



Government of the Kingdom of Lesotho

Ministry of Public Works and Transport

Material Specifications

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

	PAGE
TABLE OF CONTENTS	1
1. INTRODUCTION	4
1.1 Usage	
1.2 Materials & Workmanship	
1.3 Terminology	
1.4 Accuracy & Material Tolerances	
1.5 Samples & Testing Requirements	
1.6 Applicable Standards & Authorities	
1.7 Local Materials	
2. DEMOLITIONS & ALTERATIONS	10
2.1 Demolitions	
2.2 Alterations	
3. SITE PREPARATIONS	16
3.1 Benchmarks	
3.2 Site Clearance	
4. EARTHWORKS, LATERAL SUPPORT & EXCAVATIONS	17
4.1 Definitions of Excavated Material	
4.2 Excavations	
4.3 Filling	
4.4 Termite Control	
4.5 Ground Anchoring	
4.6 Piling	
5. CONCRETE, FORMWORK & REINFORCEMENT	21
5.1 Mass Concrete	
5.2 Reinforced Concrete	
5.3 Off-Shutter Concrete	
6. PRE-CAST CONCRETE	30
6.1 Pre-cast Concrete Units	
6.2 Pre-cast Pre-stressed Concrete Lintels	
6.3 Pre-cast Concrete Plank Walling	
6.4 Pre-cast Concrete Window and Door Frame Systems	
6.5 Pre-cast Concrete Paving Slabs	
7. MASONRY – BRICKWORK, BLOCKWORK, RUBBLE WALL, STONE & GLASS BLOCK	34
7.1 General	
7.2 Brickwork & Blockwork	
7.3 Mortar	
7.4 Rubble Wall	
7.5 Stonework	
7.6 Lintels	
7.7 Glass Blockwork	
7.8 Miscellaneous	
8. WATERPROOFING	41
8.1 Damp Proof Courses and Membranes	
8.2 Waterproofing	
8.3 Joint Filler/Sealants	

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

9.	ROOF COVERINGS	46
9.1	Roof Tiles	
9.2	Metal Profiled Roofing & Cladding Sheets	
9.3	Fibre-Cement Profiled Roof & Cladding Sheets	
9.4	Glass Reinforced Polyester & Polycarbonate Roof & Cladding Sheets	
9.5	Thatch	
9.6	Flat Sheet Metal	
10.	CARPENTRY & JOINERY	52
10.1	Structural Timber	
10.2	Timber Roof Systems	
10.3	Timber Board Floors	
10.4	Cornices, Skirtings & Rails	
10.5	Timber Doors	
10.6	Timber for Joinery	
10.7	Joinery	
10.8	Decorative Laminates	
10.9	Kitchen Cupboards	
11.	CEILINGS, PARTITIONS & ACCESS FLOORING	57
11.1	Timber Ceiling Branderling	
11.2	Fibre-Cement & Gypsum Ceilings	
11.3	Cornices	
11.4	Patent Suspended Ceilings	
11.5	Ceiling Insulation	
11.6	Wooden Ceiling & Panelling Boards	
11.7	Ceiling Hatches	
11.8	Drywall Partitions	
11.9	Access Flooring	
12.	FLOOR COVERINGS, WALL LININGS, E.T.C	60
12.1	Vinyl Tiling, Vinyl Sheeting & Accessories	
12.2	Timber Parquet Flooring	
12.3	Textile Flooring	
13.	IRONMONGERY	63
14.	STRUCTURAL STEELWORK	64
15.	METALWORK	65
15.1	Rolled Steel Window & Door Frames	
15.2	Pressed Steel Frames	
15.3	Tip-up Doors	
15.4	Aluminium Windows & Doors	
15.5	Steel Kitchen Cupboards	
15.6	Adjustable Metal Louvre Frames	
15.7	Steel Roller Shutters & Doors	
15.8	Strong Room Doors	
15.9	Stairs, Balustrading, Cat-ladders, Grilles, Gates, Framework, e.t.c	
15.10	Ribbed Floors & Permanent Decking	
15.11	Open Grill/ Grating Floors	
15.12	Fly-screens and Burglar Screens	
15.13	Other Metals	
15.14	Curtain Walls, Shopfronts, e.t.c	

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

16.	PLASTERING	74
16.1	Toppings & Screeds	
16.2	Plaster	
17.	TILING	80
18.	PLUMBING & DRAINAGE	83
18.1	Flashings & Linings	
18.2	Gutters & Pipework	
18.3	Under Ground Soil Drainage	
18.4	Above Ground Soil & Waste Water Drainage	
18.5	Below Ground Stormwater Drainage	
18.6	Water & Gas Supply	
18.7	Sumps, Catchpits, Chambers, Manholes & Boxes	
18.8	Sanitary Fittings & Appliances	
18.9	Electrical Geysers	
18.10	Fire Equipment & Cupboards	
18.11	Sleeves & Holes	
19.	GLAZING	102
19.1	Materials	
19.2	Glazing	
19.3	Mirrors	
19.4	Skylights	
19.5	Patent Glazing	
19.6	Materials Resembling Glass	
20.	PAINTWORK	107
20.1	General	
20.2	Painting	
21.	PAPER HANGING	112
21.1	Wallpaper	
22.	EXTERNAL WORK	113
22.1	Landscaping	
22.2	Roadwork	
22.3	Retaining Structures	
22.4	Fencing	
22.5	Concrete Block & Clay Brick Paving	
22.6	Concrete Kerbs & Channels	

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

1. INTRODUCTION

1.1 Usage

This document hereinafter referred to as the '*General Specifications*' is intended for use as a minimum standard of material specifications on Government of Lesotho building construction projects. It together with any addenda or amendments thereto current at the time of project initiation shall be deemed to be applicable in all respects to materials and workmanship on the project. It shall be deemed to refer to the '*General Specifications*' contained in construction contract documentation prepared for such building projects. Where required, reference is made to applicable trade standards which must be met by certain materials for which a description has not been provided. Its contents are intended to cover workmanship and materials encountered in a significant majority of projects and where this is not so, applicable specifications will most likely not be included in this document.

This document is a generic document and one that is designed to act as a basis upon which to build. It is anticipated that it will be supplemented by supplementary/particular specifications included in the text of the Bills of Quantities that will include inter alia the following:

- i. Supplementary/Particular clauses of a general nature that practitioners may deem necessary to cover their own individual requirements
- ii. Additional clauses pertaining to specific materials incorporated into a project and not covered by the Specifications

Where a supplementary/particular specification is incorporated within a contract, this shall take precedence and shall prevail over the *General Specifications* should any conflict or discrepancy arise between the two. Only those clauses or portions of clauses in the *General Specifications* which refer to items in the Bill of Quantities and/or supplementary/particular specifications, or to the construction contract documentation or to instructions issued to the Contractor shall be considered as applying to the performance of the contract, unless otherwise described.

It is anticipated that this document will be used as reference only in contract documentation and not be bound or reproduced therein. In order to improve cross-referencing with the Bills of Quantities, the *General Specifications* have been organised in accordance with the Standard System of Measuring Building Work issued by the Association of South African Quantity Surveyors. Side notes contain explanatory information and do not modify the *General Specifications* in any way. Side notes that are underlined are meant for the attention of project consultants who draw up the contract documentation.

As far as possible, products and materials are not specified by trade or manufacturer but rather by reference to standards and performance specifications. This facilitates minimum requirements and ensures competition in the market as any manufacturer may manufacture to a specified standard. South African National Standards (SANS) as produced by the Standards Division of the South African Bureau of Standards (SABS) are the main source of reference.

It is suggested that compilers of the project contract documentation submit a copy of the *General Specifications* to all

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

project consultants and relevant stakeholders for review in order to obtain modifications, amplifications, additions, e.t.c for incorporation as Supplementary/Particular specifications indicated above.

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

1.2 Materials & Workmanship

To prevent unnecessary repetition, all materials and workmanships are in every instance to be the best of their respective kinds and this requirement need not be restated.

All materials shall be from sources that have obtained quality certification from SABS or any other approved standards body. Any work, material or workmanship that does not comply with the Specifications or any other incorporated addendum or addition shall be classified as defective. A *Contractor* or supplier on a project shall provide written evidence in the form of certification, confirmation letters or any other form of documented evidence that materials and workmanship comply with standards in the Specifications.

1.3 Terminology

The following terms, always highlighted in italics in the body of this document appear often and convey specific meaning which are defined as follows:

Director: The Director of the Department of Building Services of the Ministry of Public Works and Transport, Government of the Kingdom of Lesotho

Representative/Agent: Duly appointed person(s) or firm(s) authorised to act in a consulting capacity on behalf of the *Director* in terms of a construction contract

Standards: Specifications and codes of practice as approved and published by the following bodies and shall be deemed to be references to the latest issue, as may be amended from time to time, of such specifications and codes:

SANS: South African National Standards as published by the Standards Division of the South African Bureau of Standards (SABS), Private Bag X191 Pretoria 0001

B.S: British Standards published by the British Standards Institution (BSI), 389 Chiswick High Road, London W4 4AL, United Kingdom

AASHTO: American Association of State Highway and Transportation Officials, 444 North Capitol Street N.W., Suite 249 Washington, DC 20001

MOD AASHTO: Refers to an internationally accepted test to determine the density of compacted material like soil filling, expressed as a percentage of the maximum compaction of the filling at various moisture contents as determined in a laboratory. (MOD stands for modified).

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

CSIR:	Council for Scientific and Industrial, P.O Box 395; Pretoria 0001; South Africa
Contractor:	Duly appointed person(s) or firm(s) contracted by the <i>Director</i> to carry out the construction works
Approval:	This means approval by the Representative/Agent in writing, and is limited to visual appearance of the work, material or components. <i>Approval</i> does not relieve the <i>Contractor</i> from compliance with the specification.
Drawings:	Means the drawings forming part of the contract documents, and any modification thereof or additions thereto delivered by the Representative/Agent to the <i>Contractor</i> during the execution of the works.
NBR:	Means the South African National Building Regulations as contained in SANS 10400.
General Specifications:	This document
Particular/Supplementary Specification:	Specification that is drawn up as a supplement to the General Specification (this document) to specify items for a particular project not covered by the General Specification. The Particular/Supplementary Specification has preference over the General Specification
Specified:	Means as specified in a Particular Specification, on drawings, in the Bill of Quantities or in any other contract document.
According to the manufacturer's instructions means the manufacturer's instructions at the time of tender.	

1.4 Accuracy & Material Tolerances

The degree of accuracy for all design and construction of building work contemplated by the *General Specifications* must comply with SANS 10155: 2009, accuracy level 2, except where specified otherwise.

The units of measurement are metric units as standardised by the "Système International d'Unités" (SI). The following unit symbols are used in this document:

h	-	hour
ℓ	-	litre
m	-	metre; m ² - square metre; m ³ - cubic metre
mm	-	millimetre
°C	-	degrees Celsius
g	-	grams

1.5 Samples & Testing Requirements

Project stakeholders are requested to ensure that provision is made in the Project Documentation for costs of material samples and

MATERIAL SPECIFICATIONS FOR GOLF BUILDING CONTRACT

tests, which the *Contractor* shall furnish without delay should same be requested by the Representative/Agent who may reject such material samples and/or workmanship that does not comply with the *General Specifications* and/or *Particular/Supplementary Specifications*.

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

The following samples and tests are required during the execution of the project:

Samples to be Provided:

Cement
Aggregates
Reinforcement
Cellular Concrete
Bricks and Lime
Sandstone
Roof Slates and Tiles
Flooring Material
Special Floor and Wall Finishes
Floor and Wall Tiles
Glass and Mirrors
Painting Materials
Road and paving Materials

Any other samples and tests specifically requested by the Representative/Agent

Tests to be Carried Out:

Water
Concrete
Roofing Slates
Plumbing and Drainage
Road Materials

1.6 Applicable Standards & Authorities

As the legal framework to provide for establishment of standards, certification and related issues is still in the pipeline in the Kingdom of Lesotho, reference has been made throughout the document to South African National Standards (SANS) to describe materials, methods and codes of practice. It is therefore incumbent on the users of this document to have access to the relevant SANS Standards. As standards which have legal backing are introduced into the Kingdom of Lesotho, these will supercede the applicable Standards contained in this document.

In instances where Standards are not provided or do not exist, the following will be required from the stakeholder introducing the specification:

- Provision of a sample for inspection
- Proof of quality
- Test reports
- Capability reports of the manufacturing facility
- Cost implications

Approval of materials, products or components arising from the above process must be made in writing by the Representative/Agent.

1.7 Local Materials

Wherever possible and to the fullest extent, preference shall be given to material manufactured, produced or supplied locally within the Kingdom of Lesotho with the proviso that such complies with the Standards contained in this document.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

2. DEMOLITIONS & ALTERATIONS

2.1 Demolitions

2.1.1 Nature and Extent

Descriptions and measurements of demolitions give a rough guide only as to the scope of the work. Contractors tendering for such work are consequently advised to visit the project site before submitting a tender and to acquaint themselves with the nature and extent of the work to be done and the value of recoverable materials which are not to be re-used or handed over to the Employer. Where demolitions are required to be carried out in a specific sequence, these shall be adequately described and measured in the relevant construction documentation. Where only a part of a building is to be demolished, it shall be done without damage to the remaining part of the building and any such damage shall be made good at the Contractor's expense.

The Contractor shall completely demolish the buildings or parts thereof in a skilful, practical, workmanlike and safe manner down to 150mm below existing ground level under the immediate and continuous supervision of a competent and responsible person adequately experienced in the operations concerned. Before any structural member of a lower storey is disturbed, the storey above it shall be completely removed.

Demolitions shall include breaking up and removing:

- All floors, surface beds, walls, partitions, roofs, staircases, chimney stacks and breasts with all services, pipes, cables, e.t.c complete. Where the structure is to be demolished to the lowest level, the substructure walls, fillings, service drains, e.t.c. are to be grubbed up to 1.0m below ground level and occurring voids filled as directed.
- All external screen walls, steps, ramps, aprons, surface water channels, rainwater sumps, gulleys, e.t.c attached to the building
- All services, manholes, e.t.c in ground to a point not less than 1.0m beyond the perimeter of the building including plugging off ends of all remaining pipes, drains, e.t.c filling in holes where necessary and ramming and levelling to ground level

Precautions shall, where necessary, be taken by adequate shoring or otherwise to prevent the accidental collapse of any part of a building or adjoining building, streets, sewers, drains, or other services. All shoring, needling or strutting required to ensure the stability of the premises must be supplied, erected, maintained and altered and adapted as necessary during the progress of the works and removed on completion, or when directed. The shores, needles or struts must be constructed from suitable and substantial timber and any other suitable materials necessary and must be to the satisfaction of the Principal Agent, but the Contractor shall, however, be entirely responsible for the adequacy of the measures taken.

When carrying out demolitions against adjoining property the Contractor shall leave adequate support and protection at each stage and shall not proceed until the Representative/Agent has inspected operations and issued such further instructions as are required. The place where demolition operations are in progress shall be adequately fenced or otherwise closed off so as to prevent the approach of any unauthorised person or risk of injury to such person.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

2.1.2 Notices

The *Contractor* shall, before commencing work, obtain all necessary authorization for carrying out the work, by whatever means including the use of pneumatic equipment, mechanical wrecking or blasting, give all necessary notices and pay all charges and fees in connection therewith. He shall also comply with all regulations pertaining to rodent extermination and fumigation and he shall obtain the requisite Rodent Extermination Clearance and Fumigation Certificates and pay all necessary fees. All receipts and certificates shall be left in the safekeeping of the Representative/Agent. All the charges and fees related to the aforementioned shall be paid by the *Contractor* and included in his prices

2.1.3 Loss

After the handing-over of the site to the *Contractor*, the full risk of any loss or damage to buildings to be demolished shall be the responsibility of the *Contractor* and he shall take such precautions as he deems necessary against such loss or damage

2.1.4 Existing Services

Prior to commencement of demolition operations, all services, including electrical, heating, sanitary, telephone, water, e.t.c., which come within the area to be demolished, shall be sealed off, disconnected or diverted as required. No electric cable or apparatus which may be potentially be a source of danger, other than a cable or apparatus used for the operation, shall remain electrically charged. The *Contractor* shall arrange with the relevant authorities for the proper disconnection of their service and for the removal of their fixtures or fittings, and shall pay all charges in connection therewith. Where part only of a structure is to be disconnected or where adjoining buildings share services, the *Contractor* shall arrange for the services to the remaining part or building to be left in an operating condition.

2.1.5 Underground Wells, Boreholes, Archaeological Digs, e.t.c

Should underground wells, chambers, boreholes, archaeological pits and similar underground occurrences be discovered, these are to be immediately reported, in writing, to the Representative/Agent and no work undertaken until inspected by the Representative/Agent and further written instructions given by him. Where underground wells, chambers, etc., are to be filled, these shall be inspected by the Representative/Agent before filling commences and shall be filled as directed.

2.1.6 Manholes, Drains, e.t.c

Where demolition of existing manholes, septic tanks and similar structures is required, these shall be emptied and heavily dusted with chloride of lime. A 300mm square hole shall be knocked through the base slabs, and the structure shall be demolished to 1.0m below ground level. The structures and excavations shall then be filled, rubble being used where deeper than 1.0m and approved selected material from 1.0m depth to the ground level, shall be made good to the satisfaction of the Representative/Agent.

2.1.7 Benchmarks, Survey Pegs, e.t.c

Bench marks or other survey marks found on or around structures to be demolished shall be reported to the Representative/Agent in

MATERIAL SPECIFICATIONS FOR GOLF BUILDING CONTRACT

writing, and they shall not be removed or destroyed without his specific written instruction

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

2.1.8 Removal of Glass

Glazing to windows, doors, roof lights, or other places shall be removed from any part of a building before demolition of that part

2.1.9 Avoidance of Nuisance

Demolition work is to be carried out in a manner as to cause as little inconvenience as possible to adjoining owners and the public. Wherever and whenever necessary, or at the direction of the Representative/Agent, the works must be well watered with jet or spray from a hose sufficient to prevent any nuisance from dust. The Contractor will be entirely responsible for claims which may arise from any disregard to the clause

2.1.10 Time of Demolition Operations

Demolition operations shall only take place during the period contained in the relevant Demolition Permit.

2.1.11 Protection

The Contractor shall provide and maintain all fans, screens, barriers, notices, casings, tarpaulins, dust sheets and all other measures necessary for the protection from damage, dust, inclement weather, e.t.c., of the existing and adjoining buildings. He shall protect from injury or damage the owners or occupiers thereof and the public generally and his own workpeople. He shall alter and adapt as necessary, take down and remove when no longer required.

All floors, doors, windows, fittings, etc., not being removed from the existing building must be adequately protected from damage during the progress of the works.

2.1.12 Making Good

Where the Contractor causes unnecessary damage to the part of the structure remaining or to the adjoining property, he shall reinstate and make good same at his own expense. All making good is to be executed with materials and workmanship to match in all respects the surrounding work and is to be properly bonded thereto.

2.1.13 Disposal of Debris

The Contractor shall be responsible for the periodic and final removal from the site of all materials, rubble, debris and rubbish arising from the demolitions. The remaining portion of existing buildings and the site shall be left clean and unencumbered before new work is commenced.

2.1.14 Materials from Demolitions

Unless specifically stated in the construction documentation, materials recovered from the demolitions shall become the property of the Contractor, who may allow credit in respect thereof where provided for in the construction documentation. Such materials shall not be re-used in any new work without the written permission of the Representative/Agent.

Items of materials, fittings, plant or equipment which are to remain the property of the Employer, or which are to be re-used in the new works, will be set out specifically in the construction documentation. The Contractor, when the site is handed over to him, will be entirely responsible for these; he will remove these items first and will carefully take them down, clean and prepare them in a suitable manner, and deliver them into safe custody where directed, or carefully store and protect same until they are required for re-use.

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

2.2 Alterations

2.2.1 Nature and Extent

Descriptions and measurements of alterations give an approximate guide only as to the scope and nature of the work to be carried out. Contractors tendering for such work are consequently advised to visit the project site before submitting a tender and to acquaint themselves with exact circumstances in which the work will be carried out.

Upon receiving relevant documentation, the Contractor shall satisfy himself that the extent of alterations and prevailing circumstances are adequately described in the construction documentation.

Alterations go along with Demolitions and it is important that the Contractor is conversant with the Demolition Specifications and scope of work.

The Contractor shall ensure the stability of all structures during alteration work.

2.2.2 Making Good Damaged Work

All disturbed and damaged work occurring during alterations shall be made good with all necessary new materials to match the existing.

2.2.3 Forming New Openings or Altering Openings in Existing Walls

Where new openings are formed or openings altered in existing walls, the wall above the opening shall be broken out and a new brick, in situ concrete or pre-stressed concrete lintel inserted, complete with all necessary reinforcement, formwork, turning piece, e.t.c. The jambs and portions of openings as described shall be built up with new brickwork or blockwork properly toothed and bonded to existing, cavities of hollow walls shall be closed where necessary and finishes shall be made good all round and into reveals.

2.2.4 Building Up Openings

Where existing openings are required to be built up, existing surrounding surfaces shall be prepared as necessary, brickwork or blockwork properly toothed and bonded to existing, wedged up to underside of existing lintel and finishes shall be made good to match existing on both sides.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

3. SITE PREPARATIONS

3.1 Benchmarks

Set up a site datum level based on an established bench mark, as directed by the Representative/Agent.
Maintain and protect this bench mark.

3.2 Site Clearance

3.2.1 Permits

Obtain, before commencing site clearance, all necessary permits for carrying out the work and pay all fees.
Obtain a rodent extermination certificate.
Hand over all permits, receipts and certificates to the Representative/Agent for safe-keeping.

3.2.2 Demolition

Demolish buildings and structures as shown on *drawings*, or as *specified*.
Remove all material and rubble within one metre of the perimeter of the building, including floors, screen walls, services and manholes, down to 150 mm below ground level.

3.2.3 Dust and noise

Use methods that keep dust, noise and vibration to acceptable levels, and which leave adjoining structures safe, to the *approval* of the local authority.

3.2.4 Services

Give notice to the *Representative/Agent* and the local authority regarding the disconnection of electric cables, water pipes and telephone cables, and leave safe.
Cut sewer-pipes and seal to the approval of the local authority.

3.2.5 Trees etc.

Remove trees and shrubs, vegetable matter, rubble, garbage, wire fences etc., all as shown on *drawings* or as directed by the *Representative/Agent*.
Remove tree roots where these occur under buildings or paving under construction. Fill stump holes with approved filling material as *specified* in this section.
Protect trees to be preserved.

3.2.6 Top-Soil

Remove top-soil over the building area to a depth of 150 mm and temporarily store on site for later use as garden soil.

3.2.7 Recovered Materials

Recover materials for re-use as *specified*.

3.2.8 Ownership of Demolished Material

Demolished material is the property of the *Contractor*. No credit must be allowed to the *Head of the Department*, unless otherwise *specified*.

3.2.9 Cleaning Site at Completion

At completion of the works, dig up concrete or mortar mixing platforms, and clean the site of all surface and buried rubble.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

4. EARTHWORKS, LATERAL SUPPORT & EXCAVATIONS

4.1 Definitions Of Excavated Material

4.1.1 Classification of Material Excavated By Hand

Soil means soil which can be removed with hand tools and includes sand, made-up ground, gravel, clay, shale and loose stones not more than 75mm wide

Soft Rock means rock which can be loosened by hand pick axe or crow-bar and includes hard shale, compact gravel-stone, stone of equal hardness and boulders at least 75 mm wide and with a volume of not more than 0,03 m³

Hard Rock means granite, quartzite, sandstone, solid shale, slate and rock just as hard or harder, as well as boulders with a volume of at least 0,03 m³

*This classification is in line
with SANS 1200 DA -
Earthworks (small works)*

4.1.2 Classification of Material Excavated By Machine

Soft excavations mean excavations in material which can be efficiently removed by:

- Back-acter with fly wheel power of approximately 0.10 kW per millimetre of tined-bucket width
- Without the assistance of pneumatic tools
- Rubber tyre front end loader with a mass of about 15 t and flywheel power of ± 100 kW, without ripping or stockpiling

Intermediate excavations means excavations in material which can be efficiently removed by

- Back acter with flywheel power of more than 0.10 kW for every millimetre of tined-bucket width
- With the assistance of pneumatic tools
- Be loaded by rubber tyre front end loaders with a mass of about 15 t and flywheel power of ± 100 kW, without ripping or stockpiling

Hard rock excavations means excavations in material which cannot be efficiently removed without blasting, or by wedging and splitting

Boulder excavations class A means excavation in material which contains more than 40 % by volume of boulders between 0,03 m³ and 20 m³ in size, in a matrix of softer material or smaller boulders

Boulder excavations class B means excavation in material which contains less than 40 % by volume of boulders between 0,03 m³ and 20 m³ in size, in a matrix of softer material or smaller boulders.

