

HDGASA uses SANS ISO 9223 to determine corrosivity categories, based on three factors: 1) Time of wetness, being the period that the zinc surface is covered by liquid containing the corrosive elements (electrolyte); 2) Airborne pollution containing sulphur dioxide (SO₂); 3) Airborne pollution containing salinity, usually in the form of chlorides carried on prevailing sea winds.

Estimated service life of hot dip galvanized steel complying with SANS 121									
Corrosivity Cate- gory ISO 9223	Zinc corrosion rate / yr	55 µm for steel 1.5 – 3mm thick	70 µm for steel 3 – 6 m m thick	85 µm for steel >6 mm thick					
C 1 very low	<0.1 µm	>100 yrs	>100 yrs	>100 yrs					
C 2 low	0.1 - 0.7	<78.5 yrs	>100 yrs	>100 yrs					
C 3 medium	0.7 – 2.1	26 – 78.5 yrs	33 – 100 yrs	40 - >100 yrs					
C 4 high	2.1 - 4.2	13 – 26 yrs	16 – 33 yrs	20 – 40 yrs					
C 5 very high	4.2 - 8.4	6.5 – 13 yrs	8.3 – 16 yrs	10 – 20 yrs					

Source: HDGASA Information sheet No 8.

Coating thickness in μ m can be converted to approximate coating mass per unit area in g/m² by multiplying by the nominal density of the coating (7,2 g/cm³): thus 55 μ m = 395 g/m²; 70 μ m = 505 g/m²; 85 μ m = 610 g/m²

Source: SANS 121 / SANS 14713.

Z275 is the designation for 275 g/m² zinc/surface area on both sides of steel sheet (for sheet that would mean 137.5 g/side) which equals a mean coating thickness of 19 μ m. Similarly, Z450 equals 22 μ m, and Z600 equals 43 μ m).

6 Insulation, sealants, seals

6.1 Thermal insulation

6.1.1 Materials

Consider insulation materials with recycled content, e.g. polystyrene, glass fibre, cellulose and polyester fibre. Consult TIASA (Thermal Insulation Association of SA) or EPSASA (Expanded Polystyrene Ass. of SA). type: bulk (rigid board, fibre matts or batts) / reflective (foil) / composite bulk / loose fill / pipe / spray foam required R-value/thickness: SANS 204 Show all insulation thicknesses on drawings. Actual R-value test results may be obtained from the South African Fenestration and Insulation Energy Rating Association (SAFIERA). required fire performance classification of thermally insulated building envelope systems: **SANS 428** combustability: A / B A (non combustible); B (combustible) surface fire spread properties: 1 / 2 / 3 / 4 / 5 / 6 1 (no flame spread) / 2 - 6 (rapid flame spread)

□ application: vertical / horizontal / vertical and horizontal / see drawings

Consult SANS 10400-T for fire performance requirements.

rigid board

□ material: EPS / XPS / EPU

□ expanded polystyrene (EPS) grade: 16D-85 / 24D-170 / 32D-225

16D-85 (standard); 24D-170 (high); 32D-225 (extra high) (density kg/m³–compressive strength kPa) EPS is combustible on its own but claimed to be fire-safe in a masonry cavity with closed reveals (see EPSASA leaflet *EPS Cavity Wall Insulation*). EPS will resist the passage of moisture. Panel width: 600 mm; thicknesses: 25, 30, 40, 50 (ex stock), 60, 70, 80 (to order)

□ face: plain / foil / ...

□ edge: square / shiplap / tongue and groove

fibre mats/batts

- □ form: mats (flexible) / batts (rigid)
- □ face: plain / foil / ...

Typical fibres are mineral (rock wool, glass wool), synthetic (polyester, polyethylene), and natural (wool). Fibre insulation is not recommended in partial fill masonry cavity construction – consult manufacturer.

reflective foil

□ reflective foil class: A / B / C / D

A (reinforced, both surfaces reflective), B (reinforced, one surface reflective), C (unreinforced, both surfaces reflective), D (unreinforced, one surface reflective). Foil may double as an effective vapour barrier. See additional notes on foil at end of this section.

The thermal resistance of reflective insulation varies with the direction of heat flow through it, i.e. vertical, horizontal or sloped, and the number and defined thicknes of air spaces it faces. It is important that bright surfaces facing air spaces remain untarnished on at least one surface.

The difference in direction of heat flow is generally marginal for bulk insulation but can be pronounced for reflective insulation. Reflective insulation is more effective at reducing summer heat gain than reducing winter heat loss.

Reflective foils are valuable when used in combination with bulk insulation for improved performance. Composite bulk and reflective materials are available that combine some features of both types. Examples include foil bonded to bulk insulation, whether blankets, batts or boards, i.e. foil faced blankets, foil faced batts and foil faced boards.

metal faced insulation panels

For use in buildings, cold rooms and hot rooms, interior and exterior.

- □ corrosion comparison index of panel-facing coating: 1 / 2 / 3 / 4
- core insulation: calcium silicate / mineral fibre / polyisocyanurate / polyphen / polystyrene
 / polyurethane / rockwool
- □ facing: chromadek / galvanized steel / PVC laminated galvanized steel / stainless steel / zincalume

Metal faced insulation panels are typically used in cold storage systems. Consult TPMA (Thermal Panel Manufacturer's Association).

loose fill

□ loose fill: pellets or granules / cellulose.

6.1.2 Installation

□ system: SANS 204 / rational design

masonry cavity wall insulation

□ type: full fill cavity / partial fill cavity / loose fill / see drawings

Insulation can be installed full fill in cavities in most areas where cavity walls are not required to prevent moisture migration, or where walls are plastered and painted or protected by roof overhangs of >750 mm.

Insulation should be installed partial fill in cavities where the cavity also serves as a moisture barrier against wind-driven rain, mostly in winter rainfall areas, but also in cases of exposed face brick walls in general (e.g. gable walls, walls without roof overhangs, high buildings).

In exposed walls, filling cavities with loose fill insulation may result in insulation becoming wet, losing its insulation value and causing dampness on the inner leaf.

Filling of concrete block cores with any type of insulation offers little energy savings since the majority of heat is conducted through the webs and mortar joints.

masonry wall external face insulation

□ masonry wall external face insulation: ...

Omit if default (patent system of EPS external insulation bonded and mechanically fixed to dry, sound and flat surface, finished with reinforced polymeric plaster) is acceptable, or specify alternative.

Installing insulation against internal face of envelope wall would result in losing capacitive insulation of internal leaf (thermal mass).

pitched roof/ceiling insulation

□ system: reflective foil under roof covering / bulk insulation on ceiling / foil + bulk / see drawings

flat roof insulation

- □ material: rigid EPS insulation density 32D
- □ flat roof insulation position: over waterproofing / under screed

Insulation on flat trafficable concrete roofs should be firm enough to support the waterproofing system and foreseeable loadings, i.e.under screed. See Section 8 for further particulars.

floor insulation

□ under floor slab insulation: required / not required

In case of in-slab heating as required by SANS 204.

6.2 Vapour barriers

- □ type: ...
- □ position: see drawings

Clay brick and concrete block masonry is able to accommodate moisture migration (damp open), normally rendering a vapour barrier unnecessary. SANS 204 advises that designers should consider that interstitial condensation occurs in walling systems which are not able to prevent or accommodate moisture migration. Also, that artificial cooling of buildings in some climates can cause condensation to form inside the layers of the building envelope. Such condensation can cause significant structural or cosmetic damage to the envelope before it is detected. Associated mould growth may also create health risks to the occupants. Effective control of condensation is a complex issue. In some locations a fully sealed vapour barrier may need to be installed on the more humid, or generally warmer, side of the insulation.

6.3 Sound absorption

materials

- □ structure-borne sound insulation: mineral fibre mats SANS 1381 / cork
- airborne sound absorption: mineral fibre mats SANS 1381 + perforated 10 mm plywood / plasterboard / hardboard / metal / see drawings.

6.4 Joint fillers/sealants

□ joint filler/sealant colour: ...

Industrial sealants compatible with bitumen may not be available in SA.

Two-part sealants are generally more effective and costly than one-part sealants.

See also SANS 2001-CC1 for specification of waterstops.

6.5 Architectural seals

type: patent extruded aluminium carriers with flexible seal inserts of synthetic rubber, rigid PVC, nylon brush filaments, polypropylene pile, or silicone rubber / patent PVC, pile or neoprene door and window frame seals / patent silicone intumescent seals (fire and smoke) / patent external extruded aluminium threshold plate seals

Architectural seals need careful study by the designer – consult supplier.

□ aluminium extrusion finish: mill / anodised / painted

intended use of seal: energy (draughts, dust, insects) / intumescent (fire and smoke) / acoustic (noise) / finger-pinch protection (schools, day-care centres) / threshold plate / access (mobility, disabled persons)

Intumescent seals are designed to expand when subjected to heat.

□ duty level: light / medium / heavy

Duty level: light (domestic); medium (commercial); heavy (hospitals, airports, shopping malls).

□ mounting: fully morticed / semi morticed / surface mounted / grooved.

NOTE: Additional notes on reflective foil thermal insulation:

The difference in direction of heat flow is generally marginal for bulk insulation but can be pronounced for reflective insulation. Reflective insulation is more effective at reducing summer heat gain than reducing winter heat loss.

The thermal resistance of reflective insulation varies with the direction of heat flow through it, i.e. vertical, horizontal or sloped, the number of air spaces and defined thicknesses of the air spaces. Furthermore, that the bright surfaces facing the air space/spaces remains untarnished on at least one surface.

Reflective foils are valuable when used in combination with bulk insulation for improved performance.

Composite bulk and reflective materials are available that combine some features of both types. Examples include foil bonded to bulk insulation, whether blankets, batts or boards, i.e. foil faced blankets, foil faced batts and foil faced boards.

7 Roof coverings, cladding

To be published: SANS 2001-CR2 Tiled and sheeted roofs.

7.1 General

□ type of cover, cladding: see drawings

tile / profiled sheet / fully-supported sheet / thatch

roof pitch: see drawings

Check minimum roof pitches with SANS 10400-L. Roof pitches below that recommended by the manufacturer can be achieved by laying plywood boarding over the rafters and covering with waterproofing before tiling. Check with manufacturer.

underlay

underlay type: reflective foil / polymer / the subject of an active Agrément Certificate

See Section 6 for reflective foil. Reflective foil doubles as thermal insulation and should be first choice in hot climates.

7.2 Tile roofing/cladding

7.2.1 Materials

□ type of tile: concrete / clay / slate / fibre-cement / metal

concrete roof tiles

Concrete roof tiles have a mass of ±55 kg/m² laid.

- □ pattern and colour: ...
- □ type: plain / interlocking
- body colour or surface coating category: 1 / 2 / 3 / 4

1 (none); 2 (surface coating only); 3 (body colour only); 4 (both).

□ finish: throughcolour / granular / sanded

clay roof tiles

- □ type: Broseley (plain) / Marseilles (interlocking) / ...
- □ colour: ...

natural slate tiles

□ size, colour: ...

fibre-cement slates

□ texture, colour: plain / textured / natural / ...

Mass of fibre-cement tiles is 25 kg/m² laid.

metal roofing tiles

material, finish: hot dip galvanized steel / aluminium alloy / stainless steel / coated / uncoated

fixing materials

□ fixing materials: galvanized steel / stainless steel or aluminium

Galvanized steel in inland regions. Stainless steel or aluminium in *coastal regions* or corrosive atmospheres, except for clay tiles where all fixings shall be stainless steel.

7.2.2 Roof tiling

preparation

□ terrain category: 1 / 2 / 3 / 4

Terrain category 1: exposed open/ *coastal areas* (generally the area within 5km from the coast-line unless otherwise defined locally); 2: exposed with scattered obstructions; 3: well-wooded areas and suburbs, town and industrial areas; 4: large city centres.

- □ design wind speed: 40 / 45 / 50 / 55 m/s
- □ height above ground / number of storeys: ...

□ eaves: open / boarded

Eaves should be boarded in exposed terrains.

laying

- □ tile: concrete / clay / slate / fibre-cement / metal
- □ valley gutter: open / concealed
- □ verge tiles: required / not required

roof underlay

□ roof underlay: required / not required

Underlays are strongly recommended in any area, and are mandatory in exposed and coastal terrains, depending on pitch. Not required for metal roof tiles.

SANS 204 states "all tile roofs in climatic zones 1, 2, 4 and 6 shall have a tile underlay or radiant barrier and the joints shall be sealed to prevent air infiltration and leakage".

7.3 **Profiled sheet roofing/cladding**

7.3.1 Metal sheet

Mass of metal sheet roofing is ±11 kg/m².

metal

metal and coating: zinc-coated (galvanized) steel / AZ-coated steel / prepainted zinc coated steel / weathering steel / natural aluminium alloy / prepainted aluminium alloy / stainless steel / copper

Copper, aluminium, stainless steel or weathering steel should be used in environments where atmospheric corrosion is aggressive. Check availability, thickness and finish of these metals with manufacturer/ supplier.

profile

- □ profile: corrugated / box rib (IBR) / interlocking box rib / rib-trough/standing seam
- □ sheet length: single lengths per roof slope / standard lengths with overlap / single length standing seam over-ridge (see ridging)

Standard lengths (1,8 – 14 m) – check with manufacturer/ supplier.

Corrugated and IBR sheets in standard lengths with overlap causes less thermal movement stress on exposed fixings than long lengths.

steel

nominal sheet thickness: 0,5 / 0,6 mm

Check availability of 0,8 mm sheets. 0,6 mm thick sheet costs ±16% more than 0,5 mm.

□ coating grade: Z275 / Z600 / AZ150 / AZ200

Z275 and AZ150 for inland regions, Z600 and AZ200 for coastal regions and aggressive atmospheres. Coiled sheeting with hot dip zinc coating (galvanising) class Z275 has an average zinc coating thickness of about 19µm; Z600 - 42µm. AZ coatings have increased corrosion resistance over zinc coating by 3 or 4. See notes on hot dip galvanising under Section 5 Structural Steel. Get expert advice from HDGASA or ARTF - SCRACE.

aluminium alloy

□ aluminium roofing sheet thickness: 0,6 (cladding only) / 0,7 / 0,8 / 0,9 mm

stainless steel

□ stainless steel thickness: 0,5 / 0,6 mm

copper

 \Box copper: 0,6 mm thick

prepainted metal

□ prepainted metal sheet type: 3 / 4 / 5a / 5b / 6a / 6b

Type 3 (mild to moderate rural, urban, tropical and industrial environments) / 4 (marine and industrial) / 5a (severe marine) / 5b (heavy industrial and industrial marine) / 6a very severe marine) / 6b (very severe industrial).

Coil coated and prepainted products are e.g. Chromadek or Chromadek Plus (Mittal Steel) for marine and industrial environments; there are several others. Paint coating more than doubles the life of sheets with metal coating only.

weathering steel (Cor-ten)

□ weathering steel: 0,8 mm

bullnosing

□ bullnosing radius: ...

Minimum radius about 500 mm (inside radius), depending on material, profile and sheet thickness.

roof ventilators

□ roof ventilator type, material, dimensions: ...

7.3.2 Fibre-cement sheet

Mass of 5 mm thick fibre-cement sheets is 15 kg/m². Purlins must be 50 x 76 mm at 1 200 max spacing on trusses/beams at 1 200 max spacing (SANS 10243). Finish fibre-cement sheets in *coastal areas* with an anti-fungicidal paint – see section 14 Painting.

□ bullnosing radius: ...

7.3.3 Glass-reinforced polyester sheet

See also SANS 141 GRP laminates.

□ type: 1 / 2

1 (with weathering protection both sides) / 2 (ditto one side)

□ class: W / WF

W (without fire-retardant properties) / WF (with fire-retardant properties)

SANS 10400-L: "skylights shall have a maximum opening area of 0,6 m² or, if in the form of a translucent roof sheet, an installed width of 700 mm".

 \square mass: 1,0 – 1,4 kg/m² (domestic) / 1,4 / 1,8 / 2,4 kg/m² (industrial)

□ opacity: clear / opaque

□ colour: ...

□ profile: see drawings / to match roofing/cladding sheet / corrugated / IBR / ...

7.3.4 Polycarbonate sheet

- □ colour: ...
- □ thickness: 1,0 mm / 1,2 mm

1,0 mm (domestic) / 1,2 mm (industrial)

□ profile: see drawings / to match roofing/cladding sheet / corrugated / IBR / ...

7.3.5 Fasteners and washers

corrosion resistance class: 1 / 2 / 3 / 4

1 (general internal / 2 (general internal with significant condensation) / 3 external, mild to moderate industrial or marine) / 4 (external severe marine)

Identification of corrosive characteristics of the environment is essential.

Corrosion resistance class 2, 3 and 4 correspond with class C2, C3 and C4 of ISO 9223.

Some coating information for zinc and tin-zinc coated fasteners (corrosion resistance class, coating type, coating thickness in μ m):

- 1, electroplated zinc (EZ), 4
- 2, EZ, 12
- 2, mech. plated zinc (MPZ), 17
- 3, EZ, 30
- 3, hot dip galv (HDG), 30
- 3, MPZ, 40
- 4, HDG, 50
- 4, MPZ, 45.
- For full list see SANS 1273.
- □ type and size: hook-bolt / U-bolt / J-bolt / drive screw / self-tapping screw / according to roofing material manufacturer's instruction
- □ material: zinc-coated carbon steel / stainless steel.

7.3.6 Installation

exposed fixing

□ box rib cladding: with rib against girt / with rib away from girt

lapping

Sealing of laps in sheeted roofs in climate zone 1, 2, 4 and 6 is mandatory (SANS 204)

7.4 Fully-supported metal sheet roofing and cladding

Flat metal sheet with standing seams on continuous solid boarding can follow any shape within limits of the boarding. The specification presented in PW371-A is for copper. Other materials are zinc, lead, aluminium or hot dip galvanized steel. Check material and fixing with specialists.

Boarding must be able to absorb condensation under roof sheet - use of chipboard or other dense boarding material will cause corrosion. Board thickness depends on span.

7.5 Thatch roofing

To be published: SANS 2001- Construction Works Part CR3: Thatch Roofing.

Cost of a thatch roof is 15 – 20 % higher than a conventional roof. Check insurance requirements.

Consider requesting that the work be done by a member of the South African Thatcher's Association.

Avoid penetrations of the roof area - place chimneys preferably at the ridge, ventilation pipes outside the exterior wall faces.

Thatch can be shaped and moulded.

□ thatch type: grass / Cape reed (dekriet) / water reed

Local grass will weather better in the same climate from which it originates. Hyparrhenia and Hyparphilia species should last for 35 years. Thamnochortis species (Cape reed/dekriet) could last for 75 years. Also Phragmites Communis reed. 175 mm thick thatch weighs 35 kg/m2, about 40 bundles of grass per m².

Roof pitch in general should not be less than 45 degrees, 40 degrees at dormers (SANS 10400-L).

After the maintenance period the roof should be serviced every 10 - 12 years, and a new layer of 70 - 100 mm thatch added after 35 years. The life of thatch will be prolonged by brushing with a thatch spade at 4 - 5 year intervals.

□ wire sways: prohibited / allowed

Wire sways should not be used in roof construction in areas where lightning is a problem unless provided with a lightning protection system (See SANS 10400-T).

□ ridging: thatch / sand-cement / fibreglass

□ fire retardant treatment: none / pre-treatment / during construction / after installation

7.6 Flashings, trim

Flashings to metal roofs should be similar to roof material to ensure same life to first maintenance and avoid electrolytic corrosion.

Counter flashings with an anti-capillary fold avoid electrolytic corrosion.

7.7 Fascias and barge boards

 \Box size: see drawings.

Relevant standards: SANS 10062: The fixing of concrete roof tiles. SANS 10237: Roof and side cladding. SANS 1200 HB-Cladding and sheeting. SANS10400-L Roofs. SANS 10400-T Fire protection. Concrete Roof Tiles – Technical Manual. Concrete Manufacturer's Association.

Guide to good thatching practice. Thatcher's Ass of SA.
8 Waterproofing

To be published: SANS 2001-EW Waterproofing.

8.1 Materials

This section covers the conventional system of waterproofing with membranes only. Damp proofing in masonry is covered in SANS 2001-CM1. Consult The Concrete Institute for the waterproofing of concrete with additives.

The Waterproofing Federation of South Africa is the industry representative body.

SANS 10021 is outdated but useful and hopefully to be revised.

Bituminous felt (SANS 92), mastic asphalt (SANS 297/298) and elastomeric membranes like butyl rubber (polyisobuty-lene, SANS 187), chloroprene rubber (SANS 580) and EPDM (Ethylene Propylene Diene Monomer) have been used in the past but have largely been replaced by polymer modified bitumen membranes. No national standard exists for polymer-modified bitumen membranes, but most systems are Agrément certified.

reinforced bitumen membrane (RBM)

□ finish: plain / slate granular / metal foil: aluminium or copper

self-adhesive plastic membrane (APM)

□ finish: plain / foil / granular / polyester fabric

Self-adhesive membranes are thin (1,5 mm), normally laid as single layer systems to be covered (not UV resistant, except with foil, granular or fabric finishes).

reinforced liquid membrane (RLM)

□ in situ reinforced liquid system: acrylic emulsion / bitumen emulsion / cementitious

Acrylic or bitumen emulsion is suitable only for exposed roofs and parapet walls. Cementitious systems can only be applied to cementitious backgrounds and can be tiled directly.

cavity drainage membrane

Studded polypropylene or HDPE cavity drainage membranes allow damp or running water to travel behind the membrane to a controlled drainage system. They are lighter than conventional stone and geotextile, provide continuous drainage and act as slip/separation layer.

slip/protection layers, geomembranes

Check requirements for bituminous felt or HDPE slip/protection layers and thermplastics geomembranes.

outlets

- □ outlet type: roof / small balcony / shower
- □ size: >75 mm.

8.2 **Preparation**

falls

SANS 10400-L: Slope of a (cast in situ) concrete roof should be achieved by casting the concrete to the required fall, eliminating the need for a screed which may be susceptible to cracking and and resultant spreading of leaks.

Falls in flat timber roofs should be created in the rafter/beam design and not by raising purlins.

Show ridges, valleys and falls clearly in drawings.

SANS 10400-L Roofs stipulates a design fall of 1:50, allowing for construction inaccuracies and deflection under dead or imposed loads.

balconies

Ensure balconies are at a sufficiently lower level than door thresholds to allow for the screed or topping to be minimum 50 mm thick, and have sufficient fall to outlet(s).

Balustrades are best fixed to front of upstands.

Balcony door thresholds exposed to rain: waterproofing should be continued up against threshold and finished under door frame



Diagram: Section through a balcony

1 concrete slab; 2 screed (optional); 3 tiles in adhesive on screed or bonded to waterproofing; 4 soft joint/sealant; 5 sliding door frame; 6 tiles bonded to waterproofing; 7 balustrade; 8 outlet.

outlets

Outlets set lower than their surroundings to prevent ponding: SANS 10400-L 4.3.2.4

SANS 10400-L: "attention should be given to the provision of ventilation to allow moist air, which might accumulate below the waterproofing layer, to be vented to the outside air". Check with manufacturer/ supplier.

8.3 Application

For basement construction see SANS 10021. Basement floors and walls may be tanked, or formed with a cavity construction combined with drainage or pumping, or both, or may be constructed with cavity drainage membranes.

8.3.2 Termination

Bonding waterproofing with DPC's should be considered in winter rainfall areas. DPC's should be the same material as the waterproofing and have sufficient overhang to facilitate overlapping and bonding.

Balcony door thresholds exposed to rain are a common cause of leakage. Waterproofing should be taken up against thresholds and finished under the door frame and sealed.

1.5 Waterproofing surface finishes/protection

Protection against UV degradation, traffic and hail prolongs life expectancy of membranes. No protection required to exposed bitumen membranes with slate granular or metal foil finishes.

8.5.1 Exposed non-trafficable areas

□ type finish/protection: see drawings

paint / crushed stone / crushed stone on insulation panels / tiled insulation panels

paint

Acrylic does not adhere well to new bituminous-based systems.

crushed stone

A layer of gravel protects waterproofing and acts as anchor, but makes leaks difficult to trace. Thermal insulation value of gravel layer on its own is slight.

tiled insulation panels

Thermal insulation should be placed over the waterproofing ("inverted roof"), protecting it from high temperature fluctuation, ultraviolet degradation and mechanical damage, while allowing easy visual inspection of the waterproofing when laid loose.

Depending on tile mass, loose-laid tiled insulation panels should be installed only on flat roofs protected against wind by perimeter upstands. Tiles should be fully vitrified to withstand freeze-thaw cycles and should be sturdy enough to withstand handling and maintenance foot traffic. Panel size depends on multiples of tile size. Panels could float during heavy downfalls. Panels are easily removed for inspection and maintenance.

8.5.2 Pedestrian traffic areas

□ type finish/protection: see drawings

topping / topping on insulation panels / tiles on screed / tiles on waterproofing / paving slabs on insulation panels / paving slabs on adjustable pads

Paving units are suitable for trafficable roofs, and for roof gardens and planters where waterproofing may be damaged by garden tools.

Paving on adjustable pads can be easily removed for inspection/repair, and the air space provides considerable thermal downward insulation. Paving slabs need to be sturdy, depending on traffic.

thermal insulation panels

□ lay finish on thermal insulation panels: required / not required

tiles on waterproofing

□ tile type, size: ...

See Section 12 Tiling.

paving slabs on adjustable pads

□ paving surface levels: see drawings

8.5.3 Vehicular traffic areas

□ type finish/protection: see drawings

50 mm premix laid directly onto waterproofing / brick or concrete pavers laid on 25 – 30 mm sand bed (see Section 21 External works) / 75 mm concrete paving on protection/slip layer (see Section 2 Concrete works)

8.5.4 Basement, retaining walls

- before backfilling, protect waterproofing with: softboard / hardboard / cavity drainage membrane / masonry leaf
- □ drainage system behind wall: ...

Omit if not agricultural drain encased in stone as specified.

8.5.5 Planters, roof gardens

□ type finish/protection: 100–150 mm layer stone with geocomposite drainage layer with minimum mass of 210 g/m² laid on top / cavity drainage membrane laid directly on waterproofing.

Relevant standards:

SANS 10021 Waterproofing of buildings (including damp-proofing and vapour barrier installation). SANS 10400-L Roofs.

BS.8102:2009 - Protection of Below Ground Structures against Water from the Ground.

GP Koning. The Waterproofing of Buildings. PO Box 26153 Hout Bay 76872.

9 Ceilings, linings, partitions, access flooring

To be published: SANS 2001- Construction Works Part EC1: Ceilings, partitions, access flooring.

9.1 Brandered ceilings

9.1.1 Branders, grounds

□ type: timber / steel

timber branders/grounds

SANS 2001-CT2 (and SANS 10400-L) covers the fixing of timber brandering to roofing members to support ceilings that comprise gypsum plasterboard, fibre-cement board or similar boards only: "Brandering of size 38 mm × 38 mm required to support gypsum plasterboard, fibre-cement board or similar board shall be securely spiked to the supporting timbers with 75 mm wire nails. Cross brandering shall be cut in between the longitudinal brandering and skew nailed to the same, using 75 mm wire nails at centres that do not exceed 900 mm".

Grounds for wall linings: depth of 25 mm may be influenced by thickness of required insulation, services.

steel branders

Steel brandering is ideal for bulkhead construction.

□ perimeter trim: standard / shadowline.

9.1.2 Fibre cement and gypsum board brandered ceilings

□ type: fibre-cement / gypsum

fibre-cement board

Flat fibre-cement boards are made with organic fibres, plain or textured, and are water and fire resistant.

gypsum board

Gypsum board is non-comustible. Standard board should not be exposed to contact with water – do not use in industrial bathrooms or kitchens, or in exterior applications. For high moisture conditions use moisture resistant board. For fire resistance use X-rated board. Use double layers where acoustic insulation is required.

- □ type: standard / moisture resistant / fire rated
- □ edge: square / tapered

Use tapered edge board for scrim and plaster joints when full ceiling surface is not to be plastered.

cornices

material, size: coved gypsum 75 mm wide / ditto 125 mm wide / coved polystyrene cornice / foam moulded / hardwood / softwood, profile ...

cover strips

□ joint cover strips: H-profile: prepainted galvanized steel, aluzinc or plastic / gypsum board / hardwood: specie ...; profile, size: see drawings

Omit if ceiling is plastered.

fixing

board pattern: see drawings

Omit if not visible or default (symmetrical about room) is acceptable.

position of movement/control joints: see drawings

movement/control joints should be a clean break of 15 mm through the complete ceiling structure and finish.

finish

□ finish to plaster board ceiling: plain with cover strips / plain with plastered joints / entire ceiling plastered

9.1.3 Wood board brandered ceilings, linings

□ type of board: tongue and groove / strip / plywood / perforated plywood

tongue and groove board (SANS 1039)

- □ species: softwood / hardwood / species ...
- □ grade: clear / select / knotty
- □ profile: see drawings

See SANS 1039 for various profiles.

□ face width: 50 / 65 / 75 / 102 / 140 mm

□ thickness: ceiling board: 12 / 16; panelling 12 / 16 / 22 mm

wood strip, trim

strip spacing: see drawings

plywood

□ exposure class: 1 / 2 / 3 / 4

1 (exterior); 2 (semi-exterior); 3 (humid interior); 4 (dry interior).

veneer species:...

□ cut: rotary / sliced

□ grade: S / A / B

S (select, for decorative applications), A (furniture, for joinery where it may be reworked), B (standard, to be covered, coated or painted).

□ perforations: size, spacing: ...

For effect and/or acoustic control.

fixing

position of ceiling: see drawings

above / in beteen / below roof beams

□ strip spacing: ...

□ cornice, trim size and profile: ...

9.1.4 Hatches

position of ceiling hatches: see drawings

See note on geyser position under Section 18.

□ trap door: hinged / laid loose

9.2 Suspended ceilings

Consult SABISA (South African Building Interior Systems Association, part of the AAAMSA group).

□ type: board / fabric / louvre / grid / bulkhead

□ material: mineral fibre / metal / ...

performance

□ required fire resistance in minutes: see drawings

20 / 30 / 60 / 90 / 120 / 180 / 240

See also note under 9.3.

□ required airborne sound insulation grading dB: see drawings

30 / 35 / 40 / 45 / 50

For noise measurement and rating consult SANS 10103.

See also note under 9.3.

board

- □ type: plain / perforated / smoke-tight / impact-proof (e.g. ball) / removable / fold-down / drop-and-slide
- □ material: mineral fibre / gypsum / fibre cement / metal / vinyl clad / grid / flush plaster
- □ mineral fibre edge: square / revealed square / bevelled concealed / concealed



- □ size: see drawings
- \Box colour: ...
- □ texture: plain / fissured / perforated
- □ finish: ...
- □ ceiling panels: removable and replaceable from below / fixed / as required for maintenance

suspension fittings

□ suspension system: patent / rational design

installation

□ grid pattern: see drawings

access

□ access: see drawings

Access depends on hold-down system, panel removability, access requirements to above-ceiling services, weight of ceiling panels. Discuss with manufacturer/supplier.

9.3 **Partitions, linings**

□ type: see drawings

drywall / light weight internal wall / demountable / cubicle / operable

performance

required fire resistance in minutes: see drawings

20 / 30 / 60 / 90 / 120 / 180 / 240

Fire resistance: SANS 10400 Part T classifies the performance of materials in respect of fire resistance in categories of 20, 30, 60, 90, 120, 180 and 240 minutes. Architect/*Competent Person* to specify. Fire resistance is achieved by increasing layers of board. Deflection requirements are achieved by multiple studs reinforced with layers of board. Check with SABISA.