4.2 Excavations

4.2.1 Class of Excavation Material Assumed

Assume all excavations are in material classified as *soil* or as *soft excavations*, unless specified differently in the Bill of Quantities. Notify the Representative/Agent if harder material is encountered.

4.2.2 Blasting

If blasting is required, obtain written approval from the Representative/Agent and carry out the work in compliance with the latest statutory regulations.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

4.2.3 Excess Soil

Spread excess soil over the site, keep aside for filling later if required, or cart away to a suitable dumping site to be found by the *Contractor*, outside the boundary of the site, as directed by the *Representative/Agent*.

4.2.4 Bulking

Provide for bulking of excavated material.

4.2.5 Banking

Cut and trim sloping banks at 30° to the horizontal, or as *specified*.

4.2.6 Excavation for Foundations

Excavate for foundations to at least 300 mm below the level of the adjoining natural ground, or down to firm natural ground or to solid rock, or to a depth as *specified*.

Only the *Representative/Agent* will determine firm natural ground.

If excavations for foundations are dug too deep, fill up with 10 MPa concrete at own expense.

Form steps in trench bottoms with horizontal and vertical surfaces where necessary, except where there is solid rock. Steps must be in multiples of brick or block courses.

Clean the bearing area of solid rock and provide steps or dowels to prevent lateral movement.

Give sufficient notice to the *Representative/Agent* for approval of foundation excavations before concrete is cast.

4.2.7 Reducing Levels

Excavate to reduced levels as *specified* or to a depth determined by the *Representative/Agent*.

4.2.8 Risk of Collapse

Maintain all excavated faces up to 1,5 m deep where necessary or when instructed by the *Representative/Agent*, against collapse by means of planking, strutting or other appropriate methods.

Maintain excavations deeper than 1,5 m in accordance with the Construction Regulations issued in terms of the South African Health & Safety Act 1993 (Act No. 85 of 1993).

4.2.9 Storm- and Ground Water

Protect excavations against flooding by stormwater or seepage by pumping or baling.

4.3 **Filling**

4.3.1 Filling Material

Use approved clean earth or gravel without clay or organic matter for general filling work under floors, paving, etc.

Provide test results of the filling material well in advance of ordering, if so directed by the *Representative/Agent*.

Allow for reduction of volume as a result of compaction.

Hardcore consisting of broken stone, brick or similar material ranging in size from 25 to 75 mm, well consolidated by ramming, is only to be used where height of filling exceeds 1 m, or as a substitute for plastic damp proof membranes under floors, and with the approval of the *Representative/Agent*.

4.3.2 Blinding Material

Use sufficient sand, fine gravel or other approved fine material to fill voids and provide a close smooth surface to *specified* areas and to:

- Hardcore which is to receive concrete

See Plumbing and Drainage
for excavations and filling of
service trenches

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

- Surfaces which are to receive damp proof membranes and where there is a likelihood that the membrane will be damaged

4.3.3 Inspection of Foundation Excavations

Do not fill around the foundation structure before this has been inspected and *approved*.

4.3.4 Filling

Ensure that foundation walls are adequately braced or have adequate strength to withstand the horizontal pressures resulting from compaction.

Spread, level and compact filling under floors at optimum moisture content in layers not exceeding 150 mm thick, to a density of at least 90 % MOD AASHTO.

Fill against the outside of foundation walls with a minimum fall of 1:30 away from the building(s) over a distance of at least 1,5 metres, or as *specified*.

Finish sloping banks at a maximum gradient of 30° to the horizontal, or as *specified*.

4.3.5 Top Soil

After the site has been cleaned at completion of the works, spread, level and lightly consolidate top soil temporarily stored on site, or carted in as directed, in one layer at least 75 mm thick.

4.3.6 Stormwater Removal

Shape ground levels to avoid the damming of storm water, as directed by the *Representative/Agent*.

4.4 **Termite and Rodent Control**

4.4.1 Soil Poisoning

Soil poisoning shall be by means of the application of soil insecticide carried out in accordance with SANS 10124. The inside of foundation walls and underside of floors are to be treated.

4.4.2 Rodent Proofing

Where required, rodent proofing shall be carried out in accordance with SANS 10080

4.4.3 Guarantee

Obtain a written guarantee from the pest control contractor for ten years for the effectiveness of the treatment, and hand over to the *Representative/Agent*.

4.5 **Ground Anchoring**

Where ground anchoring is required, this shall be carried out in accordance with BS EN 1537 – The Execution of Special Geotechnical Work - Ground Anchors. This shall be included as a *Particular/Supplementary Specification* which shall specify type, materials and workmanship and the requirement for a method statement to be approved by the *Representative/Agent* prior to commencement of work.

4.6 **Piling**

Where piling is required, this shall be included as a *Particular/Supplementary Specification* and shall state the type of piling required, materials and workmanship. The appointment of a specialist firm to carry out this work is encouraged; such appointment to be confirmed by the *Representative/Agent*.

Work shall be in accordance with SANS 1200AA, 1200F, 10120 – 2 to 5 F

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

5. CONCRETE, FORMWORK & REINFORCEMENT

5.1 Mass Concrete

5.1.1 Cement

See SANS 10100 - 2

Do not use masonry cement
in concrete.

Cement must comply with SANS 50197-1 and VC 9085, strength class 32,5, or higher as specified.

Type, composition and strength of the cement must be shown on the bag or the delivery slip of bulk cement. Bags must be SABS-mark bearing.

Keep bagged cement in a dry store. Always use the oldest cement first. Do not use bagged cement with lumps that cannot be crumbled by hand.

5.1.2 Aggregates

Mix proportions depend
mainly on size, particle
distribution and quality of
sand and stone

Natural or crushed sand for use in concrete must comply with SANS 1083.

Stone for use in concrete must comply with SANS 1083.

Supply 25 kg (one-half cement bag) samples if required by the Representative/Agent for testing.

5.1.3 Water

Water must conform to SANS 51008 and must be clean and free from injurious amounts of acids, alkalis, organic matter, and other substances that could impair the strength or durability of concrete. Have water tested if in doubt.

5.1.4 Concrete Mix

The Cement and Concrete
Institute of South Africa is
able to offer advice.

Mix cement, sand and stone by volume or by mass to produce the specified compressive strength at 28 days.

Mix proportions may be arrived at by a process of mix design or by the use of approved tables of trial mixes with specified aggregates. Mixing of concrete may be done by hand or by machine.

Add just enough water to produce a workable consistence.

Measure consistence with the standard slump test as described in SANS Method 5862-1:1994 and as directed by the Representative/Agent.

5.1.5 Low-Density Structural or Insulating Concrete

Aggregate of low density to comply with SANS 794. Mix to be as specified.

Patent low-density mixes by specialist suppliers may be used with the approval of the Representative/Agent.

5.1.6 Coarse (No-Fines) Concrete

Aggregate to comply with SANS 1083. Mix to be as specified.

5.1.7 Ready-Mixed Concrete

The Contractor may purchase ready-mixed concrete, in which case the following applies:

- It must conform to SANS 878
- The supplier is responsible for the quality of the material and the design of the mix
- Delivery tickets must be kept for inspection
- At least three test cubes from every 50 m³ of concrete must be prepared and tested as described hereunder.

5.1.8 Testing

Cast concrete test cubes of size and quantity, and at intervals or of batches as specified, in accordance with SANS 5861-2 and 5861-3. Have these test cubes tested for compressive strength by an approved laboratory, all according to SANS 5863.

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

5.1.9 Notice

Give timely notice to the *Representative/Agent* before casting of concrete is to commence.

5.1.10 Pumping

Obtain prior permission from the *Representative/Agent* if it is intended to place concrete by pumping.

5.1.11 Curing

Cure concrete by means of a liquid membrane-forming curing compound at an approved rate, by ponding with water, or by covering with polyethylene or similar vapour-proof material in large sheets. Cure for 7 days, and longer when the ambient temperature falls below 10 °C.

5.1.12 Surface Beds

Use 15 MPa concrete for surface beds to be covered with a screed. Cast to thickness of 75 mm, or as *specified*. Place, compact, strike off level with the top of foundation walls and leave as is. Do not trowel, so as to provide a good key for the screed.

Cast concrete surface beds without contraction joints, or cast in 200 x 200 x 4 mm welded steel mesh, placed near the top surface, if *specified*.

Use large mats. Overlap mats by at least 300 mm.

5.1.13 Floors

Cement for industrial floors must be type CEM 1 to comply with SANS 50197-1

Aggregate for industrial floors must comply with SANS 1083 as well as the following requirements:

- Coarse aggregate must comply with the 10% fine aggregate crushing test (10% FACT) values, as *specified* in table 5 of SANS 1083
- The maximum nominal size of the coarse aggregate shall be the lesser of 25% of the thickness of the floor slab and 37,5 mm
- If the nominal size of the coarse aggregate exceeds 26,5 mm, a coarse aggregate of smaller maximum size must also be incorporated in the concrete mix
- Do not use coarse aggregate smaller than 19 mm
- During the work the fineness modulus of the fine aggregate must not vary by more than 0,20 from that on which the original design was based, unless the mix proportions are adjusted accordingly
- When bleeding is likely to be excessive, consider the use of a suitable fine blending sand, or a different sand, or a water-reducing admixture, or air-entrainment.

Use 20 MPa concrete for direct-finished one-course concrete domestic floors. Cast floors to 75 mm thickness, or as *specified*.

Use 30 MPa concrete, or of a strength as *specified*, for direct-finished one-course concrete industrial floors. Have the mix designed and submit the design together with a laboratory report showing mix proportions and 7 and 28 day strengths, for approval. Cast floors to thickness as *specified*.

Where and as *specified*, reinforce the floors with welded steel mesh to comply with SANS 1024. Ensure that the reinforcement is near the top surface. Use large mats. Overlap by at least 300 mm where necessary. Do not cross over construction or day joints.

See SANS 10109 part 1 and 2.

It is impractical to position contraction joints in surface beds to be screeded over to coincide with the joint pattern of the floor finish.

Casting the slab without joints, and leaving time for it to dry out and shrink, then covering any imperfections with the screed, is an acceptable practice, provided the area of the surface bed is reasonably square and not too large.

Consider a nominal mesh to control shrinkage cracking if areas are large, or long and narrow

A direct-finished one-course concrete floor is superior to a concrete base with a screed or with "topping", and should be used if floor is to be left as is, or if it is to be covered with resilient floor finishes like thermoplastic tiles or carpet

Table 1 of SANS 10109-2 gives guidelines for concrete strengths for various industrial applications. Class AR3 (30 MPa) concrete is suitable for light duty industrial applications and rubber-tyre traffic

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

Mesh reinforcement is nominal, meant only to keep the slab together if it should crack, or for control of drying shrinkage. Not normally necessary.

Trowelling concrete before it has stiffened enough will bring up slurry which may come loose and is not as hard-wearing as the aggregate

In the case of industrial floors, arrange a pre-construction meeting with all parties involved to discuss and agree all aspects of the work, especially the type and number of finishing operations which must take place within the proper period.

Prepare thresholds by casting concrete of same thickness, material and finish as *specified* for floors, in all door openings. Domestic thresholds may have plain edges. Industrial floor thresholds must have keyways.

Place, compact, level, strike off, and wood float concrete floors to a level surface and finish as follows:

- Leave the finish undisturbed until bleeding has ceased and the surface has stiffened so that foot pressure barely indents the surface (several hours)
- Remove bleed water and laitance on the surface
- Complete edging and hand-jointing operations where relevant
- Power float the surface to produce a level surface
- Power trowel immediately after floating to produce a smooth, hard surface
- In the case of domestic floors, concrete may be cast in room-size panels, with butt joints against thresholds. In the case of industrial floors, form contraction, construction and isolation joints as described below. In the case of columns, cast the concrete against edge forms placed diagonally to the column, and afterwards fill in the area between the column and the concrete already cast.

5.1.14 Joints in Floors

Form joints in concrete floors as follows:

- Contraction joints
- Provide contraction joints in an agreed pattern or as *specified*. Saw contraction joints with a mechanical concrete saw to a width of 3 mm and a depth of one quarter of the slab thickness. Saw only after the concrete has hardened sufficiently but before shrinkage cracking can occur (between 4 and 48 hours after placement).
- Construction or day joints
- Cast construction joints at the end of the day's casting or where concreting has stopped for more than 45 minutes. Construction joints must be keyed, keyed-and-tied, or dowelled or reinforced butt joints as *specified*. Keyways must be trapezoidal or rounded keyways. Dowels must be 16 mm diameter x 300 mm length plain round mild steel dowels that comply with SANS 920, or as *specified*, placed at mid-depth of the slab at 300 mm spacings. Dowels must be coated for two-thirds of their length with a bond-breaking compound. The joint face of keyways must be coated with a suitable de-bonding agent like lime wash or bitumen. Round off all joint edges to a radius of 3 mm.
- Isolation or movement joints
Form isolation joints where floors abut any fixed structure like walls, columns, sumps or inspection chambers, with 20 mm thick compressible material like polystyrene or bitumen-impregnated softboard.

Contraction joint spacing should generally not exceed 4,5 m, but depends on reinforcement and laying method. The irregular faces of the cracks that form below saw cuts provides aggregate interlock

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

Seal joints only when and as *specified*, otherwise leave joints open. Seal joints with a suitable elastomeric material as described under *Waterproofing*. Ream sawn joints to width and depth as *specified* and according to the manufacturer's instructions.

5.1.15 Paving

MATERIAL SPECIFICATIONS FOR GOLF BUILDING CONTRACT

Use 20 MPa concrete. Cast paving to thickness as *specified*.

Cast paving with a minimum fall of 1:100, or to levels as *specified*.

Brush the surface, after the concrete has stiffened sufficiently, with a stiff brush or similar to leave a coarse surface. Prepare a sample panel for *approval*.

Form construction joints as described above at 3,5 m maximum centres in both directions, or to pattern as *specified*. Round off edges of panels.

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

5.1.16 Channels and Spill Basins

Use 15 MPa concrete.

Cast rainwater channels and spill basins on well rammed earth filling to the specified profile, 380 or 450 mm wide and not less than 75 mm thick anywhere in cross section, with 230 or 300 mm wide by 75 or 100 mm deep segmental channel respectively.

Lay channel floor to an even fall of 1:250 minimum or as specified.

Keep tops of channel sides level with brick courses and/or paving. Neatly form angles and sweeps around gulleys without changing the channel profile. Form stop-ends at tops of gradients.

Cast rainwater channels with isolation joints against walls and with keyed construction joints at 1,8 m maximum centres.

Cast concrete spill basin to shape, size and finish as specified.

Finish rainwater channels with 1:3 cement: sand plaster, rounded on salient angles. Maintain joints in plaster over joints.

Rainwater channels may be pre-cast, to the approval of the Representative/Agent.

5.2 **Reinforced Concrete**

5.2.1 Materials

Use materials, mix and cast reinforced concrete according to the instructions of the Engineer.

5.2.2 Sleeves

Cast into slabs and beams galvanised mild steel or plastic sleeves of diameter suitable to house service pipes up to 100 mm in diameter. Larger service pipes or ducts must be formed to sizes as specified.

5.2.3 Special Works

Leave holes and/or openings where required by special works under separate contract. Take instructions as regards these holes and openings from the Representative/Agent.

5.2.4 Ties

Where brickwork butts against concrete, cast in 600 x 30 x 1,2 mm galvanised mild steel ties 150 mm deep, at about 500 mm centres. Where concrete walls are to be lined with brickwork, cast in 4 mm diameter galvanised crimp wire ties in a staggered pattern 1 m apart every third course.

5.2.5 Reinforced Concrete Lintels

Use 20 MPa concrete. Cast lintels in situ or pre-cast.

Cast lintels to full width of wall and 200 mm longer on both ends of width of opening to be spanned, or as specified, and to the following depths and reinforcement:

Clear or daylight span	Depth of reinforced concrete lintel	Mild steel reinforcement
smaller than 1 m	1 block or 3 brick courses or 200 mm minimum	40 mm from bottom, for each half brick width of soffit
1 - 1,5 m	1 block or 3 brick courses or 200 mm minimum	One 12 mm diameter
1,5 - 2 m	2 blocks or 4 brick courses or 300 mm minimum	One 16 mm diameter
larger than	As specified	As specified

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

2 m		
-----	--	--

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

5.3 Off-shutter concrete

5.3.1 Aggregates

Supplies of sand and stone for off-shutter concrete must be uniform throughout the contract. Be sure that adequate quantities of rock of the desired colour are established before work begins. Consider stockpiling.

Keep grading of aggregates constant throughout the contract.

5.3.2 Pigments

Use inorganic synthetic pigments, if specified.

Add pigment dosages by mass and mix thoroughly into dry concrete materials.

5.3.3 Form Work

Discuss the type of form work, the fixing of reinforcement and selection of spacer blocks, and the detailing of joints and tie-bars with the Representative/Agent and the Engineer before any shuttering is ordered or brought on site.

Use form work that will achieve the following surface finishes, as specified.

Prepare a sample panel of at least 1 m² for approval, if so directed by the Representative/Agent. The sample panel must include all salient points like construction or day joints, splayed edges and tie-bar treatment.

- Rough: If no treatment of the concrete surface after removal of the form work is required, and the surface is within the degree of accuracy 3 to comply with SANS 10155
- Smooth: If small defects like honeycombing, irregularities and discolouration can be made good according to approved methods, and the surface is within degree of accuracy 2 to comply with SANS 10155. Make this form work of metal or wrought timber. Fit shutter bolts and joints in a regular pattern to the approval of the Representative/Agent. Strike horizontal day joints true and level with a trowel.
- Special: Smooth, dense well-compacted concrete showing the slight grain marks of planed boards or smooth plywood with well-fitted joints and sound arises, with a surface within degree of accuracy 1 to comply with SANS 10155. Make good any blemishes.

Form work must be grout-tight, properly supported, and coated with a suitable release agent.

Form work ties permanently cast in are subject to approval. Tie-wires are not permitted.

Splay visible edges to columns and slabs, or as specified

Form drips to bottoms of exposed slabs, lintel or beam edges.

5.3.4 Reinforcement

Cut and bend reinforcement correctly and fix with the necessary supports and cover blocks to ensure that position and cover to steel is maintained during casting and compaction.

All work to be in accordance with ARP 040 – The Use of Reinforcement Cover Devices to Reinforcement Concrete

5.3.5 Placing

Ensure personnel adequate in number and sufficiently skilled are available to carry out the work.

Ensure all equipment necessary for mixing, transporting and vibrating concrete is in working order.

Ensure concrete quantities are adequate for the planned placement.

Textured finishes in off-shutter concrete may be obtained by the use of special hardboard sheets, or neoprene, rubber, thermoplastic or fibreglass linings. They are costly, but may be re-used. Absorptive linings (e.g. softboard) create attractive surfaces and eliminate blow-holes and imperfections due to poor compaction. They increase the surface quality because the cement: water ratio is increased by the direct removal of free water at the surface. They provide only one use, but shutter oil is eliminated and backing forms are protected from damage

Leakages lead to grout loss, discolouration and honeycombing

Unless they can be effectively disguised it is desirable to make a special feature of tie-rod holes.

Banning ties will increase the cost of concrete Casting in storey heights reduces the number of costly horizontal joints, and the greater head of concrete reduces the number of blow-holes

Proper curing plays an important role in providing a good surface finish, but in practice this is only provided by retaining the shuttering in place

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

Cast walls and columns in single lifts not less than one storey in height.

Take special care with the bottom 200 mm of a new lift, e.g. by increasing the proportion of sand in the mix or by reducing the stone content by $\pm 20\%$.

5.3.6 Curing

Maintain constant stripping times to assist in achieving colour uniformity.

5.3.7 Bush Hammering or Tooling

Heavy bush hammering is not permitted before the concrete has attained a compressive strength of at least 25 MPa.

5.3.8 Abrasive Blasting

Blast two to three days after casting, and keep this age constant throughout the work.

Do not blast to a depth more than one-third to one-half the smallest size stone.

Take the necessary precautions to protect the public and the blasting operators.

Credits:

Addis B. - Cement, Concrete
and Mortar, 1997. Cement
and Concrete Institute
Davis D.E. - Concrete
Surface Finishes, Basic
Principles and Techniques.
Portland Cement Institute

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

6. PRE-CAST CONCRETE

6.1 Pre-cast Concrete Units

6.1.1 Casting

Pre-cast concrete units may be cast on or off site in approved conditions. Submit proposals for casting procedures to be used.

6.1.2 Patents

Where relevant, exempt the *Director* of any claims for infringement of patent rights, design or trade names regarding pre-cast systems used in this work, and pay all due patent holder's monies.

6.1.3 Samples

Submit samples on site of every required architectural finish for approval. Do not start production before samples have been approved.

6.1.4 Marking

Mark every unit indelibly so as to identify its location.

6.1.5 Storing

Store units separately on their designed end bearing surfaces in the position they will adopt when built in. Cure for at least 10 days.

6.1.6 Handling

Handle units so that strain, deformation and damage are kept to a minimum.

6.1.7 Damaged Units

Report minor and hair cracks. Repair of these defects may be permitted depending on exposure.

6.1.8 Building in Pre-Cast Units

Build in units not before 21 days after casting. Bed and joint units solidly in 1:3 cement: sand mortar. Key joints and tint if necessary to match other facings.

6.2 Pre-cast Pre-stressed Concrete Lintels

6.2.1 Lintels

Pre-cast pre-stressed concrete lintels must comply with SANS 1504. Lintels for exposed work must be uniform in colour and texture, and free from imperfections.

6.2.2 Laying Lintels

Lay lintels with a bearing length of at least 200 mm in 1:5 cement mortar. Prop lintels at 1,5 m centres for at least seven days after brickwork has been completed.

6.2.3 Reveals

Cut the faces of lintels above reveals to make provision for face brick faggots when used in face brick walls.

6.3 Pre-Cast Concrete Plank Walling

6.3.1 Posts and Planks

Pre-cast concrete posts and planks to comply with SANS 1372 of type, colour, length of post and width of panel as specified.

6.3.2 Erecting

Plant posts 600 mm deep in concrete at approximately 1,6 m centres.

Slip planks between posts and level.

SANS 1200 GE - 1984 (Pre-cast Concrete for Building Work)

These concrete planks are not designed to carry load but to act as convenient and permanent shuttering for the brick or blockwork overhead - propping is essential.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

6.4 Pre-cast Window and Door Frame Systems

6.4.1 Concrete Frames and Sills

Pre-cast concrete window and door frames must be of high strength reinforced concrete with smooth finish and cast-in lugs.

Door frames must be supplied with recessed hinges and centred lock plate to *approved sample*.

Cast-in lugs must match the building gauge.

All concrete frames and sills must be factory pre-treated with an undercoat in preparation for painting on site.

6.4.2 Aluminium Sashes

Aluminium sashes must be 25 x 25 mm nominal extruded aluminium 50 STF alloy sections, anodised finished to 0,025 mm thickness, with silicone treated woven pile weatherstrip, and grade 304 stainless steel hardware, 4 mm thick glass factory fitted in uPVC black top hat glazing gasket, all to *approved sample* and to AAAMSA standards.

6.4.3 Steel Sashes

Steel sashes must be cold rolled steel sections factory finished with oven baked polyester epoxy electrostatic powder coating to nominal thickness of 0,025 mm, with *approved hardware*, 4 mm thick glass factory fitted in black silicone, all to *approved sample*.

6.4.4 Aluminium Louvres

Aluminium louvres must be extruded aluminium 50 STF alloy sections, anodised finish to 0,25 mm thickness.

6.4.5 Flyscreens

Flyscreen frames must be 25 x 25 mm nominal extruded aluminium 50 STF alloy sections, anodised finished to 0,025 mm thickness.

6.4.6 Burglar Bars

Burglar bars must be 12 mm square mild steel rod with full strength butt welds at all intersections and ends flattened to 30 mm and drilled 5 mm for 4,5 mm rivets. Bars must be factory finished with epoxy polyester electrostatic powder coating.

6.4.7 Handling

Handle window or door units carefully. Stack units on timber strips on level ground. Transport units manually or on timber pallets.

6.4.8 Building In

Build in units as follows:

- Lay units on 1:4 cement mortar. Tamp the unit on corners only
- Set up door frames by means of a reusable patent jig and T-stay, supplied by the manufacturer
- Screw aluminium frames into the concrete frames at the end of the building phase
- Bolt burglar bars to concrete frames into cast-in sockets.

6.4.9 Fixing Glass Directly into Concrete Surrounds

Fix glass directly into concrete surrounds as follows:

- Seal the concrete surface in the rebate with two coats clear bonding liquid
- Glaze with putty to comply with SABS 680
- Paint putty within seven days, or

(AAAMSA) - Association of
Architectural Aluminium
Manufacturers of South
Africa

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

- Fix glass with a non-ascetic silicone sealant gunned directly onto clean concrete surface.

6.4.10 Fixing Frames into Concrete Surrounds

Fix frames into concrete surrounds as follows:

- Clean the glazing rebate with white spirits.
- Clean the contact face of aluminium frames with white spirits.
- Clean the contact face of steel frames with a suitable primer.
- Glue the frame into the surround with a non-ascetic silicone sealant.

6.4.11 Samples

Provide a complete sample of every type of frame for approval before ordering.

6.5 **Pre-Cast Concrete Paving Slabs** See Section 24.5

DRAFT FOR REVIEW ONLY

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

7. MASONRY, BRICKWORK, BLOCKWORK, RUBBLE WALL, STONE & GLASS BLOCK

7.1 General

7.1.1 Bond

Blocks are masonry units with length larger than 300 mm, width larger than 130 mm, height larger than 120 mm

Use full bricks or blocks wherever possible.

Build common brickwork in stretcher bond with header courses at every tenth or specified layer, wherever practical. Build face-brick work in stretcher bond or as specified. Build half-brick walls, skins of cavity walls, and blockwork in stretcher bond.

Tie brick or blockwork to concrete columns with 600 x 30 x 1,6 mm galvanised iron ties cast into concrete at about 500 mm centres. Fix ties not cast into concrete with 40 mm shot nails.

Tie brickwork linings to concrete walls with 4 mm diameter galvanised crimped wire ties cast 75 mm into concrete and built 75 mm into brickwork, spaced in a staggered pattern 1 m apart every third course.

Reinforce intersections of block walls which cannot be bonded, with metal mesh to comply with SANS 190 Part 2 as recommended by the manufacturer of the masonry unit.

7.1.2 Laying Bricks or Blocks

Lay bricks on a full bed of mortar.

Lay concrete blocks according to the recommendations of the Concrete Manufacturers' Association. Obtain a copy and keep on site for reference.

Lay hollow concrete blocks on shell bedding except first courses on foundations, where damp proof courses occur, and in columns, where all horizontal joints must be filled solid.

Fill all vertical joints solid.

Construct corners of walls accurately. Check height of courses with a gauge rod. Joints must be 10-12mm thick.

Carry up work evenly.

Keep perpend and angles plumb.

Wet clay bricks before laying only if they are highly porous. Do not wet concrete bricks or blocks.

Flush off joints in common brickwork.

Rake out joints 10 mm deep where a mechanical key is required for plastering.

Build half-brick or half-block beam filling in between roof timbers and hard up against roof covering.

7.1.3 Cavity Walls

Build cavity walls with a clean cavity.

Tie the two brick skins with galvanised mild steel wall ties, of the butterfly or modified PWD-type to conform to SANS 28, spaced in a staggered pattern at 2½ ties per m².

Close the cavity at the top of the wall with a header course, or as specified.

Leave cross joints open in the outer skin of brickwork, at centres not exceeding 1 m, at damp proof course level at floors and lintels.

7.1.4 Face-Brick Work

Sort face bricks to ensure proper mixing within the colour range. Prepare mortar in a consistent manner to ensure face-brickwork with a uniform appearance.

Cut face bricks with a bolster or carborundum wheel.

Prepare a sample panel of specified size. Maintain and protect until bricklaying is complete.

Tool horizontal and vertical joints of face-brick or face-blockwork after mortar has stiffened so as to compact the mortar and

Shell bedding means two mortar strips on each block side, intended to minimise moisture movement through the wall, because the webs are not joined by mortar

Do not lay clay bricks and concrete bricks or blocks in the same wall face because of difference in thermal and moisture movement.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

improve the weatherproofness of the wall. Joints must be keyed or recessed as specified. Clean face-brick work as the work progresses.

7.1.5 Smoke Flues

Build smoke flues 200 x 200 mm, or 220 x 220 mm, or as specified, as straight up as possible, with easy bends where necessary. Line flues with refractory firebricks where so specified, one half brick thick, bedded and jointed in approved fire cement. Parge flues in ordinary brickwork with cement plaster.

7.1.6 Building-In

Set up and securely strut door, window and cupboard frames and build in solid with the build-in lugs provided.

Grout pressed steel door frames solid at backs as work proceeds.

Build in 30 x 1,2 mm galvanised steel straps or 4 mm diameter double twisted galvanised wire roof anchors at least 600 mm deep into brickwork. Bend the bottom end of the strap into the horizontal joint. Provide the looped bottom end of the wire anchor with a short length of reinforcing rod to prevent the anchor being pulled out.

Build in all electrical conduits, boxes and distribution boards. Ensure boxes and boards are built in level, plumb and at the specified depth and height above floor level.

7.1.7 Movement Joints

Form vertical movement joints in walls, or horizontal joints in cladding panels in reinforced concrete framed structures as specified with 10 mm polystyrene or bitumen-impregnated softboard.

7.1.8 Special Works

Leave holes and/or openings where required by special works under separate contract. Take instructions as regards these holes and openings from the Representative/Agent.

7.2 **Brickwork & Blockwork**

7.2.1 Common Clay Bricks

Common clay bricks must conform to SANS 227:

- Class NFP with a minimum compressive strength of 7 MPa for general single-storey work; class NFX with a minimum compressive strength of 10,5 MPa for double storey structural walls, free-standing walls and retaining walls
- Grade of efflorescence: standard grade for internal walls that will not become damp; special grade for visible unplastered foundation walls, retaining walls or free-standing walls
- Water absorption limits must be 6-14%
- Moisture expansion limits must be 0,015%
- Work size: as specified.

Keep despatch or consignment notes as proof of manufacturer, class, work size, compressive strength and grade of efflorescence.

7.2.2 Clay Face Bricks

Clay face bricks must conform to SANS 227:

Class

- Class must be class FBS, FBX or FBA as specified, or to match existing face bricks, with a minimum compressive strength of 17 MPa
- Solid or perforated face bricks may be used

Movement joints must be designed to permit movement, prevent ingress of water, air and dust, and prevent loss of fire resistance and acoustic properties. Check with manufacturers and SANS 10145.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

- Grade of efflorescence: standard grade for internal walls that will not become damp; special grade for visible foundation walls, retaining walls or free-standing walls
- Water absorption limits must be 6-14%
- Moisture expansion limits must be 0,015%
- Work size: as specified.

Keep despatch or consignment notes as proof of manufacturer, class, work size, compressive strength and grade of efflorescence.

7.2.3 Concrete Bricks and Blocks

Concrete bricks and blocks must conform to SANS 1215:

- Colour, size, profile and surface texture: as specified
- Compressive strength: 3,5 MPa for general single-storey work; 7,0 MPa for double storey structural walls, free-standing walls and retaining walls
- Average drying shrinkage: 0,06%.

Keep despatch or consignment notes as proof of manufacturer, size, colour, profile, surface texture, compressive strength and average drying shrinkage.

7.2.4 Samples

Supply a sample of 20 clay face bricks and six of every other type of clay brick for approval. Supply one sample of every type of concrete block. Keep these units on site for reference.

7.2.5 Storage

Unload bricks and blocks carefully to prevent chipping and breakage. Stack on prepared level areas and protect from staining or marking.

7.3 **Mortar**

7.3.1 Cement

All cement must comply with VC 9085, SANS 50197-1, strength class 32,5 and masonry cement to comply with SANS 50413-1, type MC 12,5X or 22,5X.

Type, composition and strength of the cement must be shown on the bag or the delivery slip of bulk cement. Bags must be SABS-mark bearing.

Keep bagged cement in a dry store. Always use the oldest cement first. Do not use bagged cement with lumps that cannot be crumbled by hand.

7.3.2 Sand

Natural or crusher sand to comply with SANS 1090. Supply grading test results if required by the Representative/Agent.

Obtain sand from one source throughout the duration of the works. Store sand in a way that will avoid contamination by foreign matter.

7.3.3 Mix Proportions

Mix proportions for cement: sand mortars must be as follows.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

One bag of cement=50 kg.
One builder's
wheelbarrow=65 litres

Use masonry cement for
better workability in the
event of poorly graded
sands. Masonry cement is a
blend of Portland cement
and lime. 'X' indicates that
the masonry cement
includes an air-entraining
agent

Class	Minimum com- pressive strength MPa	Application	Cement: sand (common cement)	Cement: sand (Masonry cement)
I	10	High-strength structural work (multi-storey, loadbearing)	1:4 or 50 kg to 130 litres	1:3 or 50 kg to 100 litres
II	5	Normal loadbearing work, parapets, balustrades, retaining structures, freestanding walls, and walls exposed to dampness	1:6 or 50 kg to 200 litres	1:5 or 50 kg to 170 litres
III	1,5	Unexposed single-storey non-loadbearing walls.	1:9 or 50 kg to 300 litres	1:6 or 50 kg to 200 litres

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

7.3.4 Mixing

Mix ingredients dry on a clean surface or by means of a mechanical mixer. Mix thoroughly until colour is uniform. Add water to give the desired plasticity. Use within 2 hours.

7.3.5 Testing

Mortar shall be tested in accordance with SANS 50413-2

7.4 **Rubble Wall**

7.4.1 Stone

Stone must be approved natural stone varying in size between 150 and 600 mm in section.

7.4.2 Mortar

Mortar must be class III mortar.

7.4.3 Bond

Bond must be uncoursed, but with homogeneous pattern. Prepare a sample panel for approval.

7.4.4 Laying

Bed stones solid in mortar.

Build in wire ties at 3 per m² where rubble walls are to be joined to brick- or blockwork. Level up tops of walls with selected long and flat stones.

Keep wall faces even.

7.4.5 Jointing

Make joints 25 - 50 mm wide and deep, square recessed.

7.5 **Stonework**

7.5.1 Specialist Contractors

This work must be done by specialist contractors.

Arrange a meeting between the specialist contractor and the Representative/Agent to discuss every aspect of the work, well in advance of ordering of materials.

7.5.2 Stone

All stonework generally where shown on drawing to foundation and superstructure is to be Sandstone or other specified stone except to steps and thresholds which are to be Flagstone or other specified. Size of stone panels must be as specified.

Stone shall be level, plum, square and true with uniform joints, set in full bed of mortar with all vertical joints filled.

Stone shall be bedded and pointed in one operation with (3:1) cement mortar and stone dust mortar. All stones in contact with brickwork shall be backed with rendering of mortar as specified or washed with a 3:1 slurry of cement and stone dust. All brick backing to be set in cement mortar.

All work shall be carried out in accordance with SANS 10073

7.5.3 Sub-Construction

The sub-construction must be corrosion-free structural grade aluminium horizontal rails fixed to extruded brackets of the same material and anchored to the building frame.

7.5.4 Stone Panels

Attach stone panels with machine grooves in top and bottom edge to the aluminium rail sub-construction.

7.5.5 Joints

Sources of relevant information:

Pre-cast Concrete Paving Blocks – Laying Manual. The Concrete Masonry Association

Technical Guide: Clay Pavers & Paving – Selection and Construction Guidelines. Corobrick

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

Seal joints between panels with silicone compound of approved colour, according to manufacturer's instructions.

7.6 Lintels

7.6.1 Reinforced Brick Lintels

Build reinforced brick lintels as follows, suitable for light (class A or C) or heavy (class B) roofs, with a maximum truss or beam span of 10 m:

*Roof class A, B or C
according to NBR Lintels for
longer spans or heavier loads
must be designed by an
Engineer*

Clear or daylight span	Depth of lintel - number of brick courses	Span of roof supported by lintel, m Class A/C Class B		Number of mild steel reinforcing bars x mm diameter
2 m	4	6	4	2 x 8 or 3 x 6
	5	8	6	
	6	10	8	
3 m	5	6	4	3 x 8 or 4 x 6
	7	8	6	
	8	10	8	
	9		10	
4 m	7	6	4	4 x 6
	9	8	6	
	11	10	8	
	12		10	

Build in reinforcing bars in the first horizontal joint above the bottom course. Length of reinforcing rods must be the clear span plus 300 mm on each side. Reinforcing must have 40 mm cover in the outer skin.

If the lintel is in face-brick work, the first course must be brick-on-edge, or as specified.

Fill the cavity of lintels in cavity walls solid with concrete, or as specified, where the lintel is exposed to rain.

Support lintels for at least 21 days.

*In exposed conditions
provision must be made for a
stepped d.p.c. and open
cross joints.*

7.6.2 Reinforced Block Lintels

Use U-shaped concrete lintel blocks with a depth of 190 mm.

Lintel blocks must have a bearing length at each end of 200 mm.

Place reinforcement at bottom of lintel blocks as specified, and fill solid with 20 MPa concrete.

7.7 Glass Blockwork

7.7.1 Blocks

Use glass blocks of size, surface pattern and colour as specified.

7.7.2 Laying

Use only complete blocks.

Use class II mortar.

Coat the surface on which the first course is laid with bitumen emulsion or similar material to permit movement of the blocks.

Make joints 10 mm thick, strike back and smooth. Allow 15 mm clear space at sides and top of glass block panel. Fill these clearances with non-hardening compound.

Reinforce every fifth horizontal joint, and vertical joints at 1 m maximum centres, with 25 - 65 mm wide corrosion resistant metal strips or mesh, nailed to the adjacent walls or columns.

7.8 Miscellaneous

Cills and copings to be fibre-cement, quarry or cement tiles as specified and shall be bedded, pointed and jointed in 1:4 cement

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

mortar with 5% lime added. Quarry tiles shall be wet soaked before laying. Unless otherwise stated, internal cills shall be level and external cills shall be set sloping on cut brick or blockwork or on fine concrete shaped filling under. Where full tiles do not fit into length, two cut tiles shall be used, symmetrically placed as directed. Unless otherwise *specified* cills shall project 10mm beyond the finished wall face and joints in quarry or cement tiles shall be 6mm wide and slightly rounded. Joints where necessary, in fibre-cement cills shall be close butt.

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

8. WATERPROOFING

8.1 Damp-Proof Courses and Membranes

8.1.1 Polyolefin Damp-Proof Course

0,375 mm black embossed polyolefin damp proof course to comply with SANS 952, type B

Lay damp-proof course in unjointed lengths where possible and with full corner laps over full width of wall, level with the top of floors and not less than 150 mm above finished ground level.

Lay damp-proof course under jointed window sills (e.g. tiles and bricks) and tuck in under window profiles.

Lay damp-proof courses in cavity walls as follows:

- staggered over the two brick skins of the cavity and so that the inner layer is level with the top of floors and the outer layer one brick course lower but not less than 150 mm above finished ground level. Support the damp-proof course fully on concrete or mortar filling, or
- in two separate layers on each brick skin at floor level. Terminate the cavity between the two brick skins one (or two) courses lower than the damp-proof course
- staggered over cavity wall lintels where exposed to rain
- vertically over full height of window or door frames between the two leaves of cavity walls and in line with the frame, and tucked into frame.

8.1.2 Polyolefin Damp-Proof Membrane

0,25 mm smooth green polyolefin membrane to comply with SANS 952 type C.

Lay damp-proof membrane under concrete surface beds or concrete floors. Fold membrane up against the foundation walls and lap to underside of damp proof course in the walls.

Lay damp-proof membrane in the largest practical sizes with 200 mm laps. Seal laps according to the manufacturer's instructions when so specified.

8.1.3 Polyolefin Under-Roof-Tile Membrane

0,25 mm white polyolefin membrane to comply with SANS 952 type E, grade 1, or as specified.

Lay membrane horizontally over rafters prior to battening, with minimum overlaps of 150 mm, and fix with clout nails to rafter centres.

Terminate the membrane ± 25 mm beyond the external walls and fold down against gable walls. Lay a 600 mm strip under the main membrane under valleys, and over the main membrane over hips and ridges.

8.2 Waterproofing

8.2.1 Material and Application

Waterproofing materials must conform to the minimum requirements as set by the African Waterproofing Institute, and be one of the following, as specified:

- Modified bitumen sheeting, consisting of a polyester core impregnated with polymer modified bitumen, of type APP (Atactic polypropylene) wax modified bitumen membrane, or type SBS (Styrene Butadiene Styrene) rubber modified bitumen membrane, as specified and of 4 mm thickness. Apply in a single layer for exposed surfaces, and in a double layer for applications where the sheeting is covered with stone, paving, tiles etc. Seal laps by heat fusion.
- Reinforced liquid waterproofing compounds must be acrylic or styrene/acrylic of approved colour, or rubberised bitumen, as

See SANS 10021 -
Waterproofing of Buildings

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

specified, reinforced with a non-woven needle-punched polyester or polypropylene fibre fabric with a mass of 125 - 150 g/m². Apply in five coats, i.e. primer, bed coat, saturation coat and two top coats, or *according to the manufacturer's instructions*.

- Synthetic waterproofing membranes must be high density polyethylene, polypropylene alloys, chlorosulphinated polyethylenes, or polyvinyl chlorides, as *specified*. Apply synthetic waterproofing membranes in a single layer for exposed or covered applications. Seal laps by heat welding.

8.2.2 Quality Control

Prior to the awarding of the waterproofing contract:

- A certificate of competency from the relevant manufacturer of the waterproofing material must be provided for *approval*.
- The waterproofing contractor, when *specified*, must present a Quality Assurance and/or Quality Control (QA/QC) programme, setting out the quality control procedures and duties of all parties involved. This must include the date of manufacture of the waterproofing material, the signed acceptance of the surface, daily testing and the final commissioning of the waterproofing system.

During the course of the works the manufacturer of the waterproofing material must inspect regularly, and upon completion of the installation must certify in writing that the application has been done *according to the manufacturer's instructions*.

8.2.3 Preparation

Surfaces to receive waterproofing must conform to the minimum substrate requirements as set out in SABS 10021 and the minimum requirements as set by the African Waterproofing Institute:

- Screeds must be a minimum of 40 mm thick and laid to a minimum fall of 1:70
- Fillets, coves and chamfers must be provided where horizontal and vertical surfaces meet
- Screeds must be clean, smooth, even and stable. Cracks up to 0,3 mm are acceptable
- Moisture content of the screed must be less than 7%
- Outlets must have a minimum diameter of 75 mm, and not be of plastic material
- The area to be waterproofed must be free of traffic and without protrusions.

Waterproofing materials do not adhere to plastics

Organise a pre-installation meeting with the manufacturer of the waterproofing material, the *Representative/Agent*, and the waterproofing contractor well in advance of installation to review products, procedures, quality control and guarantees, and so that clarity may be reached on construction details, e.g. grooves, flashings and outlets.

These works procedures must be signed off by the waterproofing contractor and the manufacturer.

8.2.4 General Application

Waterproofing must be applied according to SANS 10021 and *according to the manufacturer's instructions*.

Waterproofing must be applied by trained artisans.

Provide slip layers, metal lathe, ventilators, movement joints etc. as necessary and *according to the manufacturer's instructions*.

MATERIAL SPECIFICATIONS FOR GOLF BUILDING CONTRACT

Dress the waterproofing down into patent type stormwater outlets. Take up waterproofing at least 150 mm above floor level or to the level of the damp proof course if present, tuck into grooves where provided, and counter-flash, or as *specified*.

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

8.2.5 Testing

Where waterproofing is applied to a horizontal surface, and before applying the protection layer, one of the following tests must be performed:

- A floodtest of 48 hours
- A spark, vacuum or air pressure test, using approved testing apparatus

Where waterproofing is applied to a vertical surface, a spark or vacuum test must be performed, whichever is easier.

Provide the *Representative/Agent* with a certificate that the waterproofing treatment was handed over in a watertight and workmanlike condition.

8.2.6 Protection

Protect the waterproofing surface with one of the following as specified

- Paint the surface of bituminous-based systems with a heavy brush of bituminous based aluminium paint to comply with SANS 802
- Paint other systems with an approved ultra-violet block. In the case of acrylic or styrene/acrylic this UV block must be an enriched titanium tiocide dispersion applied in two coats in cross directions
- Lay a specified geocomposite drainage layer having a minimum mass of 210 g/m² on the waterproofing, followed by an 80 mm thick layer of light coloured non-absorbent natural stone of 15 mm nominal size. Keep the stone back from outlets, gutters and water shedding edges and bond the stone in these areas with a thinly applied cold dressing compound
- Lay a specified geocomposite drainage layer having a minimum mass of 210 g/m² or a high density polyethylene and polypropylene scrim compatible with the dynamic load of the final finish on the waterproofing, followed by tiles of specified type and thickness, laid in cement-sand mortar or on a screed. Screed and/or tiles and mortar must be cast or placed in panels of 12 m² maximum, separated by movement joints, and separated from bounding walls at the perimeter by isolation joints. The isolation joints must proceed through the screed onto the waterproofing system
- Lay tiles of specified type and thickness on patent plastic adjustable corner supports in order to keep the tile clear of the waterproofing.

May make leaks difficult to trace

8.2.7 Guarantee

Provide an insurance backed guarantee from the manufacturer for the waterproofed area including flashings, skirtings, outlets, expansion joints and other details for a minimum period of 10 years on general surfaces, and 5 years on retaining walls and plant boxes

If any finish installed over the waterproofing is to be removed due to leaks it shall be replaced by the guarantor at no charge. Provide full maintenance particulars.

8.3 **Joint Filler/Sealants**

8.3.1 Material

- Polysulphide sealants must be two-part gun-grade polysulphide to comply with SANS 110

Asking for the guarantee to be provided by the manufacturer ensures that the quality of workmanship is monitored by the manufacturer.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

Two-part sealants are generally more effective and costly

- Silicone rubber sealant for building joints must be one part low modulus silicone rubber sealant to comply with SANS 1305, type 1. Silicone rubber sealant for glazing and sanitary ware must be one part high modulus fungus proof silicone rubber sealant to comply with SANS 1305, type 2.
- Polyurethane sealants must be two-part gun grade to comply with SANS 1077, type 2.
- Pre-formed elastomeric compression joint seals must comply with SANS 50681-1.

8.3.2 Preparation

This work must be done by specialists.

When requested by the *Representative/Agent*, organise a pre-installation meeting with the sealant manufacturer, the *Representative/Agent*, and the sealant installer well in advance of installation to review products and procedures. Samples asked for must be in place and cured before this meeting.

Ensure joints are clean and dry. Apply correct primer to sides of joints.