□ required sound insulation grading dB: see drawings

30 / 35 / 40 / 45 / 50

30 (normal speech audible, but unintelligible), 35 (loud speech understood), 40 (loud speech audible, but unintelligible), 45 (loud speech barely audible), 50 (shouting barely audible)

Comparable constructions: 26 (solid wood door without seals), 32 (6 mm laminated glass), 42 (100 mm brick wall), 48 (230 mm hollow concrete wall).

For noise measurement consult SANS 10103.

9.3.1 Materials

gypsum plasterboard

□ type: wallboard / moisture resistant wallboard / high-temperature wallboard

Moisture resistant board for use in all wet areas such as bathroom showers as well as locations with high humidity levels.

□ thickness: 12 / 15 mm

□ type of edge: square / tapered / bevelled / rounded

 \Box covering: paper backed vinyl of weight in g/m² : ...

fibre cement board

□ type: MD / HD

flat unpressed (MD), flat pressed (HD).

□ thickness:9 mm

studs and tracks

material: metal / wood

aluminium extrusions

- □ abrasion resistance: required / not required
- □ colour: natural / anodized

anodising

□ anodising grade SANS 1407: AG10 / AG15 / AG20 / AG25

grade AG10 (0,1 mm thick), for interior use only; AG15 and 20 for mild atmospheric conditions; AG25 where little or no deterioration is permitted. According to ASFA (Aluminium Surface Finishers Association), SANS 1407 is suitable for internal use only.

□ abrasion resistance when relevant: required / not required

□ colour: ...

powder coating

□ SANS 1274 type: 1 / 2

1 (heavy duty interior), 2 (interior and non-corrosive conditions).

□ colour: ...

□ finish: matt / satin / high gloss / hammertone / textured

glass

□ type: see drawings

float glass / wired / patterned / safety See GLAZING

□ thickness: see drawings

9.3.2 Drywall partitions, light weight internal walls

- □ framing: timber / steel
- □ cladding: gypsum board / fibre cement board

□ gypsum board cladding finish: vinyl / paint / tile

For cladding finish of appropriate type to suit expected traffic in designated areas, refer to manufacturer for recommendations.

□ door/window frame finish: anodising / powder coating

□ glazing: clear / opaque / patterned / safety

9.3.3 Demountable partitions

- □ framing: steel / aluminium
- □ exposed frame finish: anodized aluminium / powder coating
- □ cladding: gypsum plasterboard / melamine-faced board / ...
- □ cladding finish: vinyl / paint
- □ glazing: clear / opaque / patterned / safety

9.3.4 Cubicle partitions

- □ mounting: flush floor / raised on stainless steel stiles
- D panels: vitreous enamel / melamine faced
- □ hinge type: normal butt / rising butt
- □ accessories: indicator bolt / coat hook / ...

9.3.5 **Operable partitions**

- □ operation: individual panels / hinged paired panels
- □ accessories: pass doors / work surfaces (chalkboard, dry marker board, tackboard) / pocket doors (to hide stacked panels).

9.4 Raised access flooring

Annex B and C of SANS 1549 gives information on quality verification of components; electrical properties; fire protection and safety; special panels; surface of completed installation; moving and placing of safes and other heavy equipment.

NOTE: this standard has been withdrawn but is regarded by industry as superior to the new (European) standard (SANS 52825). Check with supplier.

□ required fire resistance in minutes: see drawings

20 / 30 / 60 / 90 / 120 / 180 / 240

See note under Section 9.3.

□ required sound insulation grading in dB: see drawings

30 / 35 / 40 / 45 / 50

See note under Section 9.3.

□ class: A / B / C

Class: A, B or C depending on static or dynamic loads. Check with manufacturer.

□ floor panel covering: heavy duty high pressure laminate on particle board P6 / textile / ...

- $\hfill\square$ degree of corrosion resistance if other than default : ...
- □ clear height to underside of floor: see drawings
- □ required life of covering: ...
- □ details of special floor panels: see drawings
- □ whether floor assembly forms part of a plenum system: ...
- □ lifting devices: required / not required.

Relevant standards: SANS 10400-L Roofs.

SANS 10218 Acoustical properties of buildings.

SANS 10103 The measurement and rating of environmental noise with respect to annoyance and to speech communication.

SANS 52825 / EN 12825 Raised access floors.

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

10.1 Performance

mechanical performance

site category: 1 / 2 / 3 / 4

Design wind pressure must be specified in terms of SANS 10160. It is derived from the site category and height above ground. Site categories are: 1: open sea, lake shores, flat treeless plains; 2: airfields, parklands, farmlands, outskirts of towns and suburbs; 3 and 4: built-up areas or city centres.

□ height above ground: ...

□ plastic, shrinkage and creep deflection of floor slabs:...

Omit if not relevant. If relevant (curtain walling/ window walling), deflection of floor slabs MUST be specified by a structural engineer.

thermal performance

- □ fenestration unit conductance: see drawings
- □ fenestration unit SHGC: see drawings

Actual Conductance and SHGF-value test results for fenestration units may be obtained from the South African Fenestration and Insulation Energy Rating Association (SAFIERA), representative of the National Fenestration Rating Council (NFRC) in the USA.

fire resistance

□ fire resistance: ...

sound insulation

 \Box sound insulation:

General requirements

□ type: see drawings

residential / industrial / stock / purpose made

type opening section: see drawings

casement / sliding / sash / tilt-and-turn / pivot

handing, whether viewed from inside or outside, including proportion of vertically pivoted casements that opens outwards: see drawings

□ frame material: see drawings

hot-rolled steel / cold-rolled steel / pressed steel / aluminium / wood / polymer / polymer concrete / composite

Aluminium is durable with low maintenance but highly heat conductive – frames with thermal breaks are acceptable. Wood has good insulating values and strength, but needs regular maintenance. Polymer frames are maintenance free with good insulation value.

□ glazing from inside: see drawings

For windows not accessible from outside.

- □ shape and size: see drawings
- □ glazing bars: see drawings
- □ burglar bars: ...

to all opening sections / to complete window

Ensure extent to which openable sections can open is acceptable.

□ pattern: see drawings

- □ insect screens: see drawings
- □ glazing: see drawings

See Section 17.

sealants and seals: ...

see Section 6.

□ hardware and fixings: see drawings

Hinges (ordinary or projecting), handles, stays, catches, bolts etc.: see also Section 16.

□ additional security devices: ...

building in

Best way to fit single aluminium frame units is to build in steel or timber subframes, finish all wet trades, and fit window or door at last possible stage. If built in early, protection of frames against damage is required. Another good method is to build and finish openings and make and fit frames to measure – thus also making it possible to fit at last possible moment. Screw fitting of frames can only be done before glazing. Discuss with supplier/installer.

10.3 Steel frame units

□ factory finish: primed / hot dip galvanized

See notes on zinc coating under Structural Steelwork.

10.3.1 Hot-rolled steel framed units (SANS 727)

Hot-rolled steel frames are not thermal performance rated and will not meet air leakage requirements as specified in SANS 10400 XA or SANS 613 without weather seals. See also cold-rolled steel framed units.

10.3.2 Cell windows

All manganese bars shall display the trade mark TISAT3030tm visible for identification on site.

10.3.3 Pressed steel clisco type window frames (SANS 1311)

□ type: A / B

A (single rebate surround) / B (double rebate surround)

10.3.4 Pressed steel door frames (SANS 1129)

□ type: see drawings

single leaf door without fanlight / ditto with fanlight / double door without fanlight / ditto with fanlight / door and frame combination

- □ material of lock strike plate: chromium/cadmium plated steel / brass
- □ hinges: steel / brass
- □ handing: see drawings
- □ size: see drawings
- □ type of profile: see drawings

single rebate / double rebate / half wall width / full wall width

□ fanlight: see drawings

fixed, with glazing beads / opening hinged bottom / opening hinged top

□ type of lock/latch: see drawings

additional clauses

Frames for power floated floors need to be shorter, and temporary bracing has to be removed after fixing.

10.4 Cold-rolled steel frame units

Cold rolled steel frames may meet air leakage requirements as specified in SANS 10400 XA or SANS 613. Check with manufacturer/supplier.

10.5 Aluminium frame units

□ performance class: A1 / A2 / A3

A1 (residential and light commercial); A2 (commercial); A3 (monumental).

Aluminium framed windows, doors and shopfronts manufactured according to the minimum requirements of the Association of Architectural Aluminium Manufacturers of South Africa (AAAMSA) are mark-bearing with the mark and number of the test certificate issued by AAAMSA. Consult AAAMSA General Specification for Glazed Architectural Products (Including Energy Efficiency Design for Fenestration).

□ frame surface finish: anodised / powder coated / liquid organic coated

Anodising is a harder and more abrasion-resistant finish than powder coating, but has a limited choice of six colours (natural through four shades of metallic bronze to black). Colours are light fast but never identical and virtually impossible to match with older or other finishes. Anodising is susceptible to mortar and lime attack during construction. Consult AAAMSA or the Aluminium Surface Finishers Association (ASFA) for the selection of anodized and powder coating thicknesses.

□ anodising grade: AA15 / AA25

Grade: AA15 (0,015 mm thick, for mild atmospheric conditions in rural environments), AA25 (0,025 mm thick, for polluted atmosphere, sites within 5 km from chemical plants, coastal regions within 25 km from the sea, marine conditions, windy areas where sand causes abrasion). See AAAMSA Surface Finishes.

powder coating colour: ...; gloss category/finish: mat / satin / high gloss / hammertone / textured.

10.5.1 Windows and glazed doors

- □ colour of gaskets and weatherstrips: black
- □ weatherstrips: renewable.

10.5.2 Skylights

No national standard on skylights exists. The Skylight Association of Southern Africa (SASA, part of the AAAMSA group) is the industry representative body. Consider heat transmission, glare, UV radiation and ventilation carefully. Provide *drawings* at time of tender, if available.

□ type, shape: see drawings

sloped / pitched / arched / domed / single / composite / openable

□ size: see drawings

SANS 10400-L: "skylights shall have a maximum opening area of 0,6 m² or, if in the form of a translucent roof sheet, an installed width of 700 mm".

□ slope: see drawings

To ensure proper condensation and water infiltration control, and to minimize the accumulation of dirt, inclination of glazing materials should be 15° minimum. Sloping glazing to have sufficient overhang to shed rainwater from significant vertical surfaces.

- □ frame: powder-coated steel / natural aluminium / anodized aluminium / powder-coated aluminium / painted wood / varnished wood
- □ glazing: glass / polycarbonate / acrylic
- □ mounting: flush / curb / integral
- □ fixed or operable: ...

10.5.3 Curtain walling

□ curtain walling type: ...

site assembled continuous mullions with discontinuous transoms with infill glazing and panels / prefabricated units of framework, glazing and panels / rational design / submit proposals

curtain walling panel construction: ...

external finish / internal finish / core insulation / combustability / surface fire spread.

10.6 Adjustable glass louvre windows

□ operation: manual / remote control.

10.7 Wood frame units

No national standard exists on wood frame doors and windows, but check compliance with SANS 613. Wood frames should be protected from rain by adequate roof overhangs or extended lintels with drips.

- □ wood species:...
- □ profile and dimensions: see drawings

10.8 PVC-U frame units (SANS 1553)

- □ profile and dimensions: see drawings
- □ surface finish: matt / glossy.

10.9 Polymer concrete frame units

- □ profile and dimensions: see drawings
- □ surface finish: ...
- □ sub- and opening frame material: aluminium / cold rolled steel.

10.10 Wood doors (SANS 545)

□ type of door: see drawings

balanced / batten / flush / casement / prehung / security-view / louvre / patterned / screen / sliding / special / stable / cupboard / X-ray / single / paired single swing / paired double swing

dimensions: see drawings

610 / 762 / 813 / 864 mm x 457 / 2032 x 40/44 mm

 $457\ \text{mm}$ high doors for cupboards. Entry doors for disabled persons in wheelchairs must be at least 813 mm wide.

□ handing: see drawings

Hand refers to position of hinge when door opens towards viewer. Show first opening leaf of paired doors when important.

□ exposure class: see drawings

2 / 3 / 4

2 (semi-exterior, partly or wholly exposed at infrequent intervals to unprotected open air conditions); 3 (humid interior); 4 (dry interior). Note there is no exposure class 1. Hardwood framed and braced batten doors are heavy duty doors, suitable for exposure class 2.

flush panel doors

performance class: see drawings

LD / MD / HD

LD (light duty, hollow core) / MD (medium duty, semi-solid core / HD (heavy duty, solid core)

Solid core flush panel doors are heavy duty doors suitable for dry interior use only – specify for frequent use and abuse, e.g. schools, public places, hospitals.

Semi-solid flush panel doors are medium duty doors suitable for dry interior use only - specify for general use in office blocks, dwellings, barracks and single quarters, including cupboard doors.

Hollow core flush panel doors are light duty doors suitable for dry interior use only - specify for dwellings or cupboard doors in dwellings only.

□ any special properties: ...

□ finish, and wood species when relevant: see drawings

fibre board / sapele mahogany veneer / plywood / coating

Do not specify veneer when door is to be painted. Other commercial veneer species: maple, cherrywood, beech – check with suppliers.

10.11 Fire doors and fire shutters (SANS 1253)

□ class (fire resistance in minutes) : see drawings

A / B / C / D / E / F

A (60 min) / B or C or D (120 min) / E or F (30 min)

□ type door: see drawings

single / double / swing / sliding

Manually operated sliding fire doors are normally parked in open position, closing only in event of a fire by means of a fusible link or electric magnet.

□ type of closing device: see drawings

fusible link / electric magnet

Electrical operation is recommended for larger doors that are frequently used.

handing: see drawings

Doors forming part of fire escape routes must open in direction of route.

□ size: see drawings

Maximum 4 x 4 m.

□ finish: see drawings

hardboard / galvanized steel cladding

Galvanized steel for heavy duty and external doors or corrosive conditions.

10.12 Garage doors

- □ type: up-and-over / sectional overhead / sliding / swing
- □ size: single / double
- □ framework material: steel / wood
- cladding/boarding material: hardwood / aluminium / prepainted galvanised steel / primed steel
- operation: manual / electric / chain drive / hand crank
- □ finish: varnish/sealer / paint / powder coated / anodised / epoxy coated
- □ locking devices: chrome plated centre lock with spring loaded side catches, interior/exterior padlock bolt and keep / automated (no locking device required)

sectional overhead doors

- panels: aluminium / aluminium/zinc / galvanised mild steel / prepainted galvanised mild steel / hardwood / glass
- □ specialised applications for solid doors: fire-doors SANS 1253 class ... / with fusible link, permanently open / gas leak proof / tornado wind resistant / high-frequency / petrol bomb resistant / acoustic control.

10.13 Roller shutter doors

Roller shutter doors are *suitable* for from counter closures to aircraft hangars, and may be used for security, fire, smoke, gas, wind and bomb control.

Push-up operation is limited to 7,5 m²; chain 8 - 30 m²; crank to 25 m²; electrical to any size.

- □ size: see drawings
- □ operation: push-up / chain / crank / electric

- □ slats: steel / aluminium / solid / see-through/ventilated / double wall / grille / with end-locks
- □ grill pattern: ...
- □ finish: mill / hot dip galvanised / wet spray / anodised / powder coated
- □ canopy enclosing rolling mechanism: required / not required
- □ bottom bar in case of sloping floor: sloping / with flexible weatherstrip
- locking devices: side bolt at waste height / external pad bolt / centre lift lock with external key and internal knob operation / floor level four point slide bolts
- □ wicket door 685 x 1830 mm: opening in / opening out
- □ additional features required: card readers / inductive loop circuits / automation
- □ specialised applications for solid doors: not required / fire-door SANS 1253 class ... / with fusible link, permanently open / gas leak proof / tornado wind resistant / high-frequency / petrol bomb resistant / floor shutter / acoustic control.