Fill the joint with closed-cell expanded polyethylene cord or strip back-up and bond-breaking material as recommended by the sealant manufacturer, or as specified.

Mask edges of joints if necessary.

8.3.3 Sealing

Fill the foremost part of movement joints to a thickness of not less than half the width of the joint, with sealant of approved colour, according to the manufacturer's instructions.

Seal joints around door and window frames, movement joints, joints between walls and columns, floor joints, and other joints where sealing is indicated, and as specified.

8.3.4 Finish Joints Neatly and Smoothly.

Fill joints in wet areas, e.g. between ceramic wall tiles and kitchen cupboards, baths, wash-basins and shower floors, with fungus-proof sealant.

Relevant codes of practice:

SANS 10021 Waterproofing of buildings

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

9. ROOF COVERINGS

9.1 Roof Tiles

9.1.1 Concrete and Clay Roof Tiles

Concrete roof tiles:
throughcolour, granular or
sanded finish, various
patterns

See SANS 10062

Concrete roof tiles must comply with SANS 542 and accessories of type, pattern, colour and surface coating category as specified. Clay roof tiles must comply with SANS 632 of type and colour as specified.

Ensure that gutter brackets and gutters are installed before laying roof tiles.

Disperse roofing material stacks on the roof structure to avoid point loads.

Fix tiles according to the manufacturer's instructions applicable to locality and pitch.

Nail all tiles at eaves projection and gable ends with galvanised clout nails penetrating the battens at least 25 mm. Nail the main body of the roof according to the manufacturer's instructions.

The first row of tiles at the eaves and the last row of tiles at the ridge must be full tiles.

Bed concrete ridge and hip tiles on a polyolefin damp course in tinted 1:3 cement/sand mortar. Soak ridge tiles in water before bedding to improve bonding with mortar.

Fix verge tiles with 70 mm serrated galvanised nails. Fix all other fittings and accessories according to the manufacturer's instructions.

9.1.2 Slate Roof Tiles

Roofing slates must be from an approved quarry, guillotined to the size and colour as specified, drilled with two holes for fixing.

Ensure that gutter brackets and gutters are installed before laying roof tiles.

Disperse roofing material stacks on the roof structure to avoid point loads.

Lay slates to roofs with a minimum pitch of 30 degrees, and to vertical siding, with double overlap to a mass of approximately 70 kg/m² and a truss or beam spacing of 600 mm maximum.

Lay slates to roofs with a minimum pitch of 15 degrees with single overlap to a mass of approximately 35 kg/m² and a truss or beam spacing of 700 mm maximum. Lay under every row of tiles, stretching over three battens, a 3- or 5-ply bituminous felt underlay faced with 0,1 mm aluminium foil over half its width, so that the bottom of the underlay rests between two slates.

Lay a double course at eaves, with a 50 mm overhang measured from the inside edge of the gutter.

Lay slates of equal thickness in one row.

Lay slates in broken bond with straight vertical joints.

Double nail slates to battens with 40 mm galvanised clout nails..

Provide half slates at abutments and verges. Cut and dress slates at ridges, hips and valleys.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

Lay approved soakers under ridge and hip slates.

9.1.3 Fibre-Cement Roofing Tiles

Fibre-cement slates manufactured with organic fibres, of specified size, colour and with the necessary fixing holes.

Store slates under cover and off the ground. Take care during handling to avoid chipping and breaking.

Ensure that gutter brackets and gutters are installed before laying roof tiles.

Lay fibre-cement slates to roofs with a minimum pitch of 17,5 degrees.

Lay a double course at eaves, with a 50 mm overhang measured from the inside edge of the gutter.

Lay slates in broken bond with straight vertical joints.

Fix slates to roof battens with 40 mm galvanised clout nails (50 mm for end slates).

Fit copper disc rivets between large slates according to the manufacturer's instructions.

Lay ridge slates on a double soaker of glass fibre reinforced bitumen.

9.1.4 Metal Tiles

Galvanized steel or aluminium alloy sheet roofing tiles shall comply with the requirements of SANS 1022 and shall be fixed in strict accordance with the manufacturer's instructions.

Timber requirements are to be calculated using graded SABS soft woods with battens spaced in accordance with manufacturer's instructions.

Tiles to be side lapped with laps facing away from valleys or rainwater pipes discharging over roofs. Tiles to be laid starting from the bottom of the roof (except on steep pitches where tiling is recommended to start at the apex) with laps facing away from normal line of sight. It is recommended that tiles are laid in a staggered pattern in order to break up the line of joints visible on the roof and to improve the aesthetic appearance of the roof.

9.2 **Metal Profiled Roofing & Cladding Sheets**

9.2.1 Material and Finish

Most profiled metal sheets are available in 0,5 mm full hard steel, 0,6 mm, 0,8 or 1,0 mm mild steel with Z 275, Z 425 or Z 650

galvanising, pre-painted one or both sides, or in stainless steel, copper or aluminium. Consult manufacturers

Galvanised steel: 0,6 mm thick mild steel sheet coated on both sides with class Z275 galvanising (commercial quality) to SANS 3575 and 4998, or as specified.

Pre-painted galvanised steel: 0,6 mm thick mild steel sheet coated with class Z275 galvanising, primed with an epoxy-based primer, and painted with silicon polyester paint for normal exterior use, or with PVC for corrosive conditions, to 0,02 mm thickness, on one or both sides, as specified, all applied under factory conditions.

9.2.2 Profile and Length

Steel roof and/or cladding sheets must have one of the following profiles:

- Corrugated, to be fixed from above: eight and a half or ten and a half corrugations per sheet width, not less than 17,5 mm deep at 76 mm centres. Sheets must be in long lengths
- Box ribbed, to be fixed from above: five ribs per sheet width, rib depth and centres as specified. Sheets must be in single lengths for each roof slope

Beware of corrugations that are too shallow

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

- Interlocking box ribbed, to be fixed with clips from below: three ribs per sheet, with rib depth and centres as *specified*, and with male and female interlocking edge ribs. Sheets must be in single lengths for each roof slope
- Interlocking seam ribbed, to be fixed with clips from below: three seam ribs per sheet, with rib depth and centres as *specified*, with beadings in between the ribs to provide the necessary stiffness, and with male and female interlocking edge seams. Sheets must be in single lengths for each roof slope.

9.2.3 Storing Roof Sheets

Store sheets off the ground and under cover to protect them from dust and moisture. Report wet-storage stain or white rust on galvanised sheet and do not fix until inspected.

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

9.2.4 End Laps and Purlin Spacing

End laps and purlin spacing must be as follows for different roof slopes:

Specified purlin spacing is conservative in comparison to spacing recommended by manufacturers. Do not exceed.

Consult with the Director when other materials or thickness are used

Profile	Roof slope, degrees	Minimum end lap, mm	Max. purlin spacing, m
Corrugated steel 0,6 mm thick	larger than 30	150	1,2
	25-30	175	1
	20-25	200	1
	15-20	225	1
	11-15	300	0,8
	Side cladding	150	1,2
box rib steel 0,6 mm thick	larger than 15	not allowed	1,2
	5-15	not allowed	1,1
	smaller than 5	not allowed	1
	Side cladding	not allowed	1,5
Interlocking rib steel 0,6 mm thick	larger than 15	not allowed	1,5
	5-15	not allowed	1,4
	smaller than 5	not allowed	1,2
	Side cladding	not allowed	1,5

9.2.5 Fixing

Ensure that gutter brackets and gutters are installed before laying roof sheets.

Fix roofing and cladding sheets strictly according to the manufacturer's instructions, and by a firm of specialists licensed by the manufacturer if so specified. Obtain a copy of the manufacturer's instructions and keep on site.

Do not order any sheet material or do any related work until every aspect thereof has been discussed with the Representative/Agent.

Arrange such a discussion in advance so as not to delay the work.

Lay side laps away from prevailing storm winds.

Fix sheets to be fixed from above as follows

- Drill all holes through sheets - do not punch
- Fix to timber purlins with 65 mm galvanised steel roof screws with galvanised steel and neoprene flanged washers
- Fix to steel purlins with 6 mm diameter galvanised hook bolts and nuts, and with similar washers
- In the case of corrugated sheets, fix on the crests of all outermost and middle corrugations, at overhangs and at end laps on every second crest
- In the case of box ribbed sheets, fix on the crest of every second and fourth rib, with side laps stitched at 900 mm centres with 6 mm diameter self-tapping screws with neoprene washers and galvanised steel caps, with approved sealing strip along full length of side laps
- In the case of side cladding, fix with the rib against the girt.

Fix sheets to be fixed from below as follows:

Establish direction of prevailing storm winds.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

- Fix with concealed clips supplied by the roof sheet manufacturer, nailed or screwed to the top of purlins
- In the case of seam ribbed sheets and if required by the manufacturer, button punch through the interlocking seam ribs at 150 mm either side of the fixing clip and at mid-span between purlins.

In the case of slopes less than 15°, bend down trough ends of ribbed roof sheets at the eaves, and bend up trough ends at the top ends of the slope.

9.2.6 Steel Ridging and Valleys

Steel ridging and valley sheets must be the same material as the roofing sheets and have a girth of approximately 450 mm.

Ridgings must be with or without roll top, and with downturned edges to suit ribbed or seamed profiles.

Valleys must be ridgings turned around, without roll top for steep slopes, or with roll top for low slopes. Valley edges must be turned up.

Lap ends of steel ridging or valleys 200 mm, cut and fit neatly at intersections of ridges, hips and valleys. Beat ridgings into corrugations of corrugated steel roof sheets. Close the roll top of ridging at the feet of hips.

Fix ridging or valleys to purlins in the same way as the roof sheets, or according to the manufacturer's instructions.

Provide serrated closers where necessary.

9.3 **Fibre-Cement Profiled Roof and Cladding Sheet**

9.3.1 Fibre-Cement Sheet

Fibre-cement: 6 or 7 mm thick, depending on profile, and to SANS 685, and to profile as specified.

Fibre-cement ridging must be in two halves so as to be adjustable to the roof slope, with collared end joints, and with plain or corrugated wings.

Fibre-cement flashings must be to same profile as roof sheets, with plain upstands and 300 mm minimum extension over the roof sheeting.

9.3.2 End Laps and Purlin Spacing

End laps and purlin spacing must be as follows for different roof slopes:

Slope of roof, degrees	Minimum end lap in mm	Maximum purlin spacing in mm
larger than 26	200	1,4
21-25	250	1,4
15-20	300	1,35

9.3.3 Fixing

Fix roofing and cladding sheets strictly according to the manufacturer's instructions. Obtain a copy of the manufacturer's instructions and keep on site.

Ensure that gutter brackets and gutters are installed before laying roof sheets.

Fix fibre-cement roof or cladding sheets with 7 mm diameter galvanised drive screws to wood purlins, or with 8 mm diameter galvanised hook bolts to steel purlins, all with malthoid or plastic washers with galvanised steel cups.

Drill all holes. Do not punch.

Lay side laps away from prevailing storm winds.

Establish direction of prevailing storm winds.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

Fill the corrugations under plain wings of fibre-cement ridgings with 1:5 cement/sand mortar.

Fix flashings, bird proofing etc. according to the manufacturer's instructions.

9.4 Glass-Reinforced Polyester & Polycarbonate Roof & Cladding Sheets

9.4.1 Sheets

Glass-reinforced polyester laminated sheets to conform to SANS 1150 type 2 (with weathering protection one side), class WF (with fire retardant properties), mass not less than 1,4 kg/m², opacity and colour as specified.

Polycarbonate sheets must be sheeting grade with a co-extruded layer of UV stabilised polymer and a mass of 1,6 kg/m².

The profile must match that of the roofing/cladding sheet, or as specified.

Store sheets on pallets under cover.

Establish direction of prevailing storm winds.

Make holes for polycarbonate sheeting oversize to accommodate for thermal movement

9.4.2 Fixing

Lay side laps away from prevailing storm winds.

Fasteners for glass reinforced polyester must have malthoid or other approved soft washers.

Sheets laid in single width between steel sheets of similar profile may be supported on the same purlins as the steel sheet. When two or more polyester sheets are laid side-by-side, roof sheets must be supported at not more than 0,8 m, and cladding at not more than 1,5 m.

Relevant codes of practice

SANS 1200 HB - Cladding and Sheeting

SANS 10237 Roof and Side Cladding

9.5 Thatch

Thatched roof construction to be in accordance with SANS 10407. Timber supports are to be in accordance with SANS 1783-4. Grass, straw or other specified roof covering reeds to be specially laid and secured to battens as base layer, the whole tied together with tossed hemp twine at 305mm centres.

Thatch roof is to be finished at roof eaves 40mm beyond rafter ends using a board straight edge and sharp knife for cutting eaves to line. Apex of roof to be finished with 0.56mm galvanized sheet iron ridge covering 915mm girth holed for and wired secured battens including all necessary riveting and soldering.

Thatch is to be raked or combed down to remove loose reeds or grass so as to leave the roof clean, straight and even.

All thatched roof is to be treated with approved fireproofing material. Lightning protection to be in accordance with SANS 10313.

Only experienced thatchers are to be employed.

Bolted roof truss systems with lapped members must be designed according to NBR deemed-to-satisfy rules and to SANS 10243

9.6 Flat Sheet Metal

Where used, flat sheet metal is to comply with SANS 1845 and fixed with sheet metal screws to SANS 1700-2-13

10. CARPENTRY & JOINERY

10.1 Structural Timber

Stress-graded sawn softwood structural timber to comply with SANS 1783. Timber must be ordered in the size in which it must be used. The grade must be marked on each piece of timber. Finger-jointing for joining end-to-end lengths is allowed. Moisture content of structural timber may not exceed 170 g/kg. Store timber neatly stacked under cover and off the ground. Plane exposed woodwork and sandpaper to a smooth finish. Round all exposed angles of planed timber to a radius of 3 - 6 mm. The minimum size of tie beams must be 38 x 100 mm.

10.2 Timber Roof Systems

10.2.1 Erection of Roof Structure

Erect and fix the roof structure according to SANS 10243:

- Ensure wallplates are level and roof anchors in position
- Mark truss positions on the wall plate
- Handle trusses with care to avoid excessive lateral bending. Use tag lines, rigging, spreader bars or strongbacks where necessary
- Hold first trusses upright with temporary bracing. Do not use gable walls to support trusses
- Ensure trusses in position are vertical and at right angles to walls, with straight rafters and tie beams
- Fix the necessary permanent bracing
- In the case of trusses spaced at 1500 mm centres and either no ceiling or a suspended ceiling, fix continuous 38 x 76 bearers across the tie beams at centres as specified
- Dress anchors over truss rafters and fix to rafter with nails
- Ensure all bracing is in position before carrying up any roofing material
- Inspect the soundness of trusses after erection and report any visible damage to the Representative/Agent
- Report any deviations from the original design and obtain approval. Do not make changes without the approval of the Representative/Agent.

10.2.2 Certificate of Approval of Roof Structure

In the case of prefabricated trusses, supply a certificate after erection, signed by the Engineer who designed the structure, stating that the whole roof structure has been fabricated and erected to SANS 10243.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

10.2.3 Timber Gang Planks

Nail two 150 x 38 mm softwood grade 5 gang planks onto tie beams when *specified*. Nail two 150 x 38 mm gang planks onto tie beams of two adjoining trusses on both sides of geysers.

10.3 **Timber Board Floors**

10.3.1 Timber

75 x 38 mm grade S5 sawn softwood floor plates.

75 x 150 mm grade S7 sawn softwood bearers.

38 x 100 mm grade S7 sawn softwood floor beams.

22 mm clear grade softwood flooring boards to comply with SANS 629 and to specie, density group, dimensions, type of tongue and groove and end-matching as *specified*.

20 mm clear grade hardwood flooring boards to comply with SANS 10043 and to specie, colour class, size, type of tongue and groove and end-matching as *specified*.

Ensure floor boards are delivered in bundles on site at least two weeks before floor is installed. Open bundles after delivery and stack strips loosely on end under cover.

10.3.2 Substructure for Suspended Floors

Bed floor plates, painted with creosote to comply with SANS 1290, in long lengths in cement mortar on foundation walls to accept floor beam ends, and strap down where necessary.

Space bearers at not more than 1,5 m centres. Build bearers 100 mm into walls. Cover ends of bearers with damp proof material. Lay bearers on sleeper walls or piers, with butt joints on walls or piers.

Space floor beams at not less than 400 mm centres and spike to floor plates and bearers. Lap floor beams at least 300 mm over bearers and nail together. Stagger end joints.

Ensure that the top edges of bearers and beams lie in a plane surface and are securely fixed.

10.3.3 Substructure for Floor on Concrete Sub-Base

Secure softwood battens of grade and finish as *specified* to concrete surface bed with metal clips, 4 mm diameter galvanised wire ties or with masonry nails at 600 mm maximum centres set in or fixed to the floor.

Hole, notch or stagger battens to provide cross ventilation.

10.3.4 Laying of Floor Boards

Lay floor boards after all building operations have, as far as possible, been completed. Ensure service pipes or conduits are in place.

Lay floors as follows:

- Allow 20 mm expansion space between flooring edge and wall or column faces.
- Lay boards with staggered end joints, cramp together and secret nail twice to every beam with flooring nails to SANS 820.
- Nail skirtings to walls, not to floor boards.

See SANS 10043:

10.3.5 Finishing

Sand floor boards with a mechanical floor sander in two (rough and fine) operations to a smooth and even surface.

Finish floor with one coat clear wax polish, or with a sealing coat and two coats approved varnish, as *specified*.

10.4 **Cornices, Skirtings & Rails**

10.4.1 Cornices, Skirtings, Quarter Rounds, Rails

Cornices, skirtings, quarter rounds and dado, chair or picture rails must be of hardwood to comply with SANS 1099, of grade and

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

specie as specified, or softwood to SANS 1783, of grade as specified, or of PVC mouldings of approved colour, all to specified or approved profile.

Fix members to walls in long lengths with splayed heading joints and mitred corner joints, with masonry nails, or screwed and plugged as specified. Fix members at centres not exceeding 600 mm. Glue PVC members over and above screwing and plugging with contact adhesive.

Drill and pop-rivet members to drywall partitioning. Touch up joints with wood filler.

Nail quarter rounds to skirtings with panel pins.

10.5 **Timber Doors**

10.5.1 Doors

Timber doors must comply with SANS 545 and be of type, handing, materials of construction, face and edge finish, size and position of coat rails and closer blocks, dimensions, performance class, interior/exterior grade, rebated pairs, weather bar and ironmongery as specified. Veneer on pairs of doors must match in grain and colour.

Batten doors for external use must be mortice and wedge tenoned, with the tenon showing on the outside edge of styles. Provide a sample batten door for approval.

Fire-doors and fire-shutters must comply with SANS 1253 and be of class, type, types of fastenings, type of closing device, direction of opening and size as specified.

10.5.2 Storage

Seal doors, or knot and prime, on all four edges immediately after delivery on site (if not prefinished).

Store doors flat (not on edge) on a level surface in a dry and well ventilated building.

10.5.3 Hanging

Delay hanging of doors until all wet trades are done.

Check distortion or out-of-plumbness of frames, and report to the Representative/Agent, before hanging door.

Hang doors to leave a clear space of 2 mm (+0 mm -1 mm) above and along the sides, and 6 mm (+0 mm -3 mm) under the door.

Take off equal amounts from each side, top and bottom of flush doors when fitting. To reduce the height of panel or framed doors, take off from the bottom only.

Fit two hinges to every door leaf. Fit three hinges to doors weighing more than 20 kg, and doors which are exposed to large differences in humidity or temperature. Hang external doors on brass hinges of which the pins are not removable.

Paint or seal the top and bottom edges of doors after trimming to size and before hanging.

10.6 **Timber for Joinery**

10.6.1 Timber

Hardwood for joinery must be clear grade furniture timber to comply with SANS 1099.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

Show finished sizes of timber members on drawings to avoid arguments about tolerance and allowance for planing. Allow 3mm off the nominal size for planed timber up to 75 mm, allow 5 mm off for planed timber over 75 mm.

Take note of nominal board sizes to ensure optimum yield.

Composite board includes batten board, blockboard, laminated board, high-pressure decorative board, veneered particle board and veneered fibre board.

Softwood for joinery must be clear grade sawn softwood industrial timber to comply with SANS 1783.
Dimensions as specified are the exact finished sizes.

10.6.2 Plywood and Composite Board

Plyboard and composite board must comply with SANS 929. The exposure class, type, material, specie, number of plies or laminate and grade must be as specified.

10.6.3 Laminated Timber

Laminated timber for joinery must be non-structural to comply with SANS 1460. The exposure class, type, appearance and finish, material, specie and adhesive type must be as specified.

10.6.4 Fibre Board

Wood fibre insulation board, low density fibreboard, medium density fibreboard and hardboard must comply with SANS 540 and be of thickness as specified.

10.6.5 Particle Board

Particle board for exterior and flooring use must comply with SANS 1300 and be of thickness and exposure class as specified.
Particle board for interior use must comply with SANS 1301 and be of thickness and exposure class as specified.

10.7 **Joinery**

10.7.1 Preparation

Shop drawings must be provided for all joinery work. Discuss all aspects with the Representative/Agent before any work is put in hand.

Provide a sample of a typical finished surface showing its final appearance and smoothness, including edge strips, stopping and dowelling. This sample must be kept on site for reference.

Provide the Representative/Agent with the opportunity to inspect the joinery before any priming or decoration is done.

Do not start any joinery before sizes have been checked on site.

10.7.2 Joinery

Produce joinery in humidity conditions which resemble those of the building site, in workshops equipped with modern machinery manned by skilled joiners.

Use joints that are not wholly dependent on adhesive and that conceal the end grain of natural wood or the edge of laminated or particle board.

Round all angles and edges slightly. Pencil round all vulnerable or exposed angles and edges.

Punch all exposed nail heads and fill with stopping that will match the wood after clear finish has been applied.

Countersink all exposed screw heads to 6 mm below the surface and glue in matching dowels. Countersink all other screws to 2 mm below surface and fill.

The grain of all fitted visible clear-finished timber, or the pattern of laminates when relevant, must run vertically on vertical surfaces

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

and parallel to walls on horizontal surfaces, wherever practicable.
Veneer on any one fitting must match in grain and colour.
Knot and prime one coat of primer, or brush apply one coat clear finish before delivery to site, as specified.

10.7.3 Timber Door Frames, Sidelights, Fanlights

Frames, sub-frames and glazing beads for door frames must be of size and timber specie as specified.

Join frames with mortise and tenon joints.

Frames for doors, side- and/or fanlights must be rebated out of solid wood. Do not lay on door stops.

Top rails of frames must be provided with bevelled haunches for building in.

Glazing beads must be tacked lightly in place.

Three 500 x 40 x 2 mm galvanised hoop iron lugs for building in must be screwed to the outside of every stile.

Bottom ends of stiles must be provided with one 10 mm diameter steel dowel for building into thresholds.

Bottom rails of sidelights must be provided with a drip.

Paint backs of sub-frames one coat wood primer before building in.

10.7.4 Hardwood Tops

Solid hardwood tops must be glued together in wide boards with tongued and grooved joints stopping 25 mm from visible ends.

Boards must be in single lengths or, if this is not possible, with staggered end joints.

Tops must be screwed to framework with rebated hardwood clamps or metal cleats at 300 mm centres, screwed from underneath.

10.7.5 Hardboard Backs

Fittings must be provided with hardwood backs when, and of thickness as, specified. Bevel hardboard backs all round.

10.7.6 Drawers

Make drawers with 19 mm hardwood front, 12 mm softwood sides and back and 6 mm tempered hardboard bottom, all rebated, grooved, dovetailed and glued together. Fit each side with two 19 x 19 mm hardwood runners, screwed on with brass countersunk screws, to take hardwood guide similarly screwed to fitting side. Wax runners and guides with candle wax. Commercial runners are acceptable.

10.7.7 Shelf Bands

Screw and plug metal shelf bands to walls. Bolt the top hole of each band with a 6 mm diameter expansion bolt or frame fixing anchor. Start first band 100 mm away from corners of rooms or from other shelves which are at right angles.

10.7.8 Fixing to Walls

Fix joinery to masonry or concrete with appropriate plugs and screws, expanding bolts or frame fixing anchors. Do not use shot nails.

Provide the necessary blocking pieces and sub-frames to take up inaccuracies of wall and floor faces.

10.8 **Decorative Laminates**

10.8.1 Quality

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

Decorative laminates must comply with SANS 929 and SANS 1763.

Board thickness for worktops should be 32 mm

Post-forming is the process of bonding the laminate to a substrate with a certain radius. Available profiles: 90°, 120°, 180° or custom-designed

10.8.2 High-Wear Areas

High-wear worktops, doors, drawers and vertical surfaces must have:

- a substrate of high density particleboard or medium density fibreboard for dry areas, or a water resistant grade particleboard grade 1 for wet areas, and to thickness as specified.
- 1,2mm high-pressure general purpose quality, and/or 0,8 mm high-pressure post-forming quality decorative laminate to colour and finish as specified. The reverse face of the substrate must be 0,8mm backer quality laminate
- approved synthetic resin type adhesive for dry areas, or an approved water resistant type adhesive for wet areas
- post-formed edges, splashbacks and downstands to profile as specified, post-formed under factory conditions with no joints, and fabricated from the same substrate material.

10.8.3 Low Wear Areas

Low wear horizontal surfaces, door and drawer fronts, and vertical surfaces and shelving must have:

- a substrate of high density particleboard class 3 or medium density fibreboard, and to thickness as specified.
- 0,55mm high-pressure light duty quality decorative laminate to colour and finish as specified.
- self-edged exposed edges with 0,35mm matching laminate.

10.9 Kitchen Cupboards

10.9.1 Built-In and Freestanding

Built-in and freestanding steel and/or wood kitchen cupboards must comply with SANS 1385, of type, material and finish as specified.

The supplier is responsible for checking the sizes on site and for providing detail layout drawings for approval before any work is started.

11. CEILINGS, PARTITIONS & ACCESS FLOORING

11.1 Timber Ceiling Brandering

11.1.1 Timber

Ceiling brandering must be sawn softwood brandering to comply with SANS 1783, or saligna.

11.1.2 Size and Spacing

Sizes of brandering for 6,4 mm gypsum board must be:

- 38 x 38 mm softwood or 32 x 32 saligna for roof truss spacing up to 1000 mm
- 38 x 50 mm softwood for truss spacing up to 1200 mm
- 50 x 50 mm softwood for truss spacing up to 1400 mm.
- Sizes of brandering for 4 or 6 mm fibre-cement board must be:
- 38 x 38 mm softwood or 32 x 32 saligna for roof truss spacing up to 1050 mm
- 38 x 50 mm softwood up to 1500 mm.

If trusses are spaced at 1400 to 1800 mm, support battens by means of 38 x 114 mm sawn softwood joists between trusses secured with 38 x 38 mm hangers from 38 x 76 mm runners at 1500 mm centres across the tie-beams of the trusses.

11.1.3 Fixing

Relevant codes of practice:

SANS 10082 Timber buildings

SANS 10163 The design of timber structures

SANS 10243 The design, manufacture and erection of timber trusses

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

Branding for 4mm board:
450mm centres, for 6mm:
600mm centres

Nail branding with staggered end joints at right angles with roof trusses and at centres recommended by the manufacturer of the ceiling boards, and at 38 mm centres away from walls for the fixing of cornices, with 75 - 100 mm wire nails.

Skew nail branding additional to the normal nail at every intersection with roof timber.

Fix branding, joists or runners with the larger dimension in the vertical position.

Install supporting branding where light fittings are to be suspended.

Level out branding, starting from the lowest point, using timber wedges where necessary.

11.2 Fibre-Cement & Gypsum Ceilings

11.2.1 Boards

Flat, plain fibre-cement ceiling boards must comply with SANS 803, made from organic fibres, 4 or 6 mm thick as specified.

Flat gypsum ceiling boards must comply with SANS 266, and be 6,4 mm thick, or as specified.

Store boards on an even surface under cover and keep dry.

11.2.2 Fixing

Install ceiling boards strictly according to the manufacturer's instructions. Upon request of the Representative/Agent, furnish written proof that the manufacturer has been consulted.

Use longest lengths possible to suit room. Arrange boards symmetrically about room, at right angles to timber branding, with cut boards along walls, and to approved pattern or as specified.

Lay fibre-cement boards ripple face down to hide nail heads.

Nail boards to timber branding with 38 mm galvanised clout nails or 32 x 2,5 mm diameter galvanised serrated ceiling nails at 150 mm centres.

Insert prepainted H-profile metal cover strips between boards.

In the case of plastered gypsum ceiling boards:

- ensure building is enclosed before ceiling boards are fixed
 - fix wire scrim or self-adhesive brown paper tape over all joints
 - plaster the entire ceiling with 3 - 6 mm lightweight hemi-hydrate gypsum plaster the same day as the board has been erected.
- Finish plaster to a smooth polished surface.

11.3 Cornices

11.3.1 Material and Fixing

Cornices must be 75 mm wide coved gypsum cornice to comply with SANS 622, or 6 mm thick coved fibre cement cornice with inside and outside corner pieces, or to profile as specified. Hardwood or softwood cornices must be to profile as specified.

Nail cornices to branding with 38 mm galvanised clout nails at 300 mm maximum centres.

Nail cornices to walls with 38 mm hardened steel nails, or glue gypsum or fibre-cement cornices to walls with approved contact adhesive or 3-4 mm gypsum plaster.

Mitre corner joints, splay all heading joints. Join fibre-cement cornices with shaped metal H-profile jointing strips.

11.4 Patent Suspended Ceilings

11.4.1 Boards

Fibre cement, gypsum, mineral fibre or cement-bonded woodwool ceiling panels of size, colour and finish as specified.

Store boards on an even surface under cover and keep dry.

11.4.2 Suspension Fittings

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

Gypsum board also in 9,5
and 12,7 mm. Gypsum
boards are not
recommended in exposed
conditions

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

Suspension fittings must be patent approved roll-formed galvanised steel Tees, hold down clips, suspension rods and hooks, suspension clips, T suspension plates, lipped wall angles, shadow line wall angles and wall channel trim, with finish and colour, all as specified.

11.4.3 Fixing

Use only approved specialist installers, if so specified.

Fix suspended ceiling system strictly according to the manufacturer's instructions.

Do not start this work before the building is enclosed, plasterwork has dried out, and the services are in position and tested.

Arrange boards symmetrically about rooms, with cut boards along walls, with straight joints in both directions or to pattern as specified.

Suspend main tees from structure at centres according to the manufacturer's instructions with galvanised mild steel strapping or 2 mm diameter galvanised wire or by patent suspension rods or hooks combined with spring clips and suspension plates. Clip cross tees into main tees at the end of each board.

Level out the suspended ceiling.

Hold down ceiling boards or tiles with patent hold-down tags or wedges.

Provide extra hangers for light fittings, sound systems, air conditioning vents etc. as may be necessary.

Provide approved access to ceiling space where concealed Tee system is used.

11.5 Ceiling Insulation

11.5.1 Mineral Fibre Insulation

Mineral fibre blanket or batts insulation to comply with SANS 1381 part 1, or loose fill thermal insulation to comply with SANS 1381 part 2, as specified.

Lay insulation over ceiling to thickness or depth as specified.

Fit blankets or batts snugly between roof trusses. Nail batts where necessary.

11.5.2 Aluminium Foil Insulation

Reflective foil laminates to comply with SANS 1381 part 4, class A (reinforced, with one side or both sides reflective as specified).

Lay foil on galvanised or PVC-coated span wires at recommended centres, and with 140 mm laps so that span wires support each lap.

Draw foil tight and fix to bottom and top purlin by gluing, double-sided tape, or hoop iron straps pop-riveted to the purlin, all according to manufacturer's instructions.

11.6 Wooden ceiling and Panelling Boards

11.6.1 Boards

Tongued and grooved timber boards of specie, grade, profile and size as specified, with matching ends, to comply with SANS 1039.

Secret nail boards with lost head oval wire nails. Stagger all end joints.

Finish edges of ceiling with cornice of size and profile as specified.

11.7 Ceiling Hatches

11.7.1 Timber Hatch

Trim 650 x 650 mm minimum clear opening in ceiling with 38 x 100 sawn softwood trimmers spiked to beams or trusses.

Form hatch frame of brandering as for ceiling.

Form trap door of brandering and ceiling board as for ceiling.

SABISA (South African Building Interior Systems Association) is able to give advice

For industrial buildings or rooms without ceilings. This foil may also be used as an underlay under roof tiles with added insulation value

See SANS 1039 for various profiles

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

Hang trap door with one pair 75 mm steel butts screwed to frame, so that trap door can open 180 degrees on to top of ceiling brantering.

Provide 50 x 19 mm hardwood fillets nailed or screwed to ceiling around hatch opening, to carry trap door in closed position. Mitre corners of fillets.

Relevant codes of practice:

SANS 10218 Acoustical properties of buildings

11.7.2 Steel Hatch

Approved 0,6 mm pressed steel ceiling trap door, hinged to open 180 degrees onto ceiling, in 25 x 25 x 3 mm T-profile steel frame. Clear opening must be at least 650 x 650 mm.

Drill frame twelve times and screw onto ceiling brantering.

11.8 **Drywall Partitions**

11.8.1 Plasterboard

Plasterboard must be standard grade plasterboard to comply with SANS 266. If *specified*, board must be covered with paper backed vinyl of *specified* weight in grams per m².

11.8.2 Studs and Tracks

Studs and tracks must be 51 or 63,5 x 0,5 mm thick galvanised steel.

11.8.3 Aluminium Extrusions

Extruded aluminium sections must be alloy 6063 or 6261 in temper T5 or T6. If *specified*, anodising must be in strict accordance with SANS 1247, and powder coating must be by applicators approved by the *specified* powder manufacturers, and in accordance with SANS 1247.

11.8.4 Glass

Glass must be as *specified*. Provide a warranty from the manufacturer against delamination and colour degradation for a period of at least five (5) years.

11.8.5 Installation

Install drywall partitions strictly according to the material manufacturer's instructions.

Partitions must conform to the *specified* fire ratings.

Partitions must conform to the appropriate deflection requirements as laid down by the South African Building Interior Systems Association (SABISA).

11.9 **Access Flooring**

Access flooring shall comply with SANS 52825

12. **FLOOR COVERINGS, WALLINGS, E.T.C**

12.1 **Vinyl Tiling, Vinyl Sheeting & Accessories**

12.1.1 Tiles, Sheet and Skirting

Semi-flexible vinyl flooring must comply with SANS 581.

Flexible vinyl flooring must comply with SANS 786.

Floor tiles and sheeting must be of thickness, pattern and colour as *specified*.

Floor tiles must be 300 x 300 mm.

Vinyl skirting must be 70 mm high and of shape and colour as *specified*.

Vinyl nosings, treads and risers must be as *specified*.

12.1.2 Preparation

Do not lay vinyl flooring before all building operations that may damage the floor have been completed.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

Ensure all pipes, conduit, cables etc. in the floor are in position and have been tested.

The base must be dry and clean. In the case of a porous or dusty base, apply a primer to improve the bond between base and adhesive.

Rectify any defects in the base. Apply levelling or smoothing compounds only to irregularities in the base floor, and according to the compound manufacturer's instructions.

12.1.3 Laying

See SANS 10070

Lay flooring and skirting according to the manufacturer's instructions of the flooring, and as follows:

- Set out the pattern as *specified* or as agreed with the Representative/Agent. Continue pattern through door openings connecting rooms with similar flooring
- Spread adhesive evenly with a serrated trowel
- Place tiles accurately on setting out lines
- Roll tiles in all directions within open time of the adhesive.
- Lay sheeting as follows:
 - Warm sheeting before it is unrolled
 - Unroll sheeting and cut to required length and shape
 - Place sheet accurately on evenly spread adhesive
 - Roll sheets in all directions within open time of the adhesive.

Fix skirtings, nosings, treads and risers according to the instructions of the manufacturer.

Flooring must be done by an approved specialist if so *specified*.

12.1.4 Finishing

Clean and polish floors with two coats polymer floor dressing to comply with SANS 1042, of type as *specified*.

12.2 **Timber Parquet Flooring**

12.2.1 Mosaic Panels

Wood mosaic flooring must comply with SANS 978, grade 1, in panels of 480 x 480 mm made up of units of 120 x 120 x 8 mm thick, in basket weave pattern, and of specie and colour category as *specified*.

Unpack the panels, store dry and under cover, and allow free air circulation to bring panels to equilibrium moisture content as agreed with the Representative/Agent.

12.2.2 Preparation

Do not lay flooring before all building operations that may damage the floor have been completed.

Ensure all pipes, conduit, cables etc. in the floor are in position and have been tested.

The base must be dry and clean. In the case of a porous or dusty base, apply a primer to improve the bond between base and adhesive.

Rectify any defects in the base. Apply levelling or smoothing compounds only to irregularities in the base floor, and according to the manufacturer's instructions.

12.2.3 Laying

Lay mosaic flooring panels according to the manufacturer's instructions and as follows:

- Set out the pattern as *specified* or as agreed with the Representative/Agent. Continue pattern through door openings connecting rooms with similar flooring.
- Spread adhesive evenly with a serrated trowel

See SANS 10043 table 1 for traffic, hardness, density and shrinkage classification of flooring timbers in common use

See SANS 10043

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

- Place panels accurately on setting out lines
- Tap firmly in position within open time of the adhesive
- Allow 16 mm expansion space between flooring edge and wall or column faces.

Flooring must be done by an approved specialist if so *specified*.

The Carpet Association of South Africa (CASA) is able to assist

Consult SANS 10186.

Seek expert advice when laying on bases other than concrete.

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

Relevant codes of practice:

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

SANS 10170 The cleaning and maintenance of floors

SANS 10186 The installation of textile floor coverings

SANS 10070 The laying of thermoplastic and similar types of flooring

12.2.4 Finishing

Sand mosaic panels with a mechanical floor sander in one operation (fine only) to a smooth and even surface.
Finish floor with one coat clear wax polish, or as *specified*

12.2.5 Guarantee

Obtain a guarantee from the specialist installer for the mosaic floor for one year after virtual completion of the building.

12.3 Textile Flooring

12.3.1 Carpets and Underlays

Textile flooring (pile construction) must comply with SANS 1375, of colour and design, fire index class and location grade number as *specified*

Textile flooring (needle punched construction) must comply with SANS 1415, of colour and design, fire index class and location grade number as *specified*.

Needle-felt underlay must comply with SANS 1419, of type and location grade as *specified*.

Accessories and fixing materials:

Use accessories and fixing materials as recommended by the carpet manufacturer.

Use non-flammable contact adhesive where fire ratings are critical.
Laying

Install floor coverings by an *approved* specialist if so *specified*:

- Ensure base is clean, level and dry, and all floor-bound services are complete
- Use coverings from the same production run to ensure uniform colour and texture
- Agree direction of seams and pile with the Representative/Agent.
- Start full widths on door side of the room. Finish carpets under doors within the width of the closed door
- Cover exposed edges of carpeting with an approved metal edging strip

To prevent bow-wave effects, e.g. in medical institutions, stick carpet to the floor with approved adhesive

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

13. IRONMONGERY

13.1 Locks, Latches, Handles, Plates, Closers Etc.

Locks, latches, handles, plates, closers etc. must be as *specified*.

If not *specified*, these items are provided for with a prime cost or provisional sum, as stated in the Bill of Quantities, for the supply only of all ironmongery and screws to the site.

Locks, latches and associated furniture for doors (domestic type) must comply with SANS 4.

Single action overhead door closers must comply with SANS 1510-1.

Padlocks must comply with SANS 1533.

Fix all ironmongery with matching screws.

Ease and adjust locks on completion.

Supply two keys with every lock. No key must pass more than one lock. Supply master and grand master keys if *specified*.

Label all keys as *specified*.

13.2 Curtain Rails and Pelmets

Pressed steel curtain rail pelmets must be ribbed with beaded edges, square returns with plastic end caps, galvanised steel fixing brackets at 800 mm maximum centres, and one or two galvanised H-profile rails with 12 nylon runners per metre rail and with end stops, and of size as *specified*.

Pelmets must be phosphate treated and finished with a factory primer before delivery to site.

Curtain rails without pelmets must be single or double, light or heavy duty curtain rail with baked enamel finish and end caps, and with brackets at one metre centres, 13 nylon rollers per metre rail, nylon cord and weighted cord pulleys, as *specified*.

Plug and screw rail brackets to wall. Project pelmet and/or rail 300 mm past all window jambs wherever possible, or continuous over windows occurring in series.

13.3 Sunken Door Mats

Edge the recess of sunken door mats with 3 x 40 mm brass strip and fill with matting of one of the following materials, as *specified*:

- natural coconut fibre with PVC backing
- rubber
- interlocking aluminium channels with polypropylene or rubber inserts
- light or heavy-duty loopmatting

13.4 Plastic Number/Name Plates, Safety Signs

Plastic number or name plates, and safety signs, must be of colour, size and height of letter as *specified*.

Symbolic safety signs on aluminium alloy backing sheets must comply with SANS 1186, to size as *specified*.

Screw plates and signs to walls, doors etc. in an approved manner, or as *specified*.

Relevant codes of practice:

SANS 10140 Identification
colour marking

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

14. STRUCTURAL STEELWORK

14.1 Steel

Hot-rolled weldable structural steel must be grade 350W to comply with SANS 1431.

Cold-formed structural steel may be commercial quality steel only when *specified*, or with permission of the Representative/Agent.

High tensile steel must be grade 50.

Steel tubes must comply with SANS 657 Part 1 and be of type, coating and grade as *specified*.

Steel tubes for furniture must comply with SANS 657 Part 4, and be of material, type, grade, size and finish as *specified*.

Cor-ten steel must be of grade as *specified*.

Present the Representative/Agent with the supplier's test certificates if required.

14.2 Shop Drawings

Arrange to have shop drawings prepared and submit for *approval* before any work is put in hand. Allow the Representative/Agent to inspect the steelwork at the steel fabricator's works.

14.3 Welding

Use only coded welders. Weld according to SANS 10044. All welds must be continuous except where otherwise *specified*. Grind visible welds smooth.

14.4 Pre-Painting, Galvanising

Prepare steel surfaces for priming according to SANS 10064, and paint two coats of zinc phosphate primer to comply with SANS 1319, before leaving the workshop.

If so *specified*, galvanise structural steel components to comply with SANS 121 to *specified* thickness. Make good welded connections on site with zinc-rich paint while steel is still warm.

14.5 Bolts

Bearing bolts for clearance holes must comply with SANS 135, or SANS 136, and be of metal and strength grade as *specified*.

High-strength friction-grip bolts must comply with SANS 10094, of strength grade as *specified*.

Drill or punch holes and ream to close tolerance.

Pretension bolts during installation to at least 70 % of their tensile resistance.

The grade number refers to the minimum yield stress in MPa guaranteed by the manufacturer, the 'W' to 'weldable'. Many cold-formed profiles are made from commercial quality steel of which the yield stress is seldom less than 210 MPa

Use Cor-ten for improved atmospheric corrosion resistance. Cor-ten is weldable. See SANS 1200H or 1200HA, and SANS 10162 Structural use of steel

Welding is mostly used for connections in the workshop

Bolting is convenient for on-site fixing.

Bearing bolts are bolts that transmit the applied load in bearing and shear, and are used in clearance holes.

Bearing bolts are economical and should be used in all situations where slip can be accommodated.

Friction-grip bolts transmit shear force by friction developed between the surfaces of the connected parts. Use only where connections are subject to load reversal - see SANS 10094

MATERIAL SPECIFICATIONS FOR GOLF BUILDING CONTRACT

14.6 Rivets

Rivets must be mild steel rivets to comply with SANS 1700.

Relevant sources:
SA Structural Steelwork
Detailing Manual, and
Structural Steel Tables (Blue
Book) published by SA
Institute of Steel Construction
SA Steel Construction
Handbook (for symbols for
rivets and bolts)
SANS 10162 The structural use
of steel; SANS 10094 The use
of high-strength friction grip
bolts

15. METALWORK

15.1 Rolled Steel Window & Door Frames

15.1.1 Frames

Window and door frames of rolled mild steel profiles must comply with SANS 727, and be of type, size, spacing of glazing bars, type of hinges, glazing side, type and finish of ironmongery, and primed or zinc coated as specified.

Suitable weather bars must be provided to bottom of opening in and vertically pivot hung ventilators and to the bottom of all opening out ventilators where they occur above other ventilators.

Suitable holes for fixing with screws and plugs must be provided to frames, at the same spacing as standard lugs for building in, wherever frames have to be fixed to concrete columns, beams or walls.

Side hung ventilators not accessible from outside for cleaning must be provided with projecting hinges for cleaning from inside, as specified.

Frames must be of one piece construction except where shown to be coupled with standard coupling mullions and/or transoms, as specified.

In the case of doors and side lights, bottom panels must be 1,5 mm mild steel sheet fixed with steel beads.

Outward opening doors must have door frames fitted at bottom with sills of door framing section (stepped sills), but inward opening doors must have door frames with metal ties welded to frames, for embedding in thresholds (flush sills).

Doors must be hung on three hinges per leaf. Hinges must be of the projecting type so that the door opens 180 degrees when frames are set back from wall faces. If so specified, locks to doors must be three-lever locks.

15.1.2 Burglar Bars

Burglar bars must be mild steel burglar proofing of standard pattern as specified.

Rivet or weld bars to window frames and at every intersection. Kink bars at peg stays. Fix burglar bars to inside of windows that open outward, and to outside of

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

windows that open inward. Fix burglar bars to all opening sections, or as *specified*.

15.1.3 Gauze Screens

Gauze screen frames to window opening sections must be of pressed steel filled in with 1,5 x 1,5 mm mesh fibreglass gauze to comply with SANS CKS 210. The steel frames must be baked enamel finished to approved colour.

Screen frames to outward opening sections must have sliding or hinged sections so as to allow access to opening stays and fasteners from the inside.

Screen frames to inward opening sections or louvres must be of a heavier gauge steel and be bolted to window frames.

Screen frames to pivot type windows must be in two sections, one on the outside and one on the inside, with the gap between the two filled with approved rubber flashing fixed in such a way as to be easily renewable.

15.1.4 Building-in of Frames

Build in frames upright, square and free from warp with fixing lugs provided with the frame.

Check frames and opening sections and adjust before glazing.

15.2 **Pressed Steel Frames**

15.2.1 Frames

Pressed steel cliscope type window frames must comply with SANS 1311 and be single or double rebated and primed or zinc coated as *specified*.

Pressed steel door frames must comply with SANS 1129 and be of type, material of lock strike plate, hinges, size, type of profile, fanlight, , type of lock, whether frames are to be for power floated floors, and primed or zinc coated as *specified*.

Frames must be of 1,2 mm thick plate except single rebate door frames for one-brick walls and frames for double swing doors which must be of 1,6 mm thick plate.

Frames for double swing doors must have

- jambs with V-shaped centres to fit rounded edges of doors
- plain heads or transoms, holed and prepared to receive top centres of spring hinges.

Rebates receiving doors must be provided with two rubber buffers on the lock side.

Frames for external doors must have a standard RFX7 residential window section permanently welded on as a threshold.

15.2.2 Pressed Steel Door and Frame Combination

1,2 mm pressed steel door with 40 mm edge, at least two V-shaped vertical ribs over full door height, three horizontal rails and 1,6 mm steel lock box, hung on one pair of 100 mm steel hinges in single rebated pressed

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

metal door frame, all primed or zinc coated as *specified*, to comply with SANS 1129.

15.2.3 Building In of Frames

Build in frames upright, square and free from warp.

Brace jambs with timber while building in.

Bed fixing lugs in 1:3 cement mortar.

Fill in space between door frame and wall solid with mortar.

Remove base ties after mortar has set, if they are to be removed.