10.14 Strongroom/record room doors, ventilators

□ type: see drawings

strongroom / vault / record room

strongroom and vault doors (SANS 949)

category strongroom doors: 1 / 2 / 2 ADM

Category: 1 (fire resistance 30 minutes, entry resistance 15 minutes), 2 (30 minutes, 1 h), 2 ADM (anti-disc cutter material)

category vault doors: 1 / 2 / 2 ADM / 3 / 4 / 5

Category 3, 4 and 5 resist increasing levels of attack.

- dimensions: see drawings
- □ fittings: see drawings
- □ handing: see drawings
- □ type and number of locks if other than specified: ...
- □ factory finish: primer only / baked enamel / hammertone

fire-resisting record room doors (SANS 1015)

- □ type of lock if other than specified: ...
- □ finish: baked enamel / hammertone.

10.15 Solar control

- □ type: internal / external / fixed / retractable / awning / canopy / blind / louvre
- □ material: fabric / metal / concrete / glass
- □ fabric: UV-resistant, washable, rot-proof
 - □ visible transmission: ...
 - □ solar transmission: ...
- □ metal: aluminium / prepainted hot dip galvanized steel
- □ louvre: fixed / adjustable
- □ operation when relevant: manual / automated / from inside.

Relevant standards:

SANS 10400-O Lighting and Ventilation.

SANS 204 Energy efficiency in buildings

11 Plaster, screeds, toppings, terrazzo

11.1 Plaster

□ type: see drawings

cement plaster / gypsum plaster / lime plaster / insulating plaster / barite plaster / waterproof plaster.

11.1.1 Cement plaster (SANS 2001 EM1)

SANS 2001- Construction Works Part EM1: Cement Plaster Admixtures are not permitted in cement plasters to improve workability or improve the properties of the finished plaster.

Specification data:

□ application: single coat / multicoat

□ finish to cement plaster: smooth / textured / roughcast / bagged / skimmed

Show in drawings: V-joints through full plaster thickness at dpc level and where different materials meet; metal lath strips over roof anchors on single leaf masonry walls, or across joints between different materials – see SANS 2001-EM1.

11.1.2 Gypsum plaster

Do not mix gypsum-based plaster with plaster made with common cement – the sulphate compound in gypsum attacks common cement paste.

11.1.4 Insulating plaster

 \Box low density aggregate density range: 60 - 160 / 120 - 240 / 450 - 720 kg/m³

60 - 160 (exfoliated vermiculite); 120 - 240 (perlite); 450 - 720 (foamed slag).

Omit if default (800 - 960 kg/m³ (clinker) covered in SANS 2001-EM1) is acceptable.

Barite plaster for use in X-ray rooms. Thickness for general diagnostic X-ray work normally between 15 and 30 mm. Check mix and thickness with requirements.

11.1.6 Accessories

- expanded metal, type: sheet/plate / angle bead / base bead / corner mesh / plaster lath / plaster stop / rib lath / strip mesh
- \Box angle rounded corner protection: 1 500 x 1,0 x 35 mm girth strip, position: see drawings.

11.2 Screeds, toppings, terrazzo

To be published: SANS 2001-EM2 Screeds and toppings.

Screed is a layer of a well-compacted mixture of cement and fine aggregate applied to a concrete base, *suitable* for receiving a floor finish.

Topping is a layer of high-strength concrete designed to provide a dense, abrasion-resistant surface on a concrete base.

Terrazzo is a hard-wearing decorative concrete finish in which crushed or uncrushed aggregate like marble and pigments is used, and of which the surface is generally ground and polished.

Specify screed or topping only where a direct-finished one-course concrete floor is impracticable.

11.2.1 Materials

proprietary surface treatments

Treatments to harden or seal the surface of toppings are not normally required, provided a sufficiently high grade of properly finished concrete is used. They may however be useful in dust sensitive areas or where oil spills or mildly acidic solutions may occur. Expert advice should be sought from the manufacturer/supplier.

- □ form: dry shake / coating / screed
- to improve: abrasion resistance / chemical impact resistance / slip resistance / density / UV resistance
- □ colour/finish: ...

mesh reinforcement

□ mesh reinforcement: ...

Mesh reinforcement may be required to restrain differential shrinkage stresses and control cracking on precast concrete elements – not normally required.

water

□ water: SANS 51008

Omit if default (drinking water) is acceptable.

11.2.2 Mix

topping

concrete grade: see drawings

20 / 30 / 40 / 50

Topping: 1 part cement to 1½ parts sand to 1½ parts stone would produce a concrete strength of 25 – 30 MPa. Use concrete of at least grade 20 where abrasion resistance is not a consideration; grade 30 for floors for light duty industrial and commercial purposes; 40 for ditto medium duty; 50 for heavy duty industrial, workshops, special commercial; very heavy duty engineering workshops would require a proprietary topping. Consult The Concrete Institute for advice.

11.2.4 Laying

Method of laying as described here is known as "separate bonded construction", where the topping or screed is laid on and bonded to a hardened base. For other methods, for example monolithic construction, and separate unbonded construction, consult SANS 10109 part 2.

Compaction of the mix is most important. Stiff semi-dry mixes not well compacted are a common cause of bond failure. Compact stiff mixes with power-operated equipment such as vibrating screed boards.

Joints in screeds should be minimal. Screeds laid in large areas may crack, but this is more acceptable than curling at edges of small panels.

□ screed thickness: see drawings

25 – 50 mm

□ topping thickness: see drawings

25 – 40 mm

□ edge/feature/dividing strips: see drawings.

11.2.5 Finishing

□ type of finish: ordinary / hard / colour pigmented / dry shake / surface ground and polished

Ordinary finish is *suitable* for surfaces that are to be covered by flooring. Hard finish is *suitable* for surfaces that are not to be covered with flooring and for toppings that require high resistance to wear (grade 30 and higher).

Hardwearing surfaces like toppings and terrazzo may be ground and polished – not recommended for sand:cement screeds. Grinding tends to create lower slip resistance. Grinding will affect appearance and will remove surface treatments such as dry shakes.

□ surface smoothness: smooth / non-slip

pigmentation

□ type: integral (mix with dry cement) / add to freshly laid surface as a dry shake / not required.

11.2.6 Joints

- □ type: isolation joint / intermediate sawn contraction joint / patent movement joint
- pattern: see drawings
- □ seal joints: required / not required
- D patent movement joint system with flexible inserts: aluminium / stainless steel / PVC

Material depends on nature and intensity of traffic. Joints should be sealed when floor is subjected to liquids, hygiene.

11.2.7 Surface regularity

□ degree of surface regularity: I (3 mm) / III (10 mm over 3 m in any direction)

Omit if default (II) is acceptable. Check with SANS 10155. In small rooms deviation should be less.

11.2.8 External thresholds



11.2.13 Surface sealing

□ seal floor surface with: one coat non-slip wax polish / epoxy / not required.

Relevant standards: SANS 10109 Part 2 Finishes to Concrete Floors. Concrete Basics for Building. 2004. Cement and Concrete Institute.

12 Tiling

12.1 Materials

□ type of tile: see drawings

ceramic / stone / concrete / terrazzo / mosaic

ceramic wall and floor tiles (SANS 1449/13006)

group: A1 / A2 / A3 / A4 / B1 / B2 / B3 / B4 / C

Group A (extruded split /quarry tiles) and B (dust pressed tiles) are classified according to their water absorption properties. C=other. Group A1 and B1 have the lowest water absorption (≤3%). Fully vitrified porcelain tiles, covered by SANS 13006 only, are frost resistant and suitable for cold rooms etc.. Not all manufacturers produce to SANS 13006.

□ surface: glazed / unglazed

□ shape, pattern, colour: ...

□ nominal dimensions: see drawings

200 x 200 / 300 x 300 / 400 x 400 / 500 x 500 mm

□ grade: first grade / second grade

Second grade tiles have minor blemishes.

□ glazed tile abrasion resistance class: 1 / 2 / 3 / 4 / 5 / not required

Abrasion resistance class to SANS 13006: 1 for interior soft domestic footwear such as bathrooms and bedrooms; 2 for interior light domestic traffic such as living rooms; 3 for interior and exterior areas such as domestic kitchens, halls and terraces, and low-traffic commercial areas; 4 for frequent traffic such as public entrances, shops, hospitals, hotel kitchens and exhibition rooms; 5 for severe pedestrian traffic such as shopping malls, airport concourses, sports stadia and factories.

□ slip resistance value (coefficient of friction) : dry ..., wet ... / on stairs and ramps only

For slip resistance, contact manufacturer. Slip resistance is important in public places and on ramps and a requirement for disabled people (SANS 10400-S). Several test methods exist. The Pendulum Test Value (PTV) to BS 7932 is acceptable. PTV 0–24 is high, 25–35 moderate, 36+ low slip potential. A calibrated tester is available in SA. Slipperiness is also affected by use, water, spills and floor care.

acid and alkali resistance of glazed tiles: type of chemical ... / not required

stone tiles

No local standard exists on natural stone tiles. Consult supplier/installer.

□ type: natural stone / cast stone

- □ natural stone: slate / quartzite / marble / granite
- □ slip resistance value (coefficient of friction) : dry ..., wet ... / on stairs and ramps only / not required

For slip resistance contact manufacturer.

nominal dimensions: see drawings

300 x 300 / 450 x 450 / 600 x 600 x 50 / 65 mm

□ shape: ...; colour: ...

concrete tiles

- □ type: concrete / terrazzo
- nominal size: see drawings

300 / 450 / 600 x 300 / 450/300 / 600/450 x 50 / 65 mm

mosaic

□ material: ceramic / glass / stone

- □ appearance: glazed / unglazed
- □ colour: ...
- □ size of tesserae: ...

grout

□ proprietary grout: cement-based / organic-based / reaction resin (epoxy)

Epoxy grout e.g. in food storage and preparation and processing areas, abattoirs, breweries, dairies, bottling plants, restaurants, industrial kitchens, hospitals and clinics.

profiled and decorative tiles

profiled and decorative tiles: see drawings

skirting / dado / bullnose

accessories

edging, trim, stair nosing and movement joint strip material: PVC / aluminium / brass / stainless steel

see also Section 16.

□ profile, size, colour: ...

12.2 Tiling

To be published: SANS 2001-ET Tiling.

bedding

□ external angles: see drawings

mitred / lapped / strip edged / bullnose tile

internal sills in bathrooms: see drawings / level / sloping

Sloping sill to prevent internal sills being used as a shelf.

External sills should be tucked in under all window frames - fixed in front of window frame will lead to moisture damage in exposed conditions. See also SANS 2001-CM1.

□ field, border, pattern: see drawings.

12.3 Jointing

Floor tiling joint width may be subject to manufacturer's recommendations, irregularities in the tiles, modular discipline or decorative effect.

Extruded tiles require a wider joint to cater for distortions.

In internal work, laser cut natural or cast stone of precise dimensions may be butt jointed with little or no grout.

□ joint width: ...

Omit if default widths are acceptable.

12.4 Movement joints

□ type: formed in situ / preformed strip / isolation joint / intermediate joint / structural joint

preformed compression joint strip

□ material, colour: PVC / aluminium / brass / stainless steel / ...

Preformed joint strip: PVC is suitable for light traffic, stainless steel for heavy traffic. Check whether chemical resistance is required.

isolation (perimeter) joints



structural joints

In practice structural substrate joints are often not true. Ignoring this fact will result in a tiling joint not uniformly coinciding with the base joint, leading to cracks. Possible solutions are:

a) if the joint is out of line but straight, consider continuing the joint through the tiling (the joint will not be aligned to the tile joints, but will at least be straight), or

b) if the joint is irregular within a narrow straight band, consider installing a prefabricated flexible metal joint capable of spanning the irregularity, or

c) if the joint is out of line and irregular, consider leaving out the row(s) of tiles in which the troublesome joint occurs, and lay the row of tiles over an underlay or in a permanently flexible adhesive, or lay a different flooring material over the joint which is able to accommodate the expected movement, e.g. carpet, thermoplastic, wood or laminate. Reinforce the edges or, in the case of rigid materials, seal both sides of the strip covering the structural movement joint.

Relevant standard: SANS 10107 Design and Installation of Ceramic Tiling.

13 Floor coverings, wall linings

□ type: see drawings

thermoplastic / wood / textile / epoxy.

13.3 Thermoplastic and similar flexible floor covering

To be published: SANS 2001-EF3 Resilient thermoplastic and similar flexible floor covering. Consider slip-resistant and tactile floor finishes for disabled persons. See SANS 784 for guidance.

13.3.1 Materials

□ type: see drawings

vinyl / linoleum / rubber

semi-flexible vinyl floor tiles

□ tile thickness: 2,0 / 2,5 / 3,2 mm

SANS 581: type of semi-flexible vinyl flooring: 120, 130, 160, 200 (domestic), 250 (heavy traffic), 320 (extra heavy traffic).

- □ pattern: none / marbled / mottled
- \Box chemical resistance: ... ; type of chemical ...

flexible vinyl flooring

□ tile thickness: 2,0 / 2,5 / 3,0 mm

SANS 786: type of flexible vinyl flooring: 125 (1,25 mm, domestic light), 160 (domestic), 200 (commercial, domestic heavy), 250 (industrial light, commercial heavy), 300 (industrial), 320, 360 (industrial heavy).

- □ form: sheet / tile
- □ pattern: none / marbled / mottled
- □ chemical resistance: ... ; type of chemical ...

linoleum sheeting or tiles

Linoleum is manufactured by mixing linseed oil with wood or cork powder, resins, ground limestone and mineral pigments, rolled out onto a jute backing and cured.

- □ thickness: 2,0 / 2,5 / 3,2 / 4,0 mm
- □ form: tile / sheet
- □ shape, size, of tile: ...
- □ colour: ...
- □ finish: unfinished / coated

rubber sheeting or tiles

Recycled and natural rubbers are "green". Recycled rubber lasts longer. Rubber floors are suitable for sport and industries. Interlocking tiles are interchangeable.

- □ form: tile / interlocking tile / sheet
- □ shape, size of tile: 300 x 300 to 500 x 500 mm
- □ texture: plain / studded / diamond
- □ colour: plain / patterned / speckled
- □ installation method: glued / interlock floating

accessories

- $\hfill\square$ skirtings: extruded PVC , height: ...
- □ trim, movement joints: extruded PVC / aluminium / brass / stainless steel

nosings: extruded PVC / rubber / extruded aluminium with non-metallic slip-resistant inlays / solid wood

13.3.2 Laying

□ pattern: see drawings / straight joints in both directions

finishing

□ polymer floor dressing type: 1 / 2

Floor dressing type 1 produces hard coating; type 2 produces soft coating.

13.4 Wood flooring, solid and laminate, on solid substrates

To be published: SANS 2001- EF1 Wood and Laminate Floor Covering.

For the installation of timber suspended floors see Section 4 Structural timber (flooring).

Solid wood floors may be sanded several times during their life span.

Wood and laminate flooring is laid directly on solid cementitious substrates. Solid wood floors are glued or nailed to battens. Laminate floors are floating floors assembled by using a patent click lock system. Wood and laminate floors expand and contract – do not use in wet areas.

SAWLFA South African Wood and Laminate Flooring Association is the industry representative body.

□ traffic class: 21 / 22 / 23 / 31 / 32 / 33

See SANS 10043 table 1 for a traffic classification according to EN 13329: 21 (domestic moderate, e.g. bedrooms), 22 (domestic general, e.g. living rooms), 23 (domestic heavy); 31 (commercial moderate, e.g. conference rooms, offices), 32 (commercial general, e.g. offices, hotels, classrooms, 33 (commercial heavy, e.g. corridors, stores, schools, halls, open plan offices).

See SANS 10043 table 6 for traffic, hardness, density and shrinkage classification of flooring timbers in common use.

13.4.1 Materials

Solid wood floors may be sanded several times during their life span.

□ flooring type: see drawings

solid wood strip/block / solid wood parquet/mosaic / plywood / faced plywood or fibreboard / melamine laminates

solid wood strip, block, parquet, mosaic

SANS 281 Hardwood block and strip flooring and SANS 978 Wood mosaic flooring were withdrawn in May 2009 and not replaced.