15.3 **Tip-Up Doors**

Household type doors only

15.3.1 Doors

Pressed mild steel tip-up door and frame with balanced counterweight or spring action as *specified*, from an approved manufacturer, and consisting of:

- 0,8 mm mild steel door pressed to troughed or fluted pattern, reinforced at back with 1,2 mm mild steel braces and channel surround, all welded together
- Two sintered metal or aluminium rollers in vertical and horizontal guides
- Jamb- or cam-spring, or counterweight mechanism
- Lock with chromium plated handle on outside, with two keys.

Paint doors one coat zinc phosphate primer to comply with SANS 1319 in factory, or galvanise or prepaint as *specified*.

Bolt channels to jambs of door openings.

15.4 **Aluminium Windows & Doors**

15.4.1 Aluminium and Finish

Aluminium extrusions must be alloy 6063 or 6261 in temper T5 or T6 to comply with BS 1474. Aluminium sheet must be alloy 1200 or 3004 or 5251 of appropriate temper to comply with BS 1470.

Anodising must be to SANS 999, of finish, thickness and colour as *specified*.

Powder coating must be to SANS 1578 part 1 and 2, of type, thickness and colour as *specified*.

Provide a certificate that the finish conforms to the *specified* standards by an approved anodizer or powder applicator, who is a member of the Aluminium Federation of South Africa (AFSA).

Provide a written guarantee for 10 years from the anodizer/powder applicator against peeling and discolouration.

15.4.2 Glass

Glass must be of type, thickness and colour as *specified*.

Design wind pressure must be specified by the Representative/Agent and/or Structural Engineer, in terms of SANS 10160.

15.4.3 Design

Design wind pressure or site category must be as *specified*.

Height of product head above ground must be as *specified*.

MATERIAL SPECIFICATIONS FOR GOLF BUILDING CONTRACT

Atmospheric temperature range is between -10°C and 35°C.

Class designation for windows and doors must be as specified.

Class designation for
windows and residential
doors: A1: residential and
light commercial;
A2: commercial; A3:
monumental.

Designs not covered by the
above must conform to the
requirements of SANS 10160
and the National Building
Regulations

15.4.4 Manufacture

Aluminium framed windows and doors must be manufactured according to the minimum requirements of the Association of Architectural Aluminium Manufacturers of South Africa (AAAMSA).

Each window and door must be marked with the mark and number of the test certificate issued by AAAMSA, or a copy of the latest performance test certificate for similar products must be provided.

The supplier is responsible for confirmation of opening sizes.

Frame parts must be joined by mechanical means or by welding. Joints may have flush, stepped or lapped surfaces. Mitred joints may only be flush. All joints must be sealed. Contact between incompatible materials is not allowed.

Accessories must be removable without having to remove the frames from the structure. Sliding members must be fitted so that no metal to metal sliding contact occurs.

Sealants must be compatible with aluminium, and fitted so that the performance of the sliding or swinging parts are not impaired by their deterioration.

Glazing beads, gaskets and glazing compounds must be compatible with the aluminium, its finish and with the glass. No putty is permitted.

Hardware and fittings must be resistant to atmospheric corrosion and be accessible for adjustment, repair and replacement after the window or door has been installed.

Fastenings must be compatible with aluminium and its finishes.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

15.4.5 Installation

The best way is to build in steel or timber sub-frames and to fit the aluminium window at the last possible stage. If built in early, protect window against damage by removable tape or motor oil. Another good method is to build the openings and make and fit the frames to measure - thus also making it possible to fit at the last possible moment. Discuss with the supplier

Build in approved sub-frames if so *specified*.

Fit windows at the last possible stage in the building process to prevent damage and staining of the aluminium frames.

Protect frames against impact or scratching by wrapping with paper or plastic or covering with a light tack tape, and leave these wrappings in place until all rough trades are finished.

Use fixings of aluminium or 304 grade stainless steel.

Avoid direct contact between aluminium and other metals or wet concrete by applying a separating coat of bituminous paint.

Install the window or door secure, sealed and undamaged.

Scratches and blemishes shall be viewed for inspection at a distance of three metres under normal and reasonable lighting conditions.

15.5 **Steel Kitchen Cupboards**

15.5.1 Cupboards

Steel kitchen cupboards must comply with SANS 1385, with type of stainless steel for sinks and/or drainboards, material of worktops, edging of worktops, locks, finish and colour as *specified*.

Supply a sample of a cupboard unit with door, drawer, handles and lock for approval.

15.5.2 Fixing

Securely fix cupboards in position according to the manufacturer's instructions.

Seal all joints between work tops and walls with an approved fungus-resistant sealant.

15.5.3 Testing

Inspect all cupboard components after fixing and leave everything in perfect working order.

Protect cupboards from damage.

15.6 **Adjustable Metal Louvre Frames**

15.6.1 Louvres

Adjustable glass louvre frames and mechanisms must be of galvanised steel to comply with SANS-CKS 413. The mechanism must be capable of being operated by the remote control system as *specified*. Glass louvres must be 115 mm wide, unless otherwise *specified*, with long edges polished.

Fit adjustable louvre frames after the fixed window frame has been painted, with stainless steel or chromium plated brass dome-head screws.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

No national standard is available. See The Specifiers Guide to Industrial Roller Shutter and Grille Doors (Publication ADMSA 001, March 1992) published by the Association of Door Manufacturers (Southern Africa). (This organisation no longer exists, but the standard remains valid). Check out any special wind loading, fire or security requirements

Various profiles are available, the most common being Pera or Napoli ($\pm 127 \times 120$ mm), Trestino or Romany ($\pm 273 \times 50$ mm), and Ovale ($\pm 127 \times 120$ mm)

Guides are not intended to be weatherproof

15.7 Steel Roller Shutters & Doors

15.7.1 Slats

Slats must be cold rolled interlocking Z275 galvanised mild steel sections of specified profile and in continuous lengths without joints, forming a weather proof curtain capable of withstanding a wind loading of 70 kPa.

The mass of interlocking slats (excluding T-bar) must be 11,0 kg/m² for door spans smaller than 4500mm; 13,5 kg/m² for door spans of 4500-5500mm, and 16 kg/m² for door spans larger than 5500mm.

15.7.2 Grilles

Grilles must be 10mm diameter continuous mild steel bar without joints over the span of the door width and of specified profile, assembled by means of an approved shaped clip.

The mass of grilles (excluding T-bar) must be at least 13 kg/m², depending on the profile.

15.7.3 T-Bars

T-bars must be two cold rolled steel angles fitted back to back with a half slat in between, riveted together with 8 mm diameter mild steel rivets, or with 6 mm diameter steel screws, at 350 mm maximum centres (pop riveting is not acceptable)

Lifting handles must be provided on the T-bar of hand operated (push-up type) doors on the side from where it is to be operated: two of 25 x 5 mm flat mild steel bent to desired shape for doors of smaller than 1500 mm width; two of 40 x 40 x 3 mm mild steel angle, for doors of 1500 - 5500 mm width); two of 50 x 50 x 6 mm mild steel angle, for doors of 5500 - 6500 mm width)

15.7.4 Guides

Guides must be 3 mm minimum thickness cold rolled mild steel channel with minimum depth of 50 mm for doors smaller than 2500 mm width, 70 mm for doors 2500 - 6500 mm width. Specially fabricated guides must be provided for doors larger than 6500 mm wide.

Provide guides with the necessary bellmouths, 25 x 3 mm flat mild steel T-bar stoppers, and 50 x 5 mm mild steel fixing lugs with 11 mm diameter holes for fixing bolts.

15.7.5 End Plates

End plates must be 4 mm minimum thick mild steel plate, fastened to supporting wall angles with not less than two 10 mm diameter bolts.

15.7.6 Barrel Or Shaft

Outer and inner tubes of barrels or shafts must be complete with springs, anchors, barrel end castings, ball bearings, stub axles and rings.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

Allowable deflection of barrels is 4 mm/m maximum.

Torque safety factor of inner tube must be 3:1 minimum.

Torsion spring must be hard drawn spring steel wire to DIN 17223/1984 or BS 5216/1980. Adjust spring so that door, when stationary, does not move more than 200 mm up or down

Barrel end castings and spring anchors must be grey cast iron.

Bearings must be high grade sealed ball bearings.

15.7.7 Canopy Cover

Canopy covers must be 1 mm thickness steel for door spans of smaller than 3000 mm; 1,2 mm thickness for door spans larger than 3000 mm.

Canopy covers must be hot-dip galvanised to comply with SANS 121, class Z275.

15.7.8 Wicket Gates

Wicket gates must be of size 685 x 1830 mm or 685 x 1220 mm as *specified*, with a fill-in curtain similar to the door curtain, a cylinder night latch and/or provision for a padlock, as *specified*.

Electrically operated doors must have a power cut-off switch.

15.7.9 Operation

Operation must be manual or push-up, chain-operated, gear-operated or electrically operated, as *specified*.

Chain-operation must be by endless hand chain that will not foul the opening of the doorway, and hangs to within 1 m of the floor. Provide a chain lock on one of the guides.

Gear operation must be by gearbox and handle with locking system, to be installed 1 m from floor level.

Electrical operation must be by electrical motor and gearbox with emergency handle in the event of a power failure, isolator and control push buttons and limit switches.

15.7.10 Fixing

Bolt guides to wall with 10 mm diameter steel anchor bolts, rawl bolts or sleeve anchors

Weld guides to steel structure by means of a stitch weld.

15.8 **Strongroom Doors**

15.8.1 Doors

Strongroom doors must comply with SANS 949 and be of class and finish as *specified*.

In addition strongroom doors must comply with the following:

- Dimensions of clear openings must be not less than the following, but not more than 880 mm, measured when the door is opened to 180 degrees:

Class of door	Clear width, mm	Clear height, mm
1	760	1850
2 (20 mm front	760	1850

Manual operation not recommended for doors exceeding 2500 mm in height

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

plate)		
3	760	1850
4	830	1850

- Provide a chromium plated bow handle for opening and closing the door
- Provide chromium plated escutcheon plates over keyholes
- Mark each door with the manufacturer's name on the outside, and the class of door on the inside
- Doors must be factory primed before delivery.

15.8.2 Ventilators

Ventilators for strongrooms must be double ended steel telescopic ventilators for wall opening size and wall thickness as specified, with face plates on both sides, drop shutter mechanism operating from a fuseable metal plug, wire gauze and baffle plates.

15.8.3 Installation

Fix strongroom door in position with lugs provided, according to the manufacturer's instructions. Ensure that the door will clear the finished floor by at least 5 mm. Build in ventilator(s).

15.8.4 Key

Arrange with the manufacturer to have the key sent to the Representative/Agent by registered post, giving the following particulars:

- Manufacturer's name
- Manufacturer's door number
- Class of door
- Size of door
- Name of contractor by whom ordered
- Building and room where installed.

15.9 Stairs, Balustrading, Cat-ladders, Grilles, Gates, Framework, e.t.c

Construction shall be in accordance with the provisions of the following Codes of Practice – SANS 10044, SANS 10064, SANS 10094, SANS 10104, SANS 10160 and SANS 10162.

The general provisions in Section 14 (Structural Steelwork) of this document shall apply

15.10 Ribbed Floors & Permanent Decking

The general provisions in Section 14 (Structural Steelwork) of this document shall apply. The manufacturer shall produce certification complying with the ISO 9001:2001 Quality Management System and a minimum fire rating of 120 minutes for the proposed installation.

15.11 Open Grille/Grating Floors

Specifications in Section 15.9 (Stairs, Balustrading, e.t.c) above are applicable.

Relevant codes of practice:

SANS 10104 Handrailing and Balustrading (safety aspects).

SANS 14713 Protection Against Corrosion of Iron and Steel in Structures

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

15.12 Fly Screens & Burglar Screens

Fly screens shall be constructed of a fibreglass or copper gauze having 1.5x1.5mm mesh, set in a pressed metal frame capable of being clipped to the inside of the window frame.

Where required, burglar bars shall be provided to opening lights of windows or glazed doors and shall be constructed of mild steel of the dimensions *specified*. Joints shall be welded and the screen shall be welded to the inside of the frame. Cut-outs shall be made to allow unrestricted use of door or window locking devices.

15.13 Other Metals

Stainless steel shall comply with SANS 10162 Part 4 – The Design of Cold Formed Stainless Steel Structural Members. Stainless steel shall be AISI Type 304 Stainless Steel and shall be buffed to an even, satin finish. Stainless steel screws shall be used for fixing stainless steel.

Copper for roofing and cladding should comply with BS EN 1172 : 1997 - 'Copper and Copper Alloys: Sheet and Strip for Building Purposes'. There is also a British Standard Code of Practice CP143: Part12: 1970 which deals with Sheet Roof and Wall Coverings in Copper.

15.14 Curtain Walls, Shopfronts, e.t.c

The component members of Curtain Walls and Shopfronts shall adhere to individual requirements specified in this section. Manufacturers shall belong to AAAMSA who shall submit shop drawings for approval by the Representative/Agent prior fabrication and installation.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

16. PLASTERING

16.1 Topping & Screeds

16.1.1 Cement

Cement must comply with SANS 50197-1, strength class 32,5 or higher.

Type, composition and strength of the cement must be shown on the bag or the delivery slip of bulk cement. Bags must be SANS-mark bearing.

Keep bagged cement in a dry store. Always use the oldest cement first. Do not use bagged cement with lumps that cannot be crumbled by hand.

16.1.2 Aggregate

Aggregate must comply with SANS 1083 for concrete. Supply grading test results if required by the Representative/Agent.

16.1.3 Topping

Use stone of the following nominal size:

Nominal aggregate size, mm	Minimum thickness of topping, mm
6,7	25
13	30
19	larger than 40

Mix cement, sand and stone by volume or by mass to produce concrete of at least 20 MPa strength at 28 days, or as specified.

Mix proportions may be arrived at by a process of mix design or by the use of recognised tables of trial mixes with South African aggregates.

Mixing of concrete may be done by hand, or preferably by forced-action mechanical mixers, for 3 minutes. If mixed by hand, first mix the dry ingredients, then add just enough water to produce a workable consistence.

Measure consistence with the standard slump test as described in SANS 5862-1 and as directed by the Representative/Agent.

16.1.4 Screeds

Mix proportion of cement-sand screeds must be 1 part cement to 3½ parts sand, or 50 kg (one sack) cement to 130 ℓ sand. Add just sufficient water to achieve a plastic, workable consistence.

16.1.5 Pigment

Colour pigment must comply with BS 1014. Add pigment to the cement before the aggregate is added, or apply pigments to the surface as a dry shake.

16.1.6 Preparation

Ensure all piped services are in position in the base. Do not bury services in the topping or screed.

Ensure the base concrete is hard and strong, free of cracks and reasonably accurate.

Concrete toppings provide a dense finish that is resistant to abrasion.

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 30 MPa strength for floors for industrial purposes. The Cement and Concrete Institute is able to offer advice.

Specify a sand-cement screed only where placing and finishing the concrete floor to acceptable standards is impracticable. Cement-sand screeds are suitable only for floors where traffic is light, e.g. store rooms, or for floors which are to be covered with carpets, plastic tiles etc.. Sand should be a concrete sand.

MATERIAL SPECIFICATIONS FOR GOLF BUILDING CONTRACT

Clean the surface by chipping if necessary and remove all dust.

Wet the surface only if the concrete is absorptive.

Prepare bay forms for toppings to coincide with joints in the base.

The 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, e.g. monolithic construction, and separate unbonded construction, consult SANS 10109 part 2

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

Toppings and screeds must be 25 - 40 mm thick, except on stair risers or other vertical surfaces which must be 12-15 mm thick.

16.1.7 Laying

Lay toppings and screeds as follows:

- Ensure base concrete is hard and strong, free from cracks, and reasonably accurate to the required level
- Brush a grout consisting of a fluid mixture of equal volumes of cement and fine, clean sand, and water, or a proprietary bonding agent, over the surface 10 to 20 minutes before applying the topping. The bonding agent must be used according to the manufacturer's instructions. Use within 30 minutes of mixing
- In the case of screeds, lay guide strips of the sand-cement mix to establish levels. Lay screeds in panels as large as possible in one operation
- In the case of toppings, establish levels by means of bay forms. Cast bays in chequerboard fashion
- Spread the mix, ram, compact, and lightly wood-float to a non-slip finish and to specified thickness
- Where a hard smooth finish is specified, leave finish undisturbed for about two to three hours (longer in cold weather), remove bleed water and laitance on the surface, and steel trowel until the desired texture is obtained. Use power trowels if areas are large
- Where a hard non-slip finish is specified, steel-trowel as above and subsequently lightly texture with carpet-faced floats or soft brushes
- Where a brushed surface is specified (e.g. to external finishes), lightly brush with a broom to achieve a non-slip texture
- Do not add dry cement at any stage. Do not trowel too soon, and avoid over-trowelling.
- Where toppings are specified as tinted, lay the mix in two thicknesses in one operation, the lower thickness brought up to 6 mm of the finished level, and the upper thickness laid with the required amount of pigment added to the mix.

16.1.8 Joints

Form isolation joints through the full thickness of topping and screed against walls, columns or other fixed objects, to coincide with isolation joints in the base, and 20 mm wide

Form intermediate contraction joints dividing the topping into panels not exceeding 9 m² by sawing halfway through the thickness of the topping.

Arris-round the top edges of joints with a radius of 3 - 5 mm, and seal with an approved elastomeric material when so specified.

16.1.9 Accuracy

MATERIAL SPECIFICATIONS FOR GOLF BUILDING CONTRACT

Check with SANS 10155. In small rooms deviation should be less.

Deviation of the floor finish from datum level must be ± 15 mm but not near door openings, where levels must be accurate.

Surface regularity: Maximum permissible deviation from a 3 m long straight-edge in any direction must be 5 mm and must be gradual.

16.1.10 Thresholds and Stair Treads

Form thresholds to external doors by removing 75 - 100 mm of the foundation wall over the width of the door opening, and casting a concrete topping threshold over the full width of the wall. Cast the threshold against a metal dividing strip under the door, as described below.

Provide thresholds and stair treads with 75 mm wide reeding, stopped 100 mm from the threshold ends.

16.1.11 Dividing Strips

Floor dividing strips must be 3 x 25 mm brass, plastic or galvanised steel as specified.

Lay dividing strips under internal doors where floor finish changes material or pattern, so that floor change is not visible when door is closed, with top edge of strip level with finished floor.

Lay dividing strips under external doors, with top edge level with finished internal floor, and with external threshold 5 mm lower to prevent rainwater from entering when door is in closed position.

16.1.12 Skirtings

Form 75 mm high skirtings of the same material as the floor finish and in the same operation, against walls, columns etc. where so specified, hollow rounded at junction between floor and skirting, and with straight top edge with slightly rounded edge.

Skirtings must project 10 mm from face brick and bagged wall surfaces, 5 mm from face of plastered walls, and be flush with tiled wall surfaces.

16.1.13 Curing

Cure the finish for at least seven days by ponding water on the surface, covering with sand which is kept moist, or with plastic sheet. Extend the curing time in cold weather, i.e. when the ambient temperature falls below 10 °C.

16.1.14 Inspection, Testing and Repair

Inspect the screed as late as possible in the construction program. Test the adhesion of the screed to the base by tapping the surface with a hammer or the end of a rod.

A hollow sound indicates lack of adhesion, in which case the Representative/Agent must decide whether repair work is necessary.

Rejected panels must be isolated by sawing with a mechanical concrete saw in an acceptable pattern, removed and relaid using the same procedure as above, starting with preparation of the base.

Failure to carry out systematic curing is responsible for many failures in base finishes.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

16.1.15 Finish

Seal the floor with one coat non-slip wax polish if so specified.

16.2 **Plaster**

16.2.1 Cement

Use masonry cements for better workability in the event of poorly graded sands. Masonry cements are a blend of Portland cement and lime. 'X' indicates that the masonry cement includes an air-entraining agent

Cement must be common cement to comply with SANS 50197-1, strength class 32,5, or masonry cement to comply with SANS 50413-1, type MC 12,5X or 22,5X.

Type, composition and strength of the cement must be shown on the bag or the delivery slip of bulk cement. Bags must be SANS-mark bearing.

Keep bagged cement in a dry store. Always use the oldest cement first. Do not use bagged cement with lumps that cannot be crumbled by hand.

16.2.2 Sand

Sand must comply with SANS 1090, preferably a natural class sand, of internal type for internal plaster, and external type for external plaster, and of fineness modulus as specified.

Supply grading test results if required by the Representative/Agent.

16.2.3 Lime

Hydrated lime to comply with SANS 523, putty plaster type for finish coats.

16.2.4 Barite

Plaster grade barium sulphate (BaSO₄).

One-coat cement plaster, bagging or roughcast

Mix cement and sand to the following proportions:

*One bag of cement=50 kg.
One builder's
wheelbarrow=65 litres*

Class	Application	Cement: sand (Common cement)	Cement: sand (Masonry cement)
I	Foundation walls, constantly damp conditions	1:4 or 50 kg to 130 litres	1:3 or 50 kg to 100 litres
II	External and internal plaster above dpc-level	1:6 or 50 kg to 200 litres	1:5 or 50 kg to 170 litres
III	Weak substrates, eg. unburnt clay brick	1:9 or 50 kg to 300 litres	1:6 or 50 kg to 200 litres

16.2.5 Gypsum Plaster

Hardwall gypsum plaster must be a retarded hemi-hydrate finishing plaster.

16.2.6 Barite Plaster

Mix one part cement to five parts barite by weight.

16.2.7 Plaster on Metal Lathing

For plaster on metal lathing add ¼ kg of sisal to every wheelbarrow (65ℓ) of the rendering coat mix.

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

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

16.2.8 Preparation

Complete all chased pipework and service outlets before plastering is commenced.

Ensure that the surface to be plastered does not deviate from the required plane by more than about 10 mm. Remove high areas by hacking or cutting. Fill low areas by applying undercoats of plaster not exceeding 15 mm in thickness, scratched as described below.

Roughen concrete surfaces where necessary by hacking, and clean the surface with a wire brush.

In case the surface is very dense and non-absorbent, eg hard-burnt bricks or dense concrete, wet and slush with 1:1 cement: sand grout to form a key for the plaster. Add a polymer emulsion bonding agent to improve adhesion if necessary.

In case the surface is absorbent, wet the surfaces directly before plastering is commenced.

Fix 1500 x 1,0 x 35 mm girth galvanised angle rounded corner protection strips to comply with SANS 190-2 above skirting to external angles of interior walls where specified.

Bonding agents are specially formulated water-based emulsions of polymers such as styrene butadiene rubber (SBR), acrylic, and polyvinyl acetate (PVA).

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GOI BUILDING CONTRACT

16.2.9 Plastering

Apply one coat plaster to surface, leave to stiffen, strike off with a striker board, and wood float to an even surface and to a thickness of 10 - 15 mm.

If plaster is to be applied in two coats, or is to be tiled, the first coat must be scored with roughly parallel lines about 20 mm apart and 5 mm deep to provide a key for the finishing coat or the tile adhesive.

Cement-sand finishing coats must be 5 - 8 mm thick. Gypsum finishing coats must be 3 - 5 mm thick.

When a roughcast finish is *specified*, spatter onto the still green rendering coat the same mix with a spatter machine to achieve an approved finish.

When a bagged finish is *specified*, spread the mix over the surface with a rolled-up sack until all holes and cracks have been filled.

Apply barite plaster in layers of 6-7 mm at a time, to a final thickness as *specified*. Float every layer well while setting to prevent the formation of cracks.

In the case of soft clay brickwork, the following applies:

- Use a class III mix
- Fill major depressions in the wall and scratch the surface of the plaster
- Nail metal lathing or mesh to the wall with galvanised nails and spacers, as *specified*
- Apply the first coat and scratch
- Apply the finishing coat.
-
- In the case of external plasterwork that has to be tiled, the following applies:
 - Nail metal lathing or mesh to the wall with galvanised nails and spacers, as *specified*
 - Apply the first coat and scratch

Finish plaster with a wooden trowel, to an even and smooth finish.