- □ species:...
- □ grade: clear / figured
- □ preservative treatment: ...

Note that some woods are naturally durable.

- □ second-hand blocks: allowed / prohibited
- □ prefinishing: required / not required

faced plywood or fibreboard

- □ facing: natural hardwood / cork / bamboo
- □ species:...
- □ prefinishing: required / not required

decorative melamine laminate

- □ pattern, colour: ...
- □ built-in underlay: required / not required
- □ prefinishing: required / not required

underlays

- □ required insulating underlay function: acoustic / thermal / noise control / impact (sports)
- polyethylene elastic-adhesive underlay:

This is an imported underlay with several advantages, not requiring gluing, nailing or clipping of the floor boards. Check with supplier.

- □ density: 30 / 50 kg/m³
- □ thickness: 2 / 3 / 5 / 10 / 15 mm
- □ adhesive type: permanent / re-usable.

13.4.2 Installation

installation in general

□ installation method: nail down / glue down / floating / stick down on elastic-adhesive underlay / sprung / as recommended by manufacturer

Underfloor heating has important repercussions for wood and laminate flooring. Check with supplier, SAWLFA.

□ pattern: see drawings

nail down

Nail down is *suitable* for solid and engineered wood strip on new concrete floors or stairs, on existing rigid floors that are reasonably level, where a dpm is required, and where the total floor covering thickness of about 40 mm can be accommodated. Not to be installed over underfloor heating unless space between battens is filled with a cement:sand mix. Can be installed on walls as panelling.

Nail down floors can reduce impact noise transmission.

13.5 Textile flooring

To be published: SANS 2001- EF2 Textile flooring.

13.5.1 Materials

textile flooring

- □ type: pile construction / needle punched construction
- □ colour and design: ...
- □ fire index class: 1 / 2 / 3 / 4 / 5

Fire index: material to be used for floor covering (including underlays) or wall finish is tested in a standard manner and is classified on a scale of 1 to 5. These classifications are based on a "fire index" which in turn represents the effect of rate of burning and the amount of heat and smoke generated. Most good quality floor coverings have a fire index of 1 or 2. See SANS 10400-T table 9 and 10 for required classes for different occupancies.

□ location grade: U1 / U2 / U3 / U4 / U5

Location grade: U1 (light domestic); U2 (medium domestic); U3 (heavy domestic, light commercial); U4 (medium commercial); U5 (heavy commercial).

carpet underlays

□ type: fibrous / foam / contractor's choice

Underlays: needled fibre, foam rubber, latex bonded fibre or composites. A carpet should be fire tested with its underfelt, since no fire classification for underfelt is currently available. Underfelt makes an important contribution to impact sound insulation, and to airborne sound absorption provided the carpet has a porous backing.

13.5.2 Installation

Seams should run parallel to length of area (so that traffic moves along rather than across the seam) and so that light from windows does not strike across the seam. Pile should face away from incident light and downwards on stairs.

13.6 Epoxy flooring

Epoxy floors are hard-wearing and have excellent resistance to chemicals, oils etc.

□ aggregate colour, size: ...

application

- D position of edge/dividing/feature strips: see drawings
- □ thickness: 1 6 mm
- □ finish: smooth / exposed aggregate finish.

Relevant standards:

SANS 10043 The installation of wood and laminate flooring

SANS 10070 The laying of thermoplastic and similar types of flooring.

SANS 10170 The cleaning and maintenance of floors.

SANS 10177 Fire testing of materials, components and elements used in buildings.

SANS 10186 The installation of textile floor coverings.

SANS 10245: The maintenance of textile floor coverings.

SANS 2424 Textile floor coverings - vocabulary.

SANS 10400-J Floors.

SANS 13746 Textile floor coverings - guidelines for installation and use on stairs.

14 Painting, paperhanging

To be published: SANS 2001-EP Painting.

14.1 Materials

primers

Standards for red lead or red lead/red oxide primers, zinc chromate primers, calcium plumbate primers, metallic lead primers have been withdrawn due to toxic lead content.

undercoats

Universal undercoats are *suitable* for interior and exterior use for subsequent application of solvent-borne finishes, especially gloss finishes.

□ universal undercoat grade: 1 / 2 / as required

1 (high hiding), 2 (utility grade).

finishing paints

alkyd

Alkyd paint, also known as enamel paint, is solvent-borne.

□ alkyd high gloss finishing paint (SANS 630) grade: 1 / 2 / as required

1 (high hiding), 2 (regular hiding).

□ decorative paint for interior use (SANS 515) type: semi-gloss / flat

emulsion

□ emulsion paint (SANS 1586)

□ grade: 1 / 2 / 3 / 4

Grade: 1 (high hiding, scrub resistant), 2 (high hiding, washable), 3 (general purpose, washable), 4 (utility, interior only)

Emulsion paint is water-borne and suitable for application over plaster and masonry substrates. Grade 1, 2 and 3 is suitable for interior and exterior use, grade 4 for interior use only.

□ gloss designation: matt / semi-matt / semi-gloss

□ textured emulsion wall coating (SANS 1227)

□ type: 1 / 2 / 3 / 4

1 (smooth aggregate-free), 2 (low-relief, sand-textured finish), 3 (high-relief, coarse-textured)

□ fungus resistance: required / not required

Aluminium paint is typically an alkyd resin binder pigmented with flake aluminium.

Micaceous iron oxide paint is typically solvent-borne. Masonry paint may be solvent-borne or emulsion type.

varnishes, varnish stains, stains, sealers

Varnishes are transparent or semi-transparent.

Stains have no protective or preservative properties and are suitable for interior work only.

□ varnish or varnish stains for interior use (SANS 887)

□ type: 1 / 2

1 (general purpose), type 2 (heat and chemical resistant)

□ gloss designation: glossy / eggshell

bituminous and tar-based coatings

Bitumen-based coatings for interior and exterior use on primed metal, masonry, fibre cement, wood, roofing felt, creosoted timber, hard bituminous surfaces.

specialized coatings

Epoxy and polyurethane coatings have superior resistance to abrasion and chemicals. One-pack materials usually do not have the same resistance as the two-pack types. They require a high standard of surface preparation.

14.2 Preparation of surfaces

□ hardware etc.: remove, mark, store and refix / mask.

14.3 Colours

Specify colours on schedules. There is a marked difference in price for various colours, especially bright colours.

□ identification colour marking (pipes etc.): required / not required.

14.8 Paint systems for on-site application

paint system: see drawings

alkyd / emulsion / textured emulsion / masonry / cement / lime / varnish / aluminium / heat-resistant / sealer / intumescent

 \Box colour: see drawings.

14.8.1 Cement-based surfaces, brick and stone

alkyd paint

Alkyd-based coatings are sensitive to alkali. Alkali-resistant sealers are required on cement plaster and offshutter concrete.

14.8.3 Wood

transparent finish systems for wood (interior)

In transparent finishes the darker colours are more durable because they absorb ultraviolet light more effectively, but increase solar heat gain so that the moisture content of the wood decreases more rapidly. Varnish is not recommended on exterior wood.

14.8.5 Plastics

paint on unplasticized polyvinyl chloride (PVC-U)

A two-pack wash primer is no guarantee for proper adhesion of conventional paint systems No general specification can be made with regard to the painting of plastic coatings. Seek expert advice.

14.8.6 Intumescent paint

□ surfaces requiring intumescent paint: ...

Intumescent paint enhances fire resistance by limiting spread of flame. Check compliance with fire regulations.

14.9 Paperhanging

wallpaper

□ type, pattern, colour: ...

Relevant standards:

SANS 10064: Preparation of steel surfaces for coating.

SANS 10305: Painting of buildings:

Part 1: Paint and paint selection.

Part 2: Paint application and defects.

Part 3: Paint types.

Part 4: Painting of walls, ceilings and cladding.

Part 5: Painting of roofs and steel structures.

Part 6: Painting of wood.

15 Furniture, equipment, stairs, architectural metalwork

15.1 Joinery

For wood doors and windows see Section 10.

15.1.1 Solid wood

wood

□ type: hardwood / softwood / laminated wood

hardwood

□ species:...

SANS 1099 includes requirements for preservative treament. Annex C gives properties of 29 hardwood species, local or exotic.

softwood

□ species:...

laminated timber

exposure class: 1 / 2 / 3 / 4

1 (exterior); 2 (semi-exterior); 3 (humid interior); 4 (dry interior).

□ type of wood: hardwood / softwood

□ species:...

15.1.2 Wood board

type: plywood / composite board / decorative melamine-faced boards (MFB) / fibreboard / particle board / oriented strand board (OSB)

plywood and composite board (SANS 929)

exposure class: 1 / 2 / 3 / 4 / as required

1 (exterior); 2 (semi-exterior); 3 (humid interior); 4 (dry interior).

- □ type board: ply / composite
- □ type plywood: commercial / marine / structural
- □ type composite board: batten board / blockboard / laminated board / high-pressure decorative board / veneered particle board / veneered fibre board
- □ thickness plywood: 3 / 6 / 9 / 12 / 15 / 18 / 22 mm
- □ number of plies or laminae: 3 / 5 / 7

Number of plies are always odd.

- □ veneer: species..., rotary cut / sliced
- □ plywood grade: S / A / B

S (select, for decorative applications), A (furniture, for joinery where it may be reworked), B (standard, to be covered, coated or painted).

decorative melamine-faced boards (MFB) (SANS 1763)

MFB is low pressure melamine on particle board or MDF, suitable for medium duty vertical and light duty horizontal surfaces e.g. shelving – not for kitchen and office desktops.

- □ core: particle board / MDF
- □ thickness: 9 / 12 / 16 / 18 / 22 / 32 mm

Board size 3,6 x 1,8 m.

- □ shelving edge: sapele-print / melamine
- □ surface finish: smooth matt / textured / embossed wood grain
- □ moisture resistant board: required / not required

fibreboard (SANS 540)

□ type: insulation board / medium density fibreboard (MDF) / tempered hardboard

MDF has a fine structure allowing for traditional wood-working techniques like moulding, embossing, routing and edge profiling.

□ thickness of tempered hardboard: 3,2 / 4,8 / 6,4 mm / as required

Hardboard can be bent by cold-dry, cold-moist and hot-moist bending techniques. Consult manufacturer. For full range of thicknesses see SANS 540.

moisture content range: ...

particle board (SANS 50312)

type: P2 / P3 / P4 / P5 / P6 / P7 / as required

P2 (general purpose, dry conditions); P3 (interior fitments, dry conditions); P4 (load-bearing, dry conditions); P5 (load-bearing, humid conditions); P6 (heavy-duty, dry conditions); P7 (heavy-duty, humid conditions).

□ thickness: 12 / 16 / 18 / 22 / 25 / 28 mm / as required

oriented strand board (OSB) (SANS 472)

□ type: OSB/1 / OSB/2 / OSB/3 / OSB/4 / as required

OSB/1 general purpose dry interior; OSB/2 load-bearing dry conditions; OSB/3 load bearing humid conditions; OSB/4 heavy-duty load-bearing humid conditions, e.g. walls, floors, roofing, I-beams.

□ thickness: 6 / 9 / 12 / 15 / 18 mm / as required

15.1.3 Polymer laminate and solid surfaces

high pressure decorative laminates (HPL) (SANS 4586)

HPLs consist of layers of phenol formaldehyde impregnated sheets of Kraft paper with melamine formaldehyde (MF) impregnated décor and overlay paper, pressed together. Normally glued to suitable board with a backer laminate for balance, but can be self-supportive (solid core).

□ material type: S / F / P / as required

S (standard) / F (flame-retardant) / P (postformable).

□ grade/duty class (wear, impact and scratch resistance):1 / 2 / 3 / 4 / / as required

1 (light duty, post-forming), 2 (vertical surface), 3 (general purpose), 4 (heavy duty)

General Purpose grade, thickness 1,2 / 1,5 / 2,0 / 2,5 / 3,0 / 3,5 / 4,5 mm: for work surfaces on counters, vanities, desks and tables, and for vertical surfaces like wall panels and front panels of work stations in hospitals, airports and restaurants.

Vertical Surface grade: for cabinet walls, door and drawer panels, desks, restaurant booths, architectural cladding.

Light duty/post forming grade, thickness 0,35 / 0,6 / 0,8 / 1,0 mm: for rounded edges.

Heavy duty, thickness 6,0 mm

thickness: light duty and post forming: 0,35 / 0,6 / 0,8 / 1,0; general purpose: 1,2 / 1,5 / 2,0 / 2,5 / 3,0 / 3,5 / 4,5 mm; heavy duty: 6,0 / as required

Omit if default (1,2 mm for grade 3 (general purpose) and 1,0 mm for grade 1 and 2 (vertical surfaces and post forming) is acceptable.

□ surface finish, colour, texture: smooth matt / textured / embossed wood grain / writing

□ solid core grade: interior grade / exterior grade

□ thickness interior grade: 3 / 6 / 8 / 10 / 20 mm

□ thickness exterior grade: 20 mm

Solid core for horizontal and vertical work surfaces; exterior grade for vertical surfaces only, e.g. cladding, balustrading and signage.

Check thickness and usage with manufacturer.

continuous pressed laminates (CPL)

CPLs are supplied in 100 -150m rolls.

□ grade/duty class, thickness: HGP / VGP / VLP / as required

HGP (horizontal, general purpose, postformable), thickness 0,6 mm, wear index number 3, impact index number 2, scratch index number 2; VGP (vertical, general purpose, postformable), 0,6 mm, 2, 2, 2; VLP (vertical, light duty, postformable), 0,35/0,5 mm, none, 2, 2.

□ colour, pattern: ...

polymer solid surfacing material

- \Box colour: ...
- □ inlays: ...
- □ form: ...

15.1.4 Stone surfaces

stone surfacing material

- □ type: ...
- □ thickness:...
- □ edge: ...
- □ form: ...

15.1.5 Steel tubes for furniture

steel tubes for furniture SANS 657-4

- □ material and grade: mild steel 230 / 250 / stainless steel class A type 1 or 2, grade 304
- □ size, profile: see drawings

Size, profile: 16, 20, 25, 32, 38, 40, 50, 60, 70 mm ø (round steel); 16, 20, 25, 32, 50 mm (round stainless steel); 30 x 16 mm (oval steel); 20 x 20, 25 x 25, 32 x 32, 40 x 40, 50 x 50, 65 x 65 mm (square steel); 25 x 25, 32 x 32 mm (square stainless steel); 50 x 20, 50 x 25 mm (rectangular steel and stainless steel)

- □ wall thickness: see drawings
- 0,9 / 1,2 / 1,6 / 1,8 / 2,0 mm, depending on material.

□ stainless steel finish: mill / matt / polished / mirror.

15.1.6 Joinery

general

Climate zones: inland / coastal. Inland zones represent over 90% of South Africa's climate, made up of an average 8% moisture content, including air-conditioned indoor areas.

□ wood sizes: see drawings

Wood sizes: show finished sizes of timber members on drawings to avoid arguments about tolerance: 25 mm nominal size reduces to 22 mm after planing, 38 to 32, 50 to 44, 76 to 68, 114 to 105, 150 to 140, 228 to 118 mm.

Check available board sizes to ensure optimum yield and to avoid unnecessary waste.

Marine ply is a superior choice to moisture resistant particle board in wet areas.

exposed edges of veneered composite board: solid wood edging to match veneer and to full thickness of board

grain, pattern

□ direction of grain or pattern: see drawings

Omit if default (vertical on vertical surfaces, parallel to walls on horizontal surfaces) is acceptable.

backs

backs to fittings: 4,8 mm hardboard / 16 mm ply/composite board / contractor's choice / not required

drawers

□ drawer construction: see drawings

Omit if default construction is acceptable.

shop painting

□ delivery of joinery on site: knot and prime / knot and prime hidden faces only / brush apply one coat clear finish as specified under Section 14 / reaction lacquer spray paint

Omit if fully painted (default) is acceptable.