Plaster single wall surfaces in one operation.

Protect surfaces against drying out for three days.

Form knife joints through full plaster thickness over movement joints and along the line of the damp proof course at floor level, with arris-rounded edges.

16.2.10 Accuracy

Permissible deviations of plaster work are 6 mm under a 2 m straight-edge.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

17. TILING

17.1 Glazed Ceramic Wall Tiles

Glazed ceramic wall tiles must comply with SANS 22, and be of size, thickness and colour as *specified*.

17.2 Ceramic Floor Tiles

Ceramic floor tiles must comply with SANS 1449, and be glazed or unglazed, of group A (split or quarry tiles), or group B (dust pressed tiles), and of size and colour as *specified*.

17.3 Clay Quarry Tiles

Clay quarry tiles must be of approved quality, even in thickness, square, free from cracks, twists and blemishes, reasonably uniform in colour, and of *specified* size.

17.4 Terrazzo Tiles

Terrazzo tiles must be of approved quality, and of pattern, colour and size as *specified*.

17.5 Natural Stone Tiles

Natural stone tiles must be slate, quartzite, marble, granite or other natural stone from an approved local or South African quarry, of size, colour, surface finish and edge finish as *specified*.

17.6 Mosaic Tiles

Glass or ceramic mosaic must be of approved manufacture, and of colour as *specified*. Tesserae must be approximately 20 x 20 x 4 mm thick, fixed to brown paper in squares of about 300 x 300 mm.

17.7 Samples

Provide samples of every colour for *approval*. Keep samples on site for reference.

17.8 Adhesive

Adhesive must be of approved type, suitable for the tiling work at hand. Provide the Representative/Agent of copies of relevant product literature before any adhesive is purchased.

17.9 Preparation

Complete all adjacent rough construction work and install and test all services in the background before commencing tiling work.

Use only personnel experienced in this type of work.

Examine backgrounds, remedy defects and allow to dry to equilibrium. Remove dust, loose matter, efflorescence and laitance.

Roughen surface of backgrounds if not rough enough to provide a satisfactory bond, or wet and slush with a 1:2 cement: coarse sand mix, or apply a bonding agent.

Cover joints in backings of sheets of asbestos cement, plasterboard, fibre board or plywood with 75 mm wide

See SANS 10107 – The design
and installation of ceramic
tiles:

*Plaster should be scratched
when applied - see
Plastering.*

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

scrim fixed with adhesive, and coat the whole surface with a suitable water-repellent.

17.10 Fixing Tiles

Fix tiles in adhesive strictly according to the manufacturer's instructions.

Use a white tile adhesive for white marble or marble with a delicate colour.

17.11 Fixing Mosaic Tiles

Fix mosaic tiles as follows:

- Fix mosaic sheets in adhesive.
- Beat the sheets to an overall flat surface
- Wet the adhesive paper when the adhesive has started to set, and remove paper with a brush.

17.12 Pattern

Fix tiles with straight joints in both directions, or in agreed or *specified* pattern.

Cut tiles only along sides of wall panels and along floors. The top row of wall tiles must be a full tile or mosaic.

17.13 Angles

Butt tiles at internal angles. Mitre tiles at external angles.

17.14 Sills and Thresholds

Lay sill tiles to the *specified* slope and projection over finished wall faces. Where internal sills are *specified* as sloping, the sill line must coincide with full tiles on the wall surface. Lay external sill tiles symmetrically about opening, with cut tiles at sill ends.

Lay shower threshold tiles sloping towards the shower.

17.15 Grouting and Pointing

Grout joints of width less than 3 mm; point wider joints.

If proprietary mixes are used, check application with the manufacturer.

Use epoxy compound or acid-proof cement mortar if surface is to be acid-proof, when *specified*.

Grout or point tiles fixed in cement mortar the day after tiles have been fixed. Grout or point tiles fixed in adhesive after a time recommended by the manufacturer of the adhesive.

Grouting: Dampen joints and apply cement grout with a brush. Work the grout into the joints with a squeegee until joints are filled flush with the surface. Before grout hardens, pencil in the joints with a piece of wood or tool of width the same as that of the joint.

Pointing: Dampen joints and fill with mortar of the same mix as the bedding mortar with a pointing tool. Before mortar hardens, tool the joints to the desired finish.

17.16 Movement Joints

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

Form 6 mm wide movement joints in tiling and through full depth of bedding coat:

- Over movement joints in the background
- At ceiling level
- Vertically and horizontally at approximately 4,5 m centres
- Where tiling is continuous over different backgrounds
- Fill joints with sealant of approved type.

17.17 Cleaning

Sponge the tiled surface with water and polish the tiled surface with a clean, dry cloth. Do not use acid cleaners, scouring powder or abrasive cleaning materials.

Seal movement joints.

Protect absorbent floor finishes (e.g. quarry tiles) with an application of non-slip wax polish or approved proprietary sealer.

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

18. PLUMBING & DRAINAGE

18.1 Flashings & Linings

18.1.1 Metal

Flashings, secret gutters, valley linings and chimney gutters must be 0,6 mm thick sheet iron with class Z275 galvanising, or prepainted to match roof sheets, in lengths of 1800 mm, or of other metal and thickness as specified.

18.1.2 Flashings

Flashings must be of the following sizes, or as specified:

- 200 x 75 mm under tile flashing
- 200 x 75 mm over flashing
- 25 x 100 mm cover flashing
- 60 x 60 mm gable flashing
- 19 or 32 mm diameter roll flashing

Commercial flashings are
175 x 50

18.1.3 Fixing

Cut, join, lap and form sheet metal flashings, secret gutters and valleys to roof and vertical surfaces to make a watertight finish.

Fix flashings to walls with 75 mm long flashing nails with a 20 mm hook. Fix flashings at ends and at 400 mm centres in between. Drive flashing nail into wall above the line of the flashing turn-up, and use the hook of the flashing nail to keep the flashing in position.

Lay under tile flashings against parapet or chimney walls on battens and under clay and concrete roof tiles. Under tile flashings must discharge into eaves gutters.

Chimney gutters must be turned up 100 mm against chimney and at least 225 mm up roof slope on battens or filting fillets. Chimney gutters must be lapped onto side flashings or under tile flashings.

Fix counter-flashings in formed joints in masonry, keep in place with short rolls of cut-off sheet iron, and fill solid with 1:3 cement: sand mortar.

Fix and seal flashings around pipes with suitable clamps. Lay valley linings with sides turned up against purlins or battens, with edges folded back as open beads. Lap valley linings 225 mm minimum. Discharge valley linings into eaves gutters.

18.2 Gutters & Downpipes

18.2.1 Sheet Iron

Sheet iron gutters must be sheet iron with class Z275 galvanising, with beaded edges, angles, stopped ends and outlet nozzles where necessary, and to the following shapes, sizes and thickness, as specified:

Gutter shape	Gutter size, mm	Sheet thickness, mm	Size of bracket, mm
Half round	150	0,6	32 x 3,5
Square	125 x 125	0,6	32 x 3,5
Square	175 x 175	0,8	40 x 5
Square	225 x 225	1,0	40 x 6
Rectangular	150 x 100 deep	0,6	32 x 3,5
Rectangular	200 x 150	0,8	40 x 5

MATERIAL SPECIFICATIONS FOR GOLF BUILDING CONTRACT

	deep		
Rectangular	250 x 200 deep	1,0	40 x 6

Sheet iron downpipes must be sheet iron with class Z275 galvanising, seamed along the pipe length. Join pipe lengths, offsets, elbows and shoes with slip joints neatly soldered.

Fix sheet iron gutters as follows:

- Lay galvanised sheet iron eaves gutters in galvanised mild steel brackets of size as stated in table above (the 5 and 6 mm thick brackets must be hot-dip galvanised after manufacture), screwed twice to roof timber at 1000 mm maximum centres. Bolt the bracket to the gutter close to the underside of the gutter bead with a 6 mm diameter galvanised gutter bolt.
- Lay gutters in long lengths. Lap gutter lengths at least 20 mm and seal with approved sealant.
- Strengthen gutter angles with 50 mm wide strips of 0,6 mm galvanised sheet iron soldered over the internal mitres inside the gutter.

Fix downpipes as follows:

- Fix sheet iron downpipes to walls, 25 mm away from the finished wall surface, and with the seam at the back, with 25 x 1,6 mm galvanised mild steel clamps, bolted around pipe in two halves, and with 6 mm diameter galvanised steel lug with toothed end riveted to clamp and built into wall. Fix downpipes at least twice to walls and at 2 m maximum centres.
- In the case of downpipes to be connected to stormwater drains, fit the end of each down-pipe with a 0,6 mm thick galvanised flange of diameter to fit into the socket of the drainpipe. Caulk the socket with cement-sand mortar.

18.2.2 Fibre-Cement

Fibre-cement gutters and downpipes must have a wall thickness of 6 mm, with spigot and socket end joints. Downpipes larger than 75 mm diameter, and all square downpipes must have a wall thickness of 8 mm. Sizes and profiles must be as *specified*.

Provide downpipes with the necessary swan-necks, branch pieces, plinth bends, radius bends and shoes.

Fix fibre-cement gutters and downpipes strictly according to the manufacturer's instructions and as follows:

- Lay spigot ends onto socket ends in the direction of flow wherever possible
- Drill bolt holes through socket and spigot ends
- Clean joining surfaces of spigots and sockets, cover with suitable jointing compound and assemble
- Secure gutter joints with 6 mm diameter galvanised gutter bolts with bolt heads on the inside of the gutter. Provide gutter bolts with felt washers and galvanised steel washers under the head. Provide a

MATERIAL SPECIFICATIONS FOR GOLF BUILDING CONTRACT

little compound under the washer. Tighten bolts until gutters are aligned, and remove surplus compound

- Lay gutters on galvanised steel or aluminium alloy brackets as supplied by the manufacturer of the gutters, of the fascia type where fixed to fascia boards, or the purlin type if fixed to purlins, or purpose-designed for industrial gutters, as specified. Fix brackets at 1 m maximum centres and at angles and outlets. Fix brackets so that gutters will have a fall of 1:200 towards outlets
- Fill downpipe joints with mastic compound if specified.
- Fix downpipes to walls with galvanised steel or aluminium alloy holderbats, immediately below the collars. Build in ends of holderbats in walls with 1:3 cement-sand mortar.

18.3 Under Ground Soil Drainage

See SANS 1200 LD: Sewers

18.3.1 Vitrified Clay Pipes

Vitrified clay pipes to comply with SANS 559, without sockets, and with polypropylene and glass fibre sleeves with rubber seal ring couplings. Sizes as specified are internal diameters.

18.3.2 Upvc Sewer and Drain Pipes, and Fittings

The class of uPVC pipe depends on the depth of cover, the nature of the back filling, traffic conditions overhead, and trench conditions.

Unplasticised polyvinyl chloride sewer and drain pipes and fittings to comply with SANS 791, of heavy duty (SDR34) or normal duty (SDR51) class as specified. Couplings must be push fit sockets with rubber seal rings. Sizes as specified are outside diameters.

18.3.3 Laying Underground Sewer Pipes

Lay pipes as follows:

- Excavate, lay and backfill in reasonable lengths and without delay. Assume excavations are in soil. Notify the Representative/Agent if excavations are in harder material
- Excavate the trench not wider than is necessary to lay, joint and backfill the pipe, or to width as specified, and to a depth of 100 mm below the required pipe level. The trench must be inspected by the Representative/Agent before bedding material is placed. Protect the trench against flooding
- Bed the pipe true to line and grade on 100 mm minimum thickness approved granular material over the full trench width. Carefully compact the bedding to 90 % MOD AASHTO. Support the pipe uniformly and continuously
- Install flexible compression joints according to the manufacturer's instructions. Make sure joints are clean before installing them.
- Place backfill in the trench, up to the level of the top of the pipe and carefully compact to 90 - 95 % MOD AASHTO. Ensure the moisture content of the backfill is within 2 % of its optimum moisture content
- Fill over the pipe with a 300 mm thick layer of the same material and tamp lightly

See SANS 1200 LD and SANS 10112.

The following procedure covers pipe sizes up to 150 mm

MATERIAL SPECIFICATIONS FOR GOI BUILDING CONTRACT

- Fill the remainder of the trench in layers not exceeding 300 mm with material from the trench excavations, but without organic material or boulders larger than 150 mm and compact to 90 % MOD AASHTO. Do not roll or use heavy mechanical compaction until at least 600 mm of material has been placed over the pipe. Fill in layers not exceeding 150 mm and compact to 93 % MOD AASHTO where the trench crosses roads or paving
- Where pipes run under buildings, lay pipes with a minimum soil cover of 300 mm, or with 100 mm pre-cast or cast-in-situ concrete slabs over the pipe, isolated from the crown of the pipe by a soil cushion not less than 100 mm thick, or with 100 mm concrete
- Where drain gradient exceeds 1:5, provide concrete anchor blocks to secure pipe in place
- Connect the sewer pipe to the sewer of the local authority where relevant.

18.3.4 Cleaning Eyes

Provide cleaning eyes where specified on drawings as "CE".

Construct cleaning eyes of pipe of same material and diameter as the drain. Insert junction in drain, or bend in end of drain, and bring branch up to ground level with easy bends. Fit top at ground level with cast iron cover with letter "CE" on the cover, secured with non-ferrous metal screws. Encase bends and pipe in 15 MPa concrete not less than 100 mm thick and finish on top with 1:2 cement-sand mortar, towelled smooth and rounded on salient angles.

18.3.5 Inspection Eyes

Provide inspection eyes where specified on drawings as "IE".

Form inspection eyes in the drain by inserting an access pipe or bend with access lid.

When the letters "IE" on drawings are enclosed with a square, mark the position of the inspection eye with a 15 MPa concrete block size 350 x 350 x 75 mm with the letters "IE" formed in the top surface.

18.3.6 Gulleys

Gulleys must be:

- Vitrified clay gully trap with gully head to comply with SANS 559, with cast iron grating to comply with SANS 1115, or
- unplasticised polyvinyl chloride (uPVC) gully trap and head with polypropylene lid to comply with SANS 791, laid loose in the socket.

Lay gulleys as follows:

- Encase gulleys in 15 MPa concrete, not less than 100 mm thick, and finish where exposed with 1:2 cement-sand mortar, flush with gully head and splayed on edges
- Lay gully so that overflow height is at least 150 mm above the finished ground level

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

- Provide pre-cast concrete gulley head where dished gulleys are indicated so that the top of the head is at least 150 mm above the finished ground level
- Bed gratings in bitumen.

18.3.7 Grease Traps

Unless otherwise *specified*, grease traps must be vitrified clay with polypropylene lids and trap provided with 150 mm deep perforated container of 1,2 mm galvanised sheet steel with galvanised mild steel handle.

18.3.8 Testing of Sewers

Inspect and test the sewer in the presence of the Representative/Agent:

- Inspect and test all under ground drains and fittings before covering with soil or encasing in concrete
- Provide all necessary testing apparatus and labour
- Inspect the inside of drains with a torch and mirror before performing the water or air test
- Plug or seal all openings, fill all traps with water
- Air test: Use an approved air test machine to raise the pressure in the pipe to 3,75 kPa. Lower the pressure to 2,5 kPa after two minutes. Switch off the machine and measure the time it takes for the pressure to fall to 1,25 kPa. This should be 2 minutes for a 100 mm diameter pipe, and 3 minutes for a 150 mm diameter pipe
- Water test: Fill the pipe with water through the highest opening so that any part of the pipe is subjected to a pressure of at least 12 kPa and not more than 60 kPa. Allow ten minutes for absorption. Water loss should not be more than 6,0ℓ per 100 m of drain per hour for a 100 mm diameter pipe, or 9,0ℓ per 100 m of drain per hour for a 150 mm diameter pipe.
- Drains may be tested in sections
- Cement mortar joints must be at least 24 hours old before testing
- Repeat the test after the whole drainage installation has been completed
- Make good any defects should the test(s) fail and repeat until the system is sound and tight. Defective parts must be replaced, not patched up.

18.3.9 Repair

Repair road or paving surfaces where disturbed by pipe-laying, when relevant.

18.4 **Above Ground Soil & Waste Water Drainage**

18.4.1 Cast Iron Pipes

Cast iron pipes must comply with SANS 746 type B (without ears), and with couplings of stainless steel band with worm drive clamps. Sizes as *specified* are internal diameters.

18.4.2 uPvc Soil Waste and Vent Pipes

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

Unplasticised polyvinyl chloride soil waste and vent pipes and fittings, for use above ground to comply with SANS 967. Joints must be push fit assembly or solvent weld type. Sizes as specified are outside diameters.

18.4.3 Galvanised Mild Steel Waste Pipes

Galvanised mild steel waste, ventilation and anti-siphon pipes must be as described under Water and Gas Supply, but fitted at angles and intersections with cast iron, brass or malleable cast iron bends and junctions. Bends and junctions to waste pipes must have inspection eyes where necessary.

18.4.4 Fixing Pipes Above Ground

Fix soil and waste water pipes above ground as follows:

- Fix cast iron ventilation pipes to walls with hinged cast iron holder bats to comply with SANS 1209
- Fix uPVC ventilation and soil water pipes with galvanised mild steel holder bats at centres according to the manufacturer
- Provide open end of ventilation pipes with a galvanised wire- or uPVC balloon
- Discuss measures to be taken to avoid unsightly pipework on the outside of buildings with the Representative/Agent before any chasing or cutting for pipework is started. In general, waste pipes with a maximum diameter of 40 mm may be built into walls or cast into floors, with the necessary cleaning eyes. Stacks and ventilation pipes may be placed inside lavatories, store rooms or in easily accessible drainage ducts.

Drainage ducts must be properly designed

18.5 **Below Ground Stormwater Drainage**

18.5.1 Concrete Stormwater Pipes

Concrete stormwater pipes must be unreinforced concrete non-pressure pipes to comply with SANS 677 type SC., with ogee or plain ends as specified. Sizes as specified are internal diameters.

18.5.2 Laying Concrete Stormwater Pipes

MATERIAL SPECIFICATIONS FOR GOI BUILDING CONTRACT

See also SANS 10102
Selection of Pipes for Buried
Pipelines, and Concrete Pipe
Handbook published by the
Concrete Society of
Southern Africa.

The type of bedding
depends on loads on pipes
e.g. earth above pipe,
traffic, change of volume in
clay soils, etc. Check with an
expert. The specified
bedding is generally used for
smaller diameter pipes
where the cost of the pipe is
less than the cost of the
installation of the pipe.

Lay concrete stormwater pipes as follows:

- Lay pipes on 100 mm minimum compacted granular bedding material. Fully support the pipe over its entire length.
- Lay pipes accurately to lines and gradient
- Joint ogee pipes with 1:2 cement mortar, well caulked in with a steel tool, and finish with a smoothly trowelled fillet, or with an approved external rubber collar
- Joint butt joined pipes with mortar coated hessian band
- Build pipes into walls of sumps, catchpits or inspection chambers with 1:2 cement-sand mortar. Lay pipes with top of bores at the same level where pipes enter or leave, with the invert of the largest pipe at the bottom of the sump, pit or chamber.

18.5.3 Bends and Junctions

Bends and junctions up to 150 mm diameter must be of vitrified clay as specified above.

Where one or more stormwater pipes are over 150 mm diameter, construct junction boxes over bends and junctions with 15 MPa concrete after the drains have been laid. Cast bottoms and sides of junction boxes 150 mm thick. Cast sides to slightly above the top level of the pipes. Cover box with a 80 mm thick slab of similar concrete, laid loose.

18.6 **Water & Gas Supply**

18.6.1 Galvanised Mild Steel Pipes

Galvanised mild steel water supply pipes must comply with SANS 62, galvanised finished inside and outside, medium wall thickness class, and with screwed ends.

Sockets, elbows, crosses, tees, bends, branches, bushes, unions, nipples, plugs, caps and back nuts must be galvanised malleable cast-iron to comply with SANS 746.

Pipe diameters mentioned on drawings refer to the nominal inside diameter of the pipe.

Join galvanised mild steel pipes as follows:

- Ream pipe ends to remove burr
- Keep jointing surfaces clean. Remove cutting oil
- Join pipes with red-lead paint, proprietary jointing tape or paste and/or hemp.

18.6.2 Copper Pipes

Copper pipes for domestic water and gas supply must comply with SANS 460, Class 0 for water or gas supply above ground, and class 2 or 3 for water or gas supply below ground.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

Capillary fittings are cheap. The SA Copper Development Association recommends Class 0 for all above ground work as its use would provide maximum cost saving benefits. Under ground and steam pipes should be class 2 or 3. Class 0 pipe is hard drawn and any change in direction should be made with fittings. Do not use copper pipes for acetylene gas installations.

Fittings must be copper-based capillary or compression fittings to comply with SANS 1067.

Join copper pipes as follows:

- Cut pipe end square, ream, remove burrs and size if required
- Clean bore of fitting and pipe with a ring brush or fine emery paper.

Capillary joints:

- Apply flux to outside of pipe, twist to help distribute the flux over the two surfaces. Use flux carefully and sparingly
- Apply flame to tube and fitting until heated. Remove flame and allow solder to be drawn into the joint until a complete fillet of solder appears around the mouth of the fitting
- Wipe joint clean.

Compression joints:

- Slide fitting onto tube end until it stops against the inner shoulder. Tighten capnut by hand
- Tighten nut with a spanner until the fitting is difficult to turn on the pipe. Thereafter tighten fittings ½ turn.

Flared joints:

- Slide coupling nut over end of pipe and insert flaring tool
- Drive the flaring tool to expand the pipe end
- Assemble joint by placing ferrule squarely between flared end of pipe and flare in fitting body, and engage coupling nut with fitting threads. Tighten with two spanners.

18.6.3 Fibre Cement Pressure Pipes

Fibre cement pressure pipes and couplings to comply with SANS 1223, Class C.

Cast iron fittings must comply with SANS 746, with rubber rings on each side of collar, and outer flange rings, tightened with bolts.

Fibre cement collars must be grooved internally and fitted with rubber spacer rings and/or rubber gaskets.

Use fibre cement or cast iron bends similar to straight couplings, in all changes of direction.

Use cast-iron collar-type T-connections for branches of 50 mm diameter and less.

Use saddle pieces supplied by the manufacturer for branches of 40 mm and less.

18.6.4 Polypropylene Pressure Pipes

Polypropylene pressure pipes must comply with SANS 1315, of type and pressure class as specified, and suitable for the conveyance of cold and hot water

Fittings must be copper-based compression fittings to comply with SANS 1067.

Join polypropylene pipes as follows:

- Cut pipe end square and remove burrs
- Clean bore of pipe

'LDPE'-pipes for below and above ground conveyance of water under pressure

MATERIAL SPECIFICATIONS FOR GOLF BUILDING CONTRACT

- Butt join pipe ends and fusion weld according to the manufacturer's instructions, or
- Slide compression fitting onto tube end until it stops against the inner shoulder. Tighten capnut by hand. Tighten nut with a spanner until the fitting is difficult to turn on the pipe. Thereafter tighten fittings ½ turn.

Fix polypropylene pipes as follows:

- With suitable holderbats at centres not exceeding one metre
- Support hot water pipes continuously in roof spaces so that the pipe will not sag and create air pockets
- Not closer than one metre from the hot water outlet of geysers.

18.6.5 Polyethylene Pipes

Black low density polyethylene pipe must comply with SANS 4427, type 1, of nominal inside diameter and used with insert couplings and clamps, or type 2, of nominal outside diameter and used with compression type couplings, and of pressure class as specified.

Join pipes as follows

Compression joints

- Use approved compression fittings according to the manufacturer's instructions
- Insert metal liner in pipe end to prevent collapse of the pipe
- Screw nut of fitting hand tight, and then a further one-and-a-quarter turns to compress the ring into the pipe.

Insert joints

- Force spigot of insert piece into end of pipe. Soften pipe end if necessary by inserting in hot water
- Clamp pipe to spigot with circular metal clamp.