15.1.7 Fixing

Consider tables, counters and shelves at a variety of heights to accommodate standing, sitting and a range of different tasks for disabled persons.

wood cornices, skirtings, quarter rounds, rails

- □ material: solid hardwood / medium density fibreboard / ...
- \Box size and profile: see drawings.

15.2 Commercial kitchen cupboards (SANS 1385)

SANS 1385 covers 8 types of kitchen unit cupboards of steel sheet, composite wood board or solid timber. Kitchen Specialist Association (KSA) is the national trade association of kitchen fitting manufacturers. Consider specifying that the manufacturer/installer is a registered member.

□ type of unit: see drawings

base / sink / was trough / wall / combination / corner / special / floor mounted tall cupboard

- □ colour: ...
- □ type of stainless steel for sinks, wash troughs, worktops: AISI-304 / AISI-430
- □ finish on mild steel fittings, handles, fasteners: electrodeposited nickel-chrome / zinc and cadmium
- □ type of wood: solid / laminated / hardboard / plywood / particle board / low pressure decorative board / laminated veneer board / as required
- □ material of work tops: composition board / stainless steel / ceramic / mosaic
- edging of worktops: hardwood / plastic moulding / extruded aluminium / self-edging (same material as top) / aminoplastic / high-pressure decorative laminate
- □ number and position of bowls: see drawings
- □ material of casings: sheet steel / solid timber / composite (particle board with laminates)
- material and construction of doors: steel butts / sliding / wood / composite board / glass panel
- □ locks: cylinder / lever
- □ region: inland / coastal region
- □ wood finish: raw linseed oil / lacquer varnish / bees wax and turpentine / epoxy resin
- □ dimensions: see drawings
Floor units: 300, 400, 450, 500, 600, 900, 1000, 1200, 1500, 1800, 2100 x 525, 600 x 900 mm; wall units: ditto length x 300 x 300, 600; tall units: 500, 900 x 525, 600; wash trough units: 450, 900, 1050, x 525, 600 x 900 mm / for non-modular dimensions, consult manufacturers.

□ type door, arrangement of drawers, shelves: see drawings

additional items

plinths or any other part of wood cupboards in contact with the floor or wet areas, e.g. sinks, food preparation: solid hardwood / marine plywood / moisture resistant particle board / moisture resistant medium density fibreboard.

Composite wood and softwood swells or rots in contact with moisture from floor cleaning operations.

15.3 Commercial steel furniture (SANS 757)

□ type of unit: see drawings

stationary cupboard / linen cupboard / pigeon-hole cupboard / locker / wardrobe / filing cabinet / card-index cabinet

class, colour and texture of paint finishes: enamel or powder class 1 / 2

enamel or powder class 1 (minimum 0,06 mm thick) / 2 (minimum 0,03 mm thick)

- □ metal finishes: chromium / zinc / cadmium
- D powder coated finishes SANS 1274: type 1 / 2 / high gloss / satin / matt
- □ number of drawers, adjustable shelves: ...
- □ type hinges: ...
- □ type of locking system: cylinder / latch rod / latch plate
- □ type of adjusting strip: ...
- □ mirrors in wardrobes: see drawings
- □ fire resistance rating of vertical plan filing cabinets: ...

15.4 Metal counters, balustrades, cladding, signs, street furniture

□ material: see drawings

stainless steel / aluminium / prefinished metal

stainless steel

Stainless steel is low carbon steel containing >11% chromium (Cr), providing the steel with a corrosion resisting passive film.

Stainless steel classes are austenitic (300 series) and ferritic (400 series). Each class has several grades. Austenitic stainless steel grade 304 (European Norm1.4301) is normally used for street furniture, shop fronts, doorways, counters, balustrades, cladding, signs, roofing and street furniture. Use grade 316 in corrosive regions. Ferritic stainless steel is used only in interior applications of a non-aggressive nature.

Locally produced stainless steel is available in flat products, forgings and castings. Hot-rolled flat sheet is 3 - 50 mm thick, cold-rolled 0,4 - 3 mm thick. Sections like angles, channels, welded pipe and tubes are cold-rolled from flat sheet. Other grades and products are imported.

Stainless steel mill finishes can be annealed, pickled or polished. Processed finishes are achieved by grinding, polishing or buffing. Stainless steel can be coloured, acid-etched, mirrored, electro-polished, perforated, expanded, meshed or screened.

Choose the correct grade with consideration of the building's location, prevailing environment and climate. Design stainless steel elements to avoid receiving run-off water from other metals, or concentrated flows of

rainwater over parts of the element. Designs must cater for the facilitation of regular cleaning.

Consult the Southern African Stainless Steel Association (SASSDA).

□ austenitic stainless steel grade: 304 or 304L / grade 316 in the coastal region 3 – 4km from the coast

- □ finish: annealed and pickled mill finish / polished / coloured / etched / mirrored / electropolished
- □ form: see drawings

sheet / section / perforated / expanded / meshed / screened

aluminium

- □ finish: mill / anodising / liquid organic coating / powder coating
- □ colour: ...
- □ finish: matt / satin / high gloss / hammertone / textured

prefinished sheet metal products

Organic film coating on steel, aluminium, stainless steel for interior and exterior use.

□ type: 1 / 2a / 2b / 3 / 4 / 5a / 5b / 6a / 6b / as required

1 (interior, requiring further application after fabrication); 2a (dry areas); 2b (wet corrosive areas); 3 (mild to moderate rural, urban, tropical and industrial environments); 4 (marine and industrial); 5a (severe marine); 5b (heavy industrial and industrial marine); 6a (very severe marine); 6b (very severe industrial)

 \Box colour: ...

- □ finish: flat / semi-gloss / gloss
- □ dry film thickness: ...
- □ type of substrate: hot dip galvanized steel / aluminium / stainless steel

15.5 Stairs and ramps

□ type: see drawings

straight / spiral / dogleg / combination / helical / security/fire / enclosed

The rule in SANS 10400 – M of a minimum going of 250 mm and a maximum rise of 200 mm often leads to a disregard for another rule, i.e, "any stairway ... shall have dimensions appropriate to its use" (NBR part M Stairways). The full range of a more comfortable and safer proportion within the rule that "the sum of the going and twice the riser is not less than 570 mm and not more than 650 mm" would be: 180/280 mm; 170/280 – 310 mm; 150/280 – 350 mm and should be used in most public buildings.

Public ramps must have a safe gradient and frequent landings for disabled persons. Check with SANS 10400-S.

□ structure: see drawings

painted mild steel / stainless steel / wood, species

treads: see drawings

wood, species ... / stainless steel / steel / glass

□ balustrade / handrail: see drawings

stainless steel / wood / glass / polymer concrete.

Relevant standards:

SANS 10400-M Stairways.

SANS 10400-S Facilities for Persons with disabilities.

SANS 10104 Handrailing and balustrading (safety aspects).

16 Hardware

Hardware information should appear on door, window or finishes schedules.

16.1 General

□ type: see drawings

lock / latch / handle / plate / closer / hook and eye / bracket / hinge / bolt / door stop / door knob / door knocker / sanitary / furniture / curtain rail / edge or feature strip / sunken door mat / signage / drawer runner

□ fire door hardware type: see drawings

escape hardware / panic bars / locksets with thumb turns / fire bolts

□ material: see drawings

steel / stainless steel / aluminium / brass / nylon / ceramics / porcelain / wood

finish

For finishes on metal see SANS 1171 Annex C.

finish: see drawings

natural / brass plated / copper plated / chrome plated / zinc plated / nickel plated / sherardised / cadmium plated / phosphated / passivated / antiqued / epoxy coated / powder coated / anodised

□ sherardising coating thickness class: 15 / 30 / 45

15 μ m normal indoor/outdoor / 30 μ m severe outdoor / 45 μ m highly severe outdoor/industrial/ marine.

electroplating service condition: 1 / 2 / 3

1 (mild), 2 (moderate), 3 (severe)

Commercially plated fasteners are mostly sold with minimum corrosion protection, suitable only for dry interior conditions (corrosion resistance class C1). Thicker plating implies a special order (contact SAMFA – SA Metal Finishers Association – for details).

Rather specify solid brass, stainless steel or sherardized steel (30/45) for exterior or wet interior conditions, or ensure that plated products are protected by an appropriate paint system.

□ appearance: bright / dull / satin.

16.2 Fasteners

- □ fastener type: bolt / screw / nut / washer / pin / rivet
- metal screws for wood, type: countersunk-head / round-head / raised countersunk-head / slotted or cross recess drive / hexagon-head / scant shank
- □ material and size: steel / brass / silicon-bronze / aluminium / stainless steel

□ mild steel nails: type...; finish...

See SANS 1700 for full list of fastener types.

For roof/cladding fasteners see Section 7.

16.3 Locks, latches, catches, bolts

□ type lock: see drawings

mortise / rim / cylinder / cupboard / drawer

□ type handle: see drawings

lever / knob

type latch: see drawings

mortise / cupboard / finger

type catch: see drawings

magnetic / ball / roller

□ type of bolt, size: see drawings

barrel / flush / tower / stable / extension / size

SANS 10400-S stipulates that door handles should be 450 mm away from any wall.

Consider handles, levers and controls that are easy to operate by disabled persons. SANS 10400-S: The manual operation of handles, taps, levers, switches, locks, control mechanisms and keys is in part affected by their design. The selection of controls requiring a 'twist-action' of the wrist and hand, and fine-finger movements should be avoided.

□ hardware on fire doors: see drawings

padlocks

□ type: see drawings

keyed / combination / masterkeyed

□ duty: medium / heavy

material: see drawings

brass / iron / chrome plated brass / aluminium / stainless steel

size: see drawings

40 / 50 / ... mm

keys

master and grand master keys: see drawings.

16.4 Hinges

hinges for lightweight doors

□ type: see drawings

piano / pivot / flush / european (adjustable) / strap

hinges for medium to heavy doors

material: see drawings

steel / stainless steel / brass / bronze

□ number of hinges for fire doors: see drawings.

16.5 Door closers

□ type: see drawings

surface-mounted / concealed in frame / concealed in floor / concealed in door / overhead / floor / manual / automatic

Consult AAAMSA Technical Publication: Hardware, Door Controls etc.

Ensure surface mounted overhead closers do not hit the wall when opening.

All fire doors are required to be fitted with closers (NBR), usually overhead. Do not fit a mechanical hold open arm to a fire door. Use concealed mechanisms in hygienic areas.

For concealed floor types, ensure floor spring box depth of up to 75 mm can be accommodated.

Specify a higher strength closer for exposed, windy or draughty conditions. Specify a lower strength for narrow doors.

Double doors with rebated meeting stiles must be fitted with a door selector to ensure the inactive leaf closes first.

□ floor springs, consisting of a floor spring unit set into the floor, bottom and top door strap of size and finish: see drawings

Size depends on door size and weight - see manufacturer's literature.

16.6 Pelmets, curtain rails, rods, blinds

pelmets

□ type, size and profile: see drawings / wood / metal / fabric

rails with rollers or glides

- □ track: single / double
- □ duty class: light / heavy
- □ finish: ...
- □ cord: with / without weighted cord pulleys

rods with rings

□ rod, rings, end caps: wood / aluminium / steel

tie backs

□ tie backs:...

indoor venetian blinds

- I slat width: 50 / 35 / 25 mm
- □ headbox: steel / aluminium
- □ type of ladder web: reinforced plastic / woven cotton / knitted cords

16.7 Edge, feature, dividing strips

- □ strip material: solid brass / aluminium / hot dip galvanized steel / PVC
- □ colour of plastic: ...

16.8 Sunken door matting

□ material: natural coconut fibre with PVC backing / rubber / interlocking aluminium channels with plastic inserts / light or heavy-duty loop matting.

16.9 Number/name plates, safety signs

Type, letter size, position, message etc. should be given in schedule form.

Signs may be grouped: general information signs; hospital signs; safety signs; signs for disabled persons; statutory signs, e.g. fire safety.

□ type: changeable plate system / variable room identification system / changeable letter system / illuminated signs / in-house signage / statutory signage

Changeable plate system: fixed plate holders to which may be attached or inserted removable interchangeable sign plates; variable room identification system: fixed room numbers and removable name strips; changeable letter system: holders into which can be inserted removable individual letters, numbers, etc.; illuminated signs: cabinet enclosing a light source illuminating a translucent face panel bearing the specified signage; in-house signage: project specific signs

□ materials: aluminium / plastic / stainless steel

□ colour: ...

symbolic safety signs

□ type: PV / MV / WW / FB / GA

PV (prohibitory – circular, red), MV (mandatory – circular, blue), WW (warning – triangular, yellow), FB (informative, fire-fighting – square, red), GA (informative, general – square, green)

reflectivity, luminousity: standard (non-reflective) / self-luminous (radio luminescent) / internally illuminated / retro-reflective or photo luminescent / decal / embossed

□ size: 100 x 100 (WW7 only) / 150 x 150 / 190 x 190 / 290 x 290 / 440 x 440 / 880 x 880 mm)

See SANS 1186 Annex C for positioning, fixing, illumination and maintenance of signs.

16.10 Drawer runners/slides

- □ type commercial ball-bearing runner: normal / self-closing / soft-closing / push-locking
- □ load capacity: 30 kg static / 45/90 160 kg (heavy duty)
- □ extension: full / three-quarter.

Relevant standards: SANS 10140 Identification colour marking.

17 Glazing

SAGGA – South African Glass and Glazing Association – is the trade association and AAAMSA member.

17.1 Materials

glass

Clear and tinted float glass is made in South Africa by one manufacturer in Springs.

□ type of glass: see drawings

float / safety / security / pattern / tinted / insulated / polymer

□ float glass thickness: see drawings

Local float glass thickness: 3, 4, 5, 6 and 10 mm.

□ laminated safety glass interlayer strength class: NS / HPR / HI

NS (normal strength), HPR (high penetration resistance), HI (high impact).

□ bullet-resistant glass: class and level of attack: GA / GC / RA / RB / SB

Safety and security glass is made by several local manufacturers. Laminated safety glass is made with a poly-vinyl butyral interlayer (0,38 mm for Normal Strength (NS); 0,76 mm High Penetration Resistant (HPR); 1,14mm High Impact (HI)); or a cast in place polyester resin interlayer, available in one thickness only (0,5 mm Normal Strength). SANS 1263 provides for three applications, i.e. human contact, burglary and firearms. See SANS 1263 for bullet-resistant glass classes and level of attack.

□ pattern glass thickness: 4 / 6 mm; colour: clear / amber / bronze; pattern: ...

All patterns cost the same.

□ tinted glass: heat-absorbing / heat-reflecting / glare-reducing

□ insulated glass units (SIGU's) : 6/12/6, low-e surface #2, dehydrated air filled gap / ...

6/12/6 denotes glass-space-glass. Common insulated glass thickness range (glass-space-glass) in South Africa is 20–28 mm. Life expectancy of double glazing in South Africa has not been recorded. Northern hemisphere experience indicates 7–12 years, 20 years being exceptional.

□ coloured glass: ...

work on glass: cutting / obscuring / acid embossing / silvering / gilding / staining or painting / bending

polymer glazing

polymer glazing type: PC / PMMA / PVC clear / GRP / PS / PET / single wall / multiwall

Available polymer glazing materials are polycarbonate (PC), polymethyl methacrylate (PMMA or 'acrylic'), polyvinyl chloride (PC), glass-fibre reinforced polyester (GRP), polystyrene (PS), polyethylene teraphthalate (PET). PC and PMMA is available in sheet sizes 1 250, 1 500 or 2 050 wide by up to 6 m long by 1,5 – 6 mm thick. They can be cold bent to minimum radii of 300 x thickness for acrylic, or 100 x thickness for polycarbonate.

Outstanding properties of polymer glazing are impact strength (polycarbonate 250x glass), light transmission, light weight, weather resistance, thermal insulation in multi-wall construction (40% better than glass). Typical applications: rooflights, industrial roofs, commercial greenhouses, shopping centres.Polycarbonate is self-extinguishing, acrylic burns like hardwood. No toxic fumes are claimed. Make generous allowance for thermal movement.

17.2 Glazing

17.2.2 Structural glazing

□ design: by *competent person* (glazing) / submit proposals

Structural glazing depends on stringent quality tests and checks, for example the pretreatment of aluminium, surface finishing, sealants, and factory and site care. Check with AAAMSA.

A butt joint in structural glazing is assumed to have no structural strength.

Check underwater glazing, glazing for fire protection, for control of reflections in shop windows, for solar control, for one-way vision, unframed glazing, suspended glazing, glass floors, glazing with channel profiles, glazing with plastics and patent glazing, with manufacturers, specialists and SANS 10137.

17.2.3 Protection and cleaning

Anti-sun glass can be permanently damaged by mortar or plaster splashes. Specify precautions if risk is high.

17.3 Mirrors

□ type: silvered clear glass / silvered coloured glass / stainless steel / privacy

silvered mirror backs are easily damaged. Silvered obscure glass also available. Stainless steel for vandal proof areas.

□ size and position: see drawings

Consider full length mirrors in public places for children and disabled persons.

□ coloured glass: pink / gold / bronze / black

Relevant standards:

SANS 10137 The installation of glazing materials in buildings.

SANS 1263 Safety and security glazing materials for buildings.

SANS 10400-N Glazing.

SANS 2001-CG1 Installation of glazing.

Relevant sources:

Selection Guide for architectural Aluminium Products. AAMSA.

Skylight Association of Southern Africa.

18 Drainage, sewerage, water and gas supply, fire equipment, sanitary plumbing

18.1 Roof eaves drainage

18.1.2 Gutters and downpipes

□ gutter type: see drawings

eaves / valley / box / parapet/chimney

material: Z275 / Z450 / Z600 / AZ150 / AZ200 hot dip galvanised steel sheet / uncoated steel painted on-site / aluminium / copper / U-PVC / fibre cement / prepainted

Galvanized sheet: Z275 or AZ150 for inland use; Z450/ Z600 or AZ200 for the *coastal region*, prepainted for corrosive industrial use. Commercial standard rainwater goods are made of 0,4 or 0,5 mm thick sheet.

□ profile: see drawings

half round / square / rectangular

□ size: see drawings

100 x 75 mm, or 100 / 125 / 150 mm half round (domestic); 125 x 100 (institutional); 150 x 100 / 200 x 150 / >225 x 225 (industrial). Sheet metal gutter standard lengths: 1,8; 3,0; 3,6; 4,8; 5,4; 6,0 m.

Gutter and downpipe sizes are determined by roof area and rainfall region in accordance with the requirements of SANS 10400-R: summer rainfall area:140 mm²/m² roof area served; year-round rainfall area:115 mm²; winter rainfall area: 80 mm². Downpipe internal size: 100 mm²/m² roof area served or 4400 mm² (75 mm diameter). For more information on gutter design, e.g. risk, rainfall intensity, hail and outlet protection, launders, drop boxes etc. see The Red Book – Southern African Steel Design Handbook, Section 11.

accessories

outlet drop boxes: funnel shaped

Drop boxes for box gutter outlets improve flow and reduce stoppage by debris.

overflow weirs in box gutters: required

□ hail guards: see drawings

removable / pedestrian trafficable

Hail guards over gutters act as protection against hail, as maintenance walkways, as outlet protection and as protection against leaves and wind-blown debris. Trafficable hail guards should be made of suitable gauge expanded mesh – provide clear working *drawings*. Hail guards should be removable for maintenance.

launders: see drawings

Launders are horizontal downpipes draining intermediate box gutter outlets to the exterior of large industrial buildings.

gutter brackets

□ type: purlin / fascia / purpose-designed for industrial/box gutters / as supplied by gutter manufacturer

downpipes

□ material: galvanised steel sheet / PVC

Do not use PVC downpipes if offsets are required.

□ size: see drawings

75 / 100 / 120 / 150 mm square / diameter

Best solution for outlet protection is to use oversize downpipes ≥200 mm diameter.

□ sheet metal downpipe bends: crimped / solder mitred / sealed and pop riveted

18.2 Flat concrete roof, balcony and floor drainage

18.2.1 Rainwater outlets

type: see drawings

patent with grating / pipe without grating

□ patent type: see drawings

vertical / 45° / 90° / two-way / car-park / pedestrian

□ outlet size: see drawings

50 / 80 / 100 / 150 mm diameter

Outlets without gratings should be used for small roof areas in accessible position only, e.g. for balconies, and be not less than 75 mm in diameter due to the waterproof dressing restricting the pipe bore, unless pipe can be flanged.

18.2.2 Floor outlets

□ material: ductile iron with baked epoxy coating / stainless steel

18.2.3 Outlet downpipes

□ material: PVC / galvanized steel

□ size: see drawings

75 / 110 / 160 mm (PVC); 80 / 100 / 125 / 150 mm (steel)

18.3 Stormwater drainage

18.3.1 Earthworks (SANS 2001-DP1)

SANS 2001-DP1 covers earthworks for trenches for all types and sizes of buried pipelines, ducts, cables and prefabricated culverts, including excavation, preparation of trench bottoms, bedding, backfilling and reinstatement of surfaces.

Specification data:

□ pipes that are to be encased in concrete: see drawings

18.3.2 Storm water drainage (SANS 2001-DP5)

SANS 2001-DP5 covers the construction of stormwater drainage systems including pipelines, manholes, culverts, catchpits, inlet and outlet structures.

Specification data:

pipes

material of pipe, associated fittings: see drawings

concrete / fibre cement / PVC-U / GRP / PP / PE

diameter: see drawings

concrete pipes: 100, 150, 225, 300, 375, 450, 525, 600, 675, 750, 825, 900, 1050, 1200, 1350, 1500, 1800 mm. Check diameters of other material pipes.

culverts

precast concrete culverts

- □ class: 75S / 100S / 125S / 150S / 175S / 200S
- □ dimensions (internal) : see drawings

span: 450, 600, 750, 900, 1200, 1500, 1800, 2400, 3000 mm height: 300, 450, 600, 900, 1200, 1500, 1800, 2400, 3000 mm

tests

□ tests: required / not required

18.3.3 In situ concrete stormwater channels

overall width: see drawings

380 / 450 / ... mm

380 mm width: 230 mm x 75 mm deep channel; 450 mm width: 300 mm x 100 mm deep channel.

□ fall: see drawings

1:250 min.

□ spill basin shape, size and finish: see drawings.

18.4 Sewerage

18.4.1 Earthworks (SANS 2001-DP1)

Specification data:

pipes that are to be encased in concrete: see drawings

18.4.2 Sewers (>160 mm) (SANS 2001-DP4)

SANS 2001-DP4, *Sewers*, covers the construction of sewer systems within servitudes, road reserves and interconnected complexes and is suitable for the construction of below ground sewers having a diameter greater than 160mm. Excludes sewer rising mains, pump stations, treatment works, and ancillary works.

Specification data:

type of pipe, associated fittings: ductile iron / fibre cement / PVC-U / structured wall PVC-U
/ PP / GRP / pitch impregnated fibre / vitrified clay / reinforced concrete

Unplasticised polyvinyl chloride (PVC-U); polypropylene (PP); glass-reinforced plastics (GRP)

□ diameter: see drawings

200 / 250 / 315 / 355 / 400 / 450 / 500 / 560 / 630 / 750 / 800 / 900 / 1 000 mm diameter (PVC-U). Check diameters of other material pipes.

- □ gradient: see drawings
- □ step irons in manholes: required / not required
- □ masonry manholes: plastered internally / plastered internally and externally to prevent infiltration
- □ tests on completed pipelines: required / not required.

18.4.3 Sewers for buildings (SANS 2001-DP7)

SANS 2001-DP7 covers surface mounted sewers having a nominal diameter of 200 mm or less; and below ground sewers having a nominal diameter of 160 mm or less including manholes and the like which discharge into a connecting sewer, conservancy tank, French drain or septic tank. This standard is *suitable* for constructing sewers designed in accordance with the design rules provided in SANS 10400-P, Drainage. Construction of manholes is referred to SANS 2001-DP4.

Specification data:

□ type of pipe, associated fittings: cast iron / ductile iron / fibre cement / PVC-U / structured wall PVC-U / PP / GRP / pitch impregnated fibre / vitrified clay / reinforced concrete

nominal diameter: see drawings

40 / 50 / 75 / 110 / 160 mm

□ gradient: see drawings

SANS 10400-P requires that sewer gradient be not flatter than 1:120 for 100 mm diameter pipes and 1:200 for 150 mm pipes. The hydraulic load determines the minimum grade of the pipe.

18.4.4 Surface boxes, manhole covers, gulley gratings, frames

For vehicular and pedestrian areas only (does not apply to gullies and manholes in buildings).

□ type: see drawings

surface box / valve chamber / manhole/inspection cover / gulley grating

□ material: polymer concrete / cast iron or steel

polymer concrete

polymer concrete covers

size: see drawings

duty class: see drawings

heavy (trucks) / medium (domestic vehicles / light (no wheeled vehicles)

cast iron/steel and concrete

□ cast iron, cast steel, rolled steel combined with concrete covers

□ size: see drawings

□ duty class: see drawings

A15 / B125 / C250 / D400 / E600 / F900

Class A15 pedestrian and pedal cyclists; B125 car parks; C250 road kerbside channels; D400 roads, hard shoulders, parking for all types of road vehicles; E600 docks, aircraft pavements; F900 particularly high wheel loads.

□ gulley gratings: laid loose / bedded in bitumen.

18.4.5 Grease interceptors

- material: stainless steel / reinforced fibreglass
- □ type, capacity and size: see drawings / to approval of the local authority

Several models are available on the market.

18.4.6 Pit latrines

type: see drawings

VIP / masonry / patent / to approval of local authority

construction: masonry / patent precast concrete / patent polymer

pit size: see drawings

Pit size depends on capacity/ number of persons using. Omit if default (750 x 1 500 x 2 000 mm minimum deep) is acceptable. Maximum pit size: 1 000 x 2 500 x 2000 mm.

18.4.7 Conservancy tanks, septic tanks and french drains

□ type: see drawings

conservancy tank / septic tank / french drain

□ construction: masonry / patent precast concrete / patent polymer

□ tank capacity: see drawings / as prescribed by local authority

Conservancy tank capacity is typically 6 000 L. See SANS 10400-P for sizing of septic tank. Patent septic tank capacity 1 250 litres (2-4 persons); 1 500 (2-6); 1 750 (4-6); 2 000 (4-7); 2 500 (4-9). Consult SANS 10252 for design guidelines.

□ french drain length: see drawings

See SANS 10400-P for length formula, positioning, soil type, etc.

18.5 Water supply

18.5.1 Earthworks (SANS 2001-DP1)

SANS 2001-DP1 covers earthworks for trenches for all types and sizes of buried pipelines, ducts, cables and prefabricated culverts, including excavation, preparation of trench bottoms, bedding, backfilling and reinstatement of surfaces.

Specification data:

□ pipes that are to be encased in concrete: see drawings.

18.5.2 Below ground medium pressure pipelines (SANS 2001-DP2)

SANS 2001-DP2 covers the supply and installation of pipelines of diameter greater than 160 mm and up to 1 000 mm, complete with ancillary works (valves, strainers, hydrants, manholes, surface boxes, chambers) for transporting water and sewage under working pressures up to 2,5 MPa.

Erf or connections to buildings from mains are covered in SANS 2001-DP6.

Specification data:

□ type of pipe: steel / ductile iron / concrete / fibre-cement / GRP / PE / PP / contractor's choice)

glass-reinforced plastics (GRP); polyethylene (PE); polypropylene (PP)

□ nominal pipe sizes: see *drawings*.

225 / 300 / 375 / 450 / 525, 600 / 675 / 750 / 825 / 900 mm

18.5.3 Below ground water installation for buildings (SANS 2001-DP6)

SANS 2001-DP6 covers the construction of water pipelines having a nominal diameter of up to 160 mm from a water reticulation main to the boundaries of individual erven or other specified points on erven. It covers the installation of pipework and associated specials which provide water, meters and fire hydrants SANS 2001-DP6 is suitable for construction of fire installations designed in accordance with the design rules provided in SANS 10400 W, Fire installations.

Specification data:

type of pipe and associated fittings: galvanised mild steel / fibre cement / GRP / PE / PVC / PVC-U / PVC-M / PVC-O / copper / contractor's choice

Glass-fibre reinforced plastics (GRP) / polyethylene (PE) / polypropylene (PP) / polyvinyl chloride (PVC) / unplasticised polyvinyl chloride (PVC-U) / modified polyvinyl chloride (PVC-M) / oriented polyvinyl chloride (PVC-O).

nominal pipe size: see drawings

40 / 50 / 75 / 110 / 160 mm

□ meter type and size: ...

18.5.4 Above ground water installation

D pipe material: galvanised mild steel / PP / copper / contractor's choice

□ nominal pipe size: see drawings

8 / 10 / 12 / 15 / 18 / 22 / 28 / 35 / 42 / 54 / 67 / 76 / 108 mm (copper, check other pipe types)

□ fixing of pipes <20 mm: chased / surface fixed

Surface mounting may be a requirement from a maintenance point of view.

Chasing is prohibited in wall faces that are to receive roof flashing. Roof flashing is inserted in grooves sawn by a separate trade with disc cutters after pipes are installed, leading to unnecessary and costly pipe repair work when pipes are damaged.

18.5.5 Water storage tanks

- □ tank material: tumbled polymer / pressed steel sections bolted and sealed together / corrugated steel
- □ capacity or size: see drawings / …L
- □ stand for external tanks: ...

18.6 Electric geysers and solar water heaters

18.6.1 Electric geysers

geyser type: open outlet / cistern type / closed (unvented) / floor or wall mounting / horizontal or vertical

geysers should be placed near kitchen sinks that are regularly used throughout the day. Show geyser positions in drawings.

nominal capacity: see drawings

open outlet and cistern type ≤15 / 25 / 50 / 75 / 100 / 125 / 150 / 175 / 200 / 250 L; closed type 15 / 25 / 50 / 75 / 100 / 125 / 150 / 175 / 200 / 250 / 300 / 400 / 600 L

□ design: standard / solar / dual purpose.

18.6.2 Solar water heaters

- □ type: domestic / commercial / industrial
- □ capacity in litres (integral units only): ...
- □ collector/storage combination: integral / close-coupled / split
- □ heat transfer method: direct / indirect
- □ circulation method: thermo-siphon / pumped
- □ cover: with cover / without cover
- □ supplementary energy source required: mains electricity / gas / ...
- working pressure: 0 / 100 / 200 / 300 / 400 kPa
- □ freezing, hail resistance: required / not required.

18.8 Fire equipment

fire hose reels

- □ height from floor to spindle if not 2 100 mm: ...
- enclose reel in security box with clear acrylic cover and suitable closer: required / not required

portable fire extinguishers

□ portable non-refillable general purpose extinguishers (SANS 1322):

Suitable for all classes of fire other than class D

```
□ class: I / II
```

class I (temp <110°C); II (temp <65°C)

- □ capacity: 1,5 / 2,5 kg
- □ extinguishing medium: lp gas / dry powder
- □ water, foam or dry powder rechargeable extinguishers (SANS 1910):
 - □ type: water / foam / dry powder
 - □ class of fire: A / B / C

A (ordinary combustibles); B (flammible liquids); C (live electric power), or combinations, e.g. ABC

 \Box CO₂ type extinguisher (SANS 1567):

□ capacity: <9kg

□ class of fire: A / B / C

□ BCF type extinguisher (SANS 1151) capacity: 1 – 12 kg

Suitable for class of fire AC / BC / ABC

□ enclose extinguisher in security box with clear acrylic cover and suitable closer: required / not required.

18.9 Sanitary plumbing

18.9.1 Sanitary appliances

appliances

□ appliance type: see drawings

wash-hand basin / bath / water closet / urinal / bidet / sink / flushing cistern

material: see drawings

glazed ceramic / stainless steel / plastic / stone / concrete

□ stainless steel grade: 430 / 304 / 316; finish: satin / bright

Omit if default (430) is acceptable. Stainless steel grades are listed by the American Iron and Steel Institute (AISI). Grade 430 is *suitable* for domestic purposes, kitchen sinks, wash troughs and hand wash basins. Grade 304 is *suitable* where mild corrosive conditions exist, e.g. in *coastal areas*. Grade 316 is *suitable* for laboratories, photographic workrooms and seagoing vessels where corrosive conditions are severe.

□ anti-theft waste plug: required / not required

□ flow restrictors: required / not required

baths

□ type, shape: see drawings

built-in / freestanding / spa / rectangular / oval / corner

□ handles: required / not required

basins

□ type, shape: see drawings

counter-top / wall hung / drop-in / pedestal / round / oval / corner

wash troughs

□ type: see drawings

single trough / double trough / with drainboard

water closets

type: see drawings

wall-hung / floor mounted / close-couple / squat

flushing cisterns

□ type: see drawings

high level / low level / near level / close coupled / wall-hung / concealed

 \Box flush capacity: low-flush (4¹/₂ or 6 L) / regular flush (6 or 9 L)

□ flush valve flushing operation: single flush / dual flush / interruptible flush

urinals

urinal type: see drawings

bowl / trough / stall

bidets

□ bidet type: see drawings

wall-hung / floor mounted

sinks

□ sink type: see drawings

domestic / laboratory / scullery / scrub sink / cleaner's / drop-in / wall-hung / pot / freestanding / with drainboard / with backsplash and tiling key / single, double or triple compartment

bowl position: see drawings

left / right / centre

shower enclosures

SASEMA (South African Shower Enclosure Manufacturer's Association). SANS 549 "domestic" includes use in hotels, student accommodation, hospitals.

- shower enclosure type: purpose made / prefabricated / domestic to SANS 549 / medical / industrial / cabinet / curtain / roofed (steam shower)
- □ drained floor type: tiled / tray / bath

□ glazed wall/door/roof construction: framed / frameless

Frameless construction requires toughened safety glass. Holes for hinges etc. must be prepared before toughening.

- □ safety glass: toughened safety glass / laminated safety glass / plastic
- □ door type: pivoting / folding- sliding
- □ metal finish: anodising, grade ... / powder coating, type 4

Metal coating grade/thickness will depend on location: anodising grade AG15 or AG20 will suffice for mild atmospheric conditions, while grade AG25 will be required for coastal applications. For powder coating, type 4 or 5 should suffice. Check with manufacturer.

18.9.2 Taps, valves, showerheads

□ tap, valve type: see drawings

bath / basin / shower / sink / garden / bib / pillar / mixer / divert mixer / swivel / stop / flush / gate / hose / washing machine / draincock / float

showerhead type: see drawings

fixed rose, diameter ... / adjustable rose / swivel / rail / vandalproof / handshower and holder

□ material: chromium plated brass / stainless steel / plastic

□ flush valve type: WCHP / WCLP / urinal

WCHP (Water closet high pressure; WCLP (water closet low pressure).

18.9.3 Traps

□ type: see drawings

bottle trap / P-trap / P-trap resealing / pop-up

□ material: plastic / rubber / chromium plated brass

□ depth of seal: 40 / 75 mm.

18.9.4 Miscellaneous

holders

□ holder type: see drawings

paper / soap / tumbler / tooth brush / toilet brush / towel rail/ring/hook

□ material: chromium plated brass / glazed ceramic / aluminium / wood

shelves

material: safety glass with polished edges on nickel-chromed / wood / metal / plastic brackets

cabinets

- □ type: wall / vanity / with mirror
- □ material: wood / plastic / metal.

Relevant standards:

SANS 10105 The classification, use and maintenance of portable fire extinguishers.

SANS 10112 The installation of polyethylene and PVC-U pipes.

SANS 10102 Selection of pipes for buried pipelines.

SANS 10252-1 part 1: Water supply and drainage for buildings; part 2: Drainage installation for buildings.

SANS 10254: The installation of fixed electric storage water heating systems.

SANS 10400-P Drainage.

SANS 10400-Q Non-water-borne means of sanitary disposal.

SANS 10400-R Stormwater disposal.

Relevant sources:

Concrete Pipe Handbook published by the Concrete Society of Southern Africa.

19 Electrical works

19.1 Earthworks (SANS 2001-DP1)

SANS 2001-DP1 covers earthworks for trenches for all types and sizes of buried pipelines, ducts, cables and prefabricated culverts, including excavation, preparation of trench bottoms, bedding, backfilling and reinstatement of surfaces.

Specification data:

areas where pipes are to be encased in concrete: see drawings

19.2 Cable ducts (underground) (SANS 2001-DP3)

SANS 2001-DP3 covers the supply, and the laying and bedding in trenches, of pipes of diameter not exceeding 160 mm as ducts for the protection of telephone and electric power cables.

Specification data:

□ type of pipe, associated fittings: pitch impregnated fibre / PVC-U / fibre cement / vitrified clay

Unplasticised polyvinyl chloride (PVC-U).

 \Box draw pits: see drawings.

19.3 Materials and installation

19.3.1 Wiring

conduits

Chasing is prohibited in wall faces that are to receive roof flashing. Roof flashing is inserted in grooves sawn with disc cutters after conduits are installed, leading to unnecessary and costly repair work.

conductors

See SANS 10198 The selection, handling and installation of electric power cables of rating not exceeding 33 kV.

distribution board, meter cabinets

□ position of DB's and meter cabinets: see drawings.

19.3.2 Fittings

luminaires

□ type: see drawings

surface mount / recessed / accent / downlighter / step / theatre / outdoor (pole, step, bollard)

stove, hob, oven, cooker hood

□ stoves, hobs, ovens, cooker hoods model, type: ... / see drawings.

Relevant standards: SANS 10114 Interior lighting. SANS 10389 Exterior lighting. SANS 10142 The wiring of premises. SANS 10222 Electrical security installations. SANS 10313: The protection of structures against lightning. SANS 61024 Lightning protection of structures.

20 Mechanical works

20.1 Installation

□ routing and/or concealment of cables, ducts, trays, pipes etc. : see drawings.

20.3 Location and access

□ catwalks, cat ladders, access panels: see drawings.

Catwalks and cat ladders should be detailed and coordinated with other services in order to keep to a minimum.

21 External works

21.1 Paving

21.1.1 Materials

units

paving unit type: see drawings

precast concrete blocks / burnt clay pavers / in-situ concrete / precast concrete slabs

precast concrete segmental paving blocks

- □ type: S-A (interlock) / S-B (semi-interlock) / S-C (rectangular)
- □ class: 25 / 35

Class 25 (MPa) concrete blocks should be specified for most uses.

nominal thickness: 50 / 60 / 80 / 100 / 120 mm

Thickness of blocks depends on site conditions, design requirements and cost.

□ top edges: chamfered / not chamfered

 \Box colour: ...

burnt clay paving units

□ class: PB / PA

PB (uniform), PA (highly uniform in shape and size).

□ colour and work size: ...

precast concrete paving slabs

□ size: 295 / 445 / 595 x 295 / 445/295 / 595/455 x 50/65 mm

sand for bedding and jointing of flexible paving

The use of mine sand for jointing is generally accepted.

21.1.2 Preparation

subgrade

□ subgrade levels and falls: see drawings

Check soil and traffic conditions with a Competent Person. The sub-base thickness is a function of both the type and amount of traffic to be carried and the strength of the subgrade. See also SANS 1200 ME, MF, ML.

concrete sub-base for rigid paving

□ thickness, reinforcement: see Section 2

weed killer

□ treat area to be paved with suitable weed killer: required / not required

levels, falls, pattern

levels and falls: see drawings

A fall of 1:60 is regarded as an optimum fall. Gradients of 1:100 are less forgiving (workmanship, settlement).

□ pattern: see drawings / herringbone / basket weave / stretcher / waving

Edge restraints along the perimeter of the paving is necessary to prevent lateral spread of the units and to retain the bedding course sand. See concrete culverts, kerbs etc. below.

21.1.3 Laying

See SANS 784 for guidance on tactile indicators for access and mobility.

type of paving: see drawings / flexible block/brick / flexible slab / rigid block/brick / in situ concrete

flexible block/brick paving

Flexible paving is paving laid on sand, with joints filled with sand. The surfaces of flexible paving usually bed down ±5 mm after trafficking.

Consider mixing filling sand with 10 - 15% cement depending on traffic, type of paver, and control of weed growth. Spray paving thus filled with a fine spray of water immediately after filling to clean off all cement.

concrete anchor beams across road on grades exceeding 8%: ...

Horizontal forces of motor traffic increase considerably on grades exceeding 8%, causing creep. This is avoided by casting concrete anchor beams across the road. On steeper grades the paving should preferably be rigid. See CMA technical note 6.2 1994.

flexible slab

□ joints: filled with mortar / to be left open

rigid block/brick paving

Rigid paving is paving units bedded in mortar on a concrete base. External paving is exposed to wide temperature and moisture fluctuation which can only be provided for by movement joints.

accuracy

Accuracy depends on experience of contractor and/or labourers, and importance of the contract.

21.2 Concrete culverts, kerbs, channels

□ type: see drawings

culvert / kerb / channel

21.2.1 Materials

□ precast concrete culvert class: 75S / 100S / 125S / 150S / 175S / 200S

Class depends on foundation conditions and fill.

dimensions (internal) : see drawings

span: 450 / 600 / 750, 90 / 120 / 150 / 180 / 240 / 3 000 mm; height: 300 / 450 / 600 / 900 / 1 200 / 1 500 / 1 800 / 2 400 / 3 000 mm

□ kerb type: see drawings

rectangular / half-battered / battered / mountable

□ edging type: see drawings

rectangular / half-round

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□ channel type: see drawings
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rectangular / tapered.

21.2.2 Laying

□ movement joints: leave open / fill with polysulphide.

21.3 Concrete retaining blocks

Concrete retaining blocks are an economical, versatile and environmentally compatible method of retaining earth and be used for planting, steps, seats, pavilions, and for erosion and scour control.

blocks

□ shape, size and colour: ...

preparation

□ depth, level and type of foundation: see drawings

Foundations: also on sloping or gravel foundation. *Drawings* should show this. Compacted earth foundation is usually sufficient for structures not higher than 1,2m. Higher walls should be thicker, inclined towards the retained earth, anchored with a geogrid mesh, or by modifying the properties of the backfill. Consult the supplier of the blocks and/or Competent Person. Ensure building regulations are complied with.

□ width of foundation: see drawings

Show width of foundation if of concrete.

□ drain pipes, aggregate drain, geofabric drain behind retaining wall: required / not required

placing

- □ stacking pattern: see drawings
- □ geofabric reinforcement: required / not required.

SANS 207 gives recommendations for the application of reinforcement techniques to soils and other fills.

21.4 Gabions

materials

- \Box cage dimension: 4 x 1 x 1 / 6 x 2 x 0,5 m
- □ mesh wire to be PVC-coated: required / not required.

21.5 Fencing

□ type: see drawings

line wire on steel posts, stays, droppers and standards / wire chain-link mesh on strain wire on steel posts, stays, droppers and standards / welded mesh / barbed tape / palisade / electric / private swimming pool

21.5.1 Line wire and chain-link mesh fencing

□ type wire: ...

line / barbed

□ type chain link wire: 1 / 2

1 (zinc coated) / 2 (zinc coated and PVC coated).

□ colour of PVC coating when relevant: dark green / white

□ nominal size mesh of chain-link wire: 40 / 50 / 60 / 75 / 100 mm

posts, stays, standards, droppers

□ type: steel / concrete / wood

erection

□ fence height: see drawings

900 / 1 200 / 1 800 / 2 000 / 2 400 / 3 000 / 3 600 mm

fencing gates

 \Box size, shape: see drawings.

21.5.2 Weld mesh fencing

□ material: mild steel / high tensile steel / very high tensile steel

High tensile steel (>950 MPa); very high tensile steel (>1 250 MPa).

- mesh size: 25 x 25 / 50 x 25 / 50 x 50 / 100 x 50 / 100 x 100 mm
- □ finish: hot dip galvanized / black / hot dip galvanized and powder-coated
- □ fence height: see drawings

1 200 / 1 800 / 2 400 mm

21.5.3 Barbed tape fencing

- □ type: A (concertina) / B (flatwrap) / C (barbed tape unclipped) / D barbed razor tape
- □ material: zinc-coated steel strip / stainless steel
- □ zinc coating grade: light / medium / heavy

21.5.4 Palisade fencing

- □ type: steel / concrete
- □ finish on steel: paint / hot dip galvanized

steel

□ type: security purpose / general purpose

□ steel fence height: see drawings

1 800 / 2 400 / 3 000 / 3 600 mm

□ concrete fence height: see drawings

1 800 / 2 400 mm.

21.5.5 Electric fencing

- □ type: wall top / from ground up / electrified palisade / freestanding
- □ number of lines for wall-top type: 6 / ...
- □ powered by: mains / battery / solar.

21.5.6 Gate automation

□ theft-resistant cages with padlock: required / not required.

21.5.7 Private swimming pool fencing

□ fence height: see drawings

1,6 m* / 1,2 m

□ type of protective wire coating: powder / zinc / paint / dual (paint over zinc).

21.6 Precast concrete plank walling

- □ type panel: plain / decorative
- □ colour: natural / ...
- □ height of wall: see drawings

900 / 1 200 / 1 500 / 1 800 / 2 200 mm

 \square width of panel: 300 / 600 mm.

21.7 Swimming pools

□ swimming pool size, shape and finish: see drawings

21.8 Timber decking

SANS 10043 covers general principles on the installation of timber decking.

21.8.1 Materials

poles

wood: softwood / hardwood

Softwood: Pinus; hardwood: Eucalyptus.

top diameter (thin end): see drawings

50-79 (red) / 80-99 (yellow) / 100-119 (blue) / 120-139 (white) / 140-159 (orange) / 160-179 (green) / 180-199 (black) mm; ditto posts: 145-174 / 175-199 / 200-230 mm.

structural laminated timber

wood: softwood / hardwood

Softwood: Pinus; hardwood: Eucalyptus.

appearance and finish: P

Rough-sawn (R), fine-sawn (F), planed (P), sanded (S), smoothed (G), coated (C), special (X).

Preservative treatment: The Forestry Act 1968 (Act 72 of 1968) provides for the legal requirement of pressure treatment of structural softwood timber to combat any fungus or bacterial disease, insects or parasites affecting the timber. The present legislation applies to the so-called *the coastal region* only.

□ fire retardant treatment: required / not required

□ size:...

deck boarding

- □ wood: softwood (Pinus) / hardwood
- □ softwood:
 - □ grade: clear / semi-clear
 - \Box dimensions: 22 / 33 mm x >50 mm wide

□ hardwood:

- □ specie: ...
- □ grade: clear / figured
- □ dimensions: 20 mm x 35 90 mm wide

fixings

□ screws: solid brass / silicon bronze / aluminium / stainless steel

balustrades

□ material: wood / metal / glass / ...

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□ construction:...
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Balustrades to conform to SANS 10400-M.

21.8.2 Installation

- pole to ground contact: see drawings / planted in concrete / on metal brackets on concrete footings
- plug screw holes with matching wood: required / not required
- □ protect end grain with metal caps: required / not required / see drawings.

21.9 Landscaping

21.9.9 Garden furniture

□ garden furniture type: see drawings

table / bench / seat / canopy / litter bin / playground equipment

□ material: see drawings

precast concrete / wood / metal

□ finish: ...

21.9.10 River pebbles

□ size, colour, mix: ...

Relevant standards:

SANS 1200 MJ Segmental paving.

Precast concrete paving blocks - laying manual. The Concrete Masonry Association.

Technical guide: Clay Pavers & Paving - selection and construction guidelines. Corobrik.

SANS 10244 Zinc and zinc-alloy coatings on steel wire.

SANS 10104 Handrailing and balustrading (safety aspects).

SANS 14001 Environmental management systems.