Screwed joints

- Cut ends of pipe off square. Chamfer pipe end with a file. Cut thread on pipe ends with special dies, without oil and with a mandrel inserted in the end of the pipe to support it against the die. Thread only enough length necessary to enter the joint
- Screw on cast iron fittings firmly hand-tight

18.6.6 Laying Pipes Under Ground

Lay pipes under ground as follows

- Lay water supply pipes 500 mm away from drains if parallel, 100 mm away if at right angles. Pipes of 75 mm diameter or less must have 450 mm minimum cover, larger pipes must have 750 mm cover. Pipes must not have more than 1000 mm cover
- Excavate trench 100 mm deeper than the required level. Backfill with compacted stable material to achieve a level bottom
- Bed the pipe true to line. Support the pipe uniformly and continuously
- Test the pipe for leakages before covering the pipe. Provide all necessary testing equipment. Fill pipes

see SANS 10112 - The installation of polyethylene and uPVC pipes:

See SANS 1200L and SANS 10112:

MATERIAL SPECIFICATIONS FOR GOLF BUILDING CONTRACT

Anaerobic bacteria in clay soil could erode mild steel pipes within months. Pipes could be protected with a suitable tape, but plastic pipes will be a better choice.

- with water and evacuate all air. Pressurise the system to one and a half times the design pressure and maintain for at least four hours. Fix all leaks
- Fill over the pipe with selected soil and compact in layers not exceeding 300 mm. Tamp the first layer lightly and do not roll or use heavy mechanical compaction until at least 600 mm of material has been placed over the pipe. Compact to 90% MOD AASHTO
- Do not lay galvanised steel pipes in clay soil without approved protection.
- Provide 0,5 m2 concrete anchors at changes in direction and at ends of lines of fibre-cement pipes.

18.6.7 Fixing Water or Gas Supply Pipes Above Ground

Fix water or gas supply pipes above ground as follows:

- Discuss measures to be taken to avoid unsightly pipework with the Representative/Agent before any chasing or cutting for pipework is started. In general no surface mounted water or gas piping is permitted on external walls except for the vertical rising water main from ground level to ground floor level provided this is not unsightly. All other surface mounted pipes must preferably run in ducts or be so placed as to be unobtrusive. All visible surface pipework must run in straight lines and be neatly fixed
- Fix pipes larger than 20 mm diameter firmly to walls with galvanised cast iron holderbats to comply with SABS 1209 or plastic holderbats for copper or polypropylene pipes to leave a clear space between the pipe and the finished wall
- Embed pipes up to 20 mm diameter in walls. Chase neatly. Do not chase walls constructed of hollow blocks - locate pipes in the block cavities. Chase solid walls not deeper than one third of the wall thickness vertically and not more than one sixth horizontally. Avoid horizontal chasing where possible. Ensure that chases, holes and recesses are so made as not to impair the strength or stability of the wall, or reduce the fire resistant properties of the wall. Fill chases with class 1 or 2 mortar once the conduits are in position
- Fasten pipes firmly to roof timber with galvanised mild steel or copper pipe clips screwed on
- Use bends in preference to elbows if practicable. If a reduction in the size of the pipe takes place at an angle, the bend or elbow must be the size of the larger pipe
- No air may lodge in pipes. Maintain a proper fall
- Provide for expansion in long lengths of pipes. Insert long- screws or approved couplings at convenient points to provide for alterations and repairs. Provide unions at in- and outlets of geysers.

18.6.8 Pressure-Reducing Valve Box

Pressure-reducing valve box must be a pressed sheet steel valve box with door or lid, ball stopcock, 20 mm

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

stainless steel sieve, pressure reducing valve with non-return and relief valve to comply with SANS 198 and with working pressure as *specified*, and 20 mm overflow pipe through bottom of box down in wall and bent outwards at floor height. Pre-paint box in factory. Build in valve box in wall in approved position or as *specified*, at a height of 1200 mm above finished ground level so that it can be reached easily.

18.6.9 Water Meters

Water meters must be of the semi-positive rotary piston type, each with brass or bronze working chamber, hinged cover to cyclometer dial and screwed ends for coupling to water mains. Registration of consumption must be in kilolitres. Accuracy and rate of flow must be as follows:

Size of meter, mm	Accuracy within 2%, litres/hour	Continuous rated flow, litres/hour
15	22	900
20	27	1800
25	54	4100
40	109	7250

18.6.10 Cleaning

Flush the entire pipeworks before any valves or taps are connected.

Fill fibre-cement pipes with water containing 0,15 g/l calcium hypochlorite. Allow the solution to flow slowly into the pipe and let stand for 24 h. Flush fibre-cement pipes with clean water until a sample taken from the pipe complies with the requirements for drinking water of the local authority.

18.6.11 Insulation

Insulate pipes above ground with bonded preformed mineral fibre pipe sections to comply with SANS 1445 part 3, where *specified*.

18.7 **Sumps, Catchpits, Chambers, Manholes & Boxes**

18.7.1 Bricks

Bricks must comply with SANS 227, class NFX (extra durable)

18.7.2 Concrete

Use concrete as described under Concrete, Form work and Reinforcement:

- 15 MPa concrete for unreinforced work
- 20 MPa concrete for reinforced work.

18.7.3 Mortar

Use mortar as described under Masonry. Mortar must be class I (1:3 cement: sand).

18.7.4 Plaster

Use plaster as described under Plastering. Plaster must be class I (1:3 cement: sand).

18.7.5 Gratings, Covers, Boxes

MATERIAL SPECIFICATIONS FOR GOLF BUILDING CONTRACT

Cast iron covers and frames must comply with SANS 558 for inspection chambers, septic tanks and surface boxes, of type, size and duty class as specified.

Cast iron gratings and frames must comply with SANS 1115 for gulleys and stormwater drains, of type, size and duty class as specified.

18.7.6 Pre-Cast Concrete Catchpits and Inspection Chambers

Pre-cast concrete catchpits and inspection chambers must comply with SANS 1294, of type and size as specified.

Offload and stack manhole components in an upright position, not higher than 2m. Use lifting equipment as recommended by the manufacturer.

18.7.7 Step-Irons

Step-irons must comply with SANS 1294.

18.7.8 Excavations

Follow closely excavation, installation and backfilling operations in order to minimise obstruction to traffic and possible stormwater damage.

Excavate 300 mm greater than the outside measurements of the chamber.

Drain any water filtering in to one side and remove by suitable means.

Take the necessary safety precautions as required by law.

18.7.9 In-Situ Brick and Concrete Construction

Build catchpits, chambers, manholes, sumps and boxes to sizes and depths as specified or as required. Refer to type drawings.

Build rainwater sumps and stopcock-, meter- and valve boxes with half brick walls on 100 mm unreinforced concrete bottoms and with 80 mm reinforced concrete top rebated for frame of grating and cover, or to full depth of cast iron boxes. Build insides to a fair face with flush joints. Plaster exposed surfaces only.

Build stormwater catchpits, manholes and sewer inspection chambers with one brick walls on 100 or 150 mm unreinforced concrete bottom and with 100 mm reinforced concrete cover slab rebated for frame of grating or cover. Plaster catchpits, manholes and chambers internally and on exposed surfaces.

Splay cover slab of sewer chambers and manholes away from manhole cover frames. Splay cover slab of stormwater catch pits towards grating frames.

Where stormwater surface channels discharge into catchpits, cast the cover slab as thick as the surface channel, and shape tops as shown on detail drawings.

Bench around half-round channels, bends and junctions of sewer chambers with unreinforced concrete finished smooth.

18.7.10 Pre-Cast Manhole Cast In-Situ Base Construction

Excavate to required level. Lay a 50 mm thick concrete blinding layer if in-situ material conditions are

MATERIAL SPECIFICATIONS FOR GOL BUILDING CONTRACT

unsuitable. Lay a 20 MPa unreinforced concrete foundation slab to specified thickness.

Set the starter section into the foundation slab or on 1:3 cement:sand mortar.

Lay acceptable channel fittings to the required line and level.

Fill around the channels with concrete and bench to the wall of the manhole at a slope of at least 1:6. Finish off with class I plaster.

Lower successive sections onto one another and seal and point neatly.

18.7.11 Testing

Test chambers for watertightness before backfilling

For pre-cast concrete manholes:

- Fill completely with water.
- Allow to stand for 24 hours.
- Refill and allow to stand for a second 24 hours.
- If the second drop in water level is more than 150 mm, inspect for faults and rectify

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

18.7.12 Backfilling

Backfill with selected fill material in layers not exceeding 300 mm in thickness, and compact to the same density as the fill over the pipeline.
Remove surplus material.

18.8 **Sanitary Fittings & Appliances**

18.8.1 Baths

Baths must be of enamelled steel or acrylic as *specified*. Enamelled steel baths must be of 1,6 mm thick enamelled pressed steel, rectangular, with recessed rims, overflow and outlet hole, and of *specified* size with or without handles.

Acrylic baths must comply with SANS 1402, carry a written guarantee against latent defects of a minimum of five years, and be of *specified* size with or without handles.

Fit baths with outlet and overflow unit, plug and chain, trap and two 20 mm chromium plated pillar taps.

18.8.2 Basins

Hand wash basins must be ceramic or stainless steel as *specified*.

Ceramic hand wash basins must be white glazed to comply with SANS 497, with outlet and overflow, and of *specified* size.

Stainless steel basins must be of 1,2 mm thick pressed stainless steel grade 304 to comply with SANS 906 with outlet, and of *specified* size with splashback, and soap-sinkings. Stainless steel basins may be single or in banks.

Fit basins with outlet and overflow unit, plug and chain, trap and one or two 15 mm chromium plated pillar taps. Fit white glazed stopper in second tap hole of ceramic basins, and leave one taphole of stainless steel basins un-pierced, in the case where cold water only is supplied.

Fit basins in ablutions with approved chromium plated taps with built-in flow controllers.

Hang basins on two white enamelled cast iron brackets each, fixed to walls. Space basins in ranges 75 mm apart. Build in hand rinse basins approximately 50 mm into walls with 1:3 cement-sand mortar.

18.8.3 Water Closets

Ceramic water closets must be white glazed to comply with SANS 497. Closet rims must be approximately 400 mm high, or in the case of nursery schools 300 mm high, or in the case of squatter pans, level with the floor. Squatter pans must be without foot treads.

Fit hinged solid hardwood or plastic double flap seats to closets with non-ferrous bolts. Fit nursery school closets with hardwood seat pads screwed and pelleted with brass screws.

18.8.4 Cisterns

Cisterns must be white low level cisterns of *specified* capacity to comply with SANS 821, of the valveless siphonic type or of the flushing valve type, with bodies

**MATERIAL SPECIFICATIONS FOR GOLF BUILDING
CONTRACT**

and lids of enamelled or spray painted cast iron or pressed steel, or of approved plastic, and with plastic flushing system.

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GOLF BUILDING CONTRACT

18.8.5 Urinals

Urinals must be white glazed ceramic to comply with SANS 497 of the wall mounted bowl type, of *specified* size, with back flush entry. Fit urinals with chromium plated domed grating, outlet and bottle trap, flush pipe and spreader.

Flushing system must be approved flush valve with chromium plated push button assembly, or white glazed ceramic automatic cistern of *specified* capacity, with bracket and drip-cock, as *specified*.

18.8.6 Drip Sinks

Drip sinks must be white glazed ceramic to comply with SANS 497, of *specified* size, with 320 mm high splashback, and fitted with hinged chromium plated bucket grating with rubber stops and hardwood pad. Fit drip sinks with chromium plated waste outlet, plug and chain.

Hang drip sink on two white enamelled cast iron brackets.

18.8.7 Stainless Steel Sinks

Stainless steel sinks with draining boards must be of satin polished stainless steel type 304, with sound-deadening material on the under side and with overflow, to comply with SANS 242, and of *specified* sizes. Sinks and draining boards must have splashbacks and tiling keys along the back and at sides where against walls.

Stainless steel sinks with draining boards and pot-sinks for institutions must be of satin polished stainless steel type 304, with sound-deadening material on the under side and with overflow, to comply with SANS 907, and of *specified* sizes. Sinks and draining boards must have splashbacks and tiling keys along the back and at sides where against walls.

18.8.8 Concrete Wash Troughs

Concrete wash trough must be of reinforced concrete, of *specified* size, with reeded front. Fit trough with outlet, plug and chain.

Drainers must be of reinforced concrete with lip to fit over side of trough and fixed to trough with copper dowels and to wall with bracket supplied.

Pedestals must be reinforced concrete.

Bed pedestals on floor, and trough on pedestals, with 1:2 cement-sand mortar.

18.8.9 Taps and Valves

All water taps and stop cocks must comply with SANS 226. Taps for cold and hot water must be marked blue and red respectively with plastic inserts.

Single control mixer taps must comply with SANS 1480.

Flush valves must comply with SANS 1240, of class and size as *specified*.

18.8.10 Traps

MATERIAL SPECIFICATIONS FOR GOLF BUILDING CONTRACT

Waste traps must be plastic or rubber or as *specified*.
Plastic waste traps must comply with SANS 1321, part 1,
of *specified* type, size and depth of seal.
Rubber waste traps must comply with SANS 1321 part 2,
of *specified* type, size and depth of seal.

18.8.11 Toilet Roll Holders, Towel Rails

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

Float glass comes in 3, 4, 5, 6 and 10 mm thickness.

Patterned glass is obtainable in 4 or 6 mm thickness in thirteen different designs and in clear, amber and bronze tints. All patterns cost the same.

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. Note that laminated and toughened safety glass is subject to manufacturer's lead times and can perhaps not be ordered before accurate dimensions can be established on site

Other glass types are wired glass, heat-absorbing glass, heat-reflecting glass, glare-reducing glass, toughened glass, bullet-resistant glass

Available plastic glazing material is polycarbonate, polymethyl methacrylate (acrylic), cellulose acetate butyrate, polyvinyl chloride, glass-fibre reinforced polyester, polystyrene

See also SANS 10137 The installation of glazing materials in buildings

Toilet roll holders must be chromium plated brass, of approved burglar proof type, or white glazed ceramic, as specified.

Towel rails must be chromium plated brass or aluminium, of approved type, or as specified.

18.8.12 Fixing of Sanitary Fittings Generally

- Leave protective wrappings in position for as long as possible
- Fix in a manner that will facilitate future removal if necessary
- Fix all appliances securely. Use manufacturers' brackets and fixing methods wherever possible. Use frame fixing anchors for fixing brackets. Do not screw and plug.
- Bed water closet pans in 1:3 cement-sand mortar. Bed squatter pans in 10 MPa concrete
- Build bath fronts up in brick masonry except where specified otherwise
- Bed acrylic baths in 1:5 cement: sand mortar on three rows of bricks, or bed solidly on dry river sand or concrete.
- Fix shower heads at 2100 mm above shower floor level
- Screw and plug toilet roll holders and towel rails to walls.

18.9 Electric Geysers

Geysers must comply with SANS 151 and be of type, working pressure, capacity, kW rating and mounting position as specified. Geysers must carry a guarantee on the tank, element, and thermostat for a period as specified.

Install geysers according to the manufacturer's instructions.

Position geysers on firm timber joists in roof space near a ceiling hatch so that the electric element can be reached from a step ladder through the hatch, whenever possible, or as specified.

Pre-set the geyser thermostat to 55° C.

18.10 Fire Equipment & Cupboards

SANS 10400 - The Application of the National Building Regulations, Parts T and W – Fire Protection and Fire Installation respectively are applicable. SANS 306-4, SANS 543, SANS 1128, SANS 1151, SANS 1910, SANS 10105-1, SANS 10139, SANS 10287, SANS 11601, SANS 14520-1 and SANS 50054-7 are all applicable standards.

18.11 Sleeves & Holes

Where water supply and other pipes pass through concrete, brick or blockwork, provision is to be made for sleeve pipes.

Chases and holes in walls for pipes and sleeves shall be carefully marked out prior to commencing work. These shall be of minimum practical size allowing an adequate cover of plaster, and if required, an additional reinforcing material.

**MATERIAL SPECIFICATIONS FOR GOLF BUILDING
CONTRACT**

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

19. GLAZING

19.1 Materials

19.1.1 Glass

Glass must be of type and thickness as *specified*.

Maximum pane sizes for single-pane float glass should not exceed 0,75 m² for 3 mm thickness, 1,5 m² for 4 mm thickness, 2,1 m² for 5 mm thickness or 3,2 m² for 6 mm thickness.

Safety and security glass must comply with SANS 1263, parts 1, 2 and 3. Each sheet of glass must be permanently engraved with the trade name of the laminator and the symbol '1' for safety glass, '2' for burglar-resistant glass, and '3' for bullet-resisting glass. These markings must be visible after glazing, and be situated in the left or right bottom corner of the installed sheet, unless otherwise *specified*.

Plastic glazing materials must be acrylic or polycarbonate to *specified* thickness.

19.1.2 Putty

Putty must comply with SANS 680 for use in primed metal or wooden frames.

19.1.3 Sealants

Sealants must be one or more of the following, as *specified*:

- polysulphide to comply with SANS 110 (two part)
- Silicone to comply with SANS 1305
- Polyurethane to comply with SANS 1077.

19.1.4 Gaskets, Tape, Setting Blocks

Elastomeric structural glazing and panel gaskets must comply with SANS 635, of dimensions and thickness as *specified*.

Adhesive glazing tape must be treated cotton-based tape with self-adhesive coating on one or both sides, or adhesive velvet ribbon with adhesive coating one side. Setting and locating blocks must be of an approved resilient, non-absorbent, inert material.

19.2 Glazing

19.2.1 Preparation

Allow an edge clearance of at least 3 mm all around panes up to 6 mm thick. Increase the edge clearance for thicker panes and with a minor dimension exceeding 1000 mm.

Do not cut or nip any glass thicker than 4 mm on site.

Discuss direction of pattern in obscure glass before cutting.

Treat timber frames and beads with a wood primer to comply with SANS 678. Ensure that the primer is compatible with glazing compounds.

MATERIAL SPECIFICATIONS FOR GOLF BUILDING CONTRACT

These glasses are liable to fracture if edges are damaged. Ensure that pane sizes allow for full specified edge clearance as edge nipping is not allowed

Putty glazing is not recommended for large panes or for buildings of more than five storeys.

All glazing methods require setting and location blocks to ensure proper performance of all elements of a window or door, especially opening sections - see SANS 10137

Treat steel frames with a suitable primer to comply with SANS 1319 or galvanising to comply with SANS 121.

Seal relative areas of masonry and concrete frames with two coats of alkali-resistant sealer that is compatible with the compound, unless the glass is fixed in mortar.

Ensure frames are dry, clean, true and square before glazing.

Ensure rebates are free from projections, e.g. screws.

Fix beads with screws and allow for the thickness of the glass plus at least 3 mm of glazing compound on each face.

Check edges of solar and tinted glass for damage and reject before fixing.

19.2.2 Putty Glazing

Putty glaze as follows:

- Place 25 - 75 mm long setting and location blocks and apply putty to rebate
- Press glass into putty to form solid backing at least 3 mm thick
- Secure sprigs, clips or cleats at 500 mm centres around perimeter
- Trim off excess back putty and finish to a smooth fillet
- Apply front putty and finish to a splayed finish. Finish front putty approximately 2 mm below the sight line to allow for sealing of the edge of the putty to the glazing material by overlapping of the paint. Intercut corners neatly
- Seal the putty to the glass with a light brushing.

19.2.3 Glazing with Flexible Compounds

Glaze with compounds as follows:

- Place 25 - 75 mm long setting and location blocks and apply compound to rebate
- Press glass into compound to form solid backing at least 3 mm thick
- Insert distance pieces
- Apply compound to glazed face as bedding for the beads
- Insert distance pieces
- Fix beads
- Tool compound to a smooth chamfer on both sides.

19.2.4 Structural Glazing

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

Also termed flush glazing or stuck-back glazing, structural glazing depends on stringent quality tests and checks, e.g. the pre-treatment of aluminium, surface finishing, sealants, and factory and site care. Check with AAAMSA

In the absence of any South African standard, the Glass and Architectural Aluminium Industry conforms with ASTM/C 794-80 (Standard Test for Adhesion-in-peel of Elastomeric Joint Sealants) as a method for determining the adhesion of structural sealants.

The local market for structural glazing sealant/adhesives is now well served by two major overseas sealant manufacturers, whose recommendations can be followed with confidence. Check with AAAMSA

Ensure liaison between the Representative/Agent, Engineer, aluminium contractor, glazing contractor and sealant manufacturer at an early stage and ensure continuous contact throughout the course of the contract.

Adhesion of the sealant to the aluminium, whether anodised or organic coated, must be capable of maintaining an ultimate adhesive bond strength between the aluminium and the sealant of 0,828 MPa. The design stress must not exceed 0,138 MPa

- Use only freshly manufactured silicone
- Use only compatible accessory materials as approved by the sealant manufacturer, e.g. degreasing solvents, primers, back-up material with integral bond breaker, spacer and setting blocks
- Ensure that disciplined quality assurance prevails during all stages of fabrication and installation. Factory glazing is preferred over site glazing.
- Fill the sealant cavity completely by applying the sealant in an approved manner.
- It is the responsibility of the structural sealant glazing contractor to check the adhesion of the cured sealant on representative test joints on site before proceeding with the installation. These checks should be carried out periodically throughout the installation period.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

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

19.2.5 Protection and Cleaning

- Protect glass against harmful splashes and weld splatter
- Clean the glass as soon as practicable after installation with mild soap and water
- Ensure cleaning materials are not harmful to plastic glazing material and glazing compounds.

19.2.6 Warranties

Provide a warranty by the manufacturer of the laminated safety glass and/or the hermetically sealed glazing units against delamination and colour degradation for a period of at least 5 (five) years.

Provide written proof that all stages of fabrication and installation of structural glazing have been executed with disciplined quality assurance in accordance with the relevant part of SANS 9000.

Provide written proof that structural sealants are compatible with extrusion surface, glazing tape and glass, together with the regular test reports regarding the adhesion of the sealant to the aluminium frame in accordance with American Society for Testing and Materials C794-80 (standard test for adhesion-peel of elastomeric joint sealants)

19.3 **Mirrors**

Mirrors must be one of the following, as specified:

- Silvered float glass mirrors with chamfered and polished edges, to comply with SANS 1236, class A.
- 0,9 mm thick bright annealed stainless steel.

Fasten glass mirrors with chromium plated mirror screws to wall and allow 3 mm air space at back for ventilation, or fix mirrors with vertical strips of double sided tape to allow for ventilation.

Fasten stainless steel mirrors by screws and/or glue in an approved manner.

Colour range from silver to pink, gold, bronze and black. Venetian strip mirror for visual privacy and/or security. Mirror backs are easily damaged. Support mirrors larger than 1 m² with additional clips, anchors or beads. Silvered obscure glass also available

No national standard on skylights exists. The Skylight Association of Southern Africa (SASA) addresses the issue of standards. Obtain a professional Engineer's certificate on design loading compliance. Consider heat transmission carefully. Provide drawings at time of tender, if available

19.4 **Skylights**

19.4.1 Shape

Skylights must be of shape and size as specified.

19.4.2 Mounting

Mounting must be flush, curb or integral, as specified.

19.4.3 Operation

Operation must be fixed or operable, as specified.

19.4.4 Wind Loading

Wind loading must be of category as specified.

19.4.5 Waterproofing

Glazing bars must allow for water penetration and effective drainage to the outside.

Condensation must be removed through the use of a guttered weep system.

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

19.4.6 Metal

Metal must be one of the following:

- Commercial alloy 6063 for extruded members
- Commercial aluminium alloy 3103, copper, zinc alloy, lead or galvanised steel flat sheet for sills and flashings
- Steel must be hot-rolled weldable structural steel, grade 300WA to comply with SANS 1431; Steel tubes must comply with SANS 657 part 1.

19.4.7 Glass

Glass must conform to SANS 1263 part 1.

Laminated glass or toughened glass must be to specified thickness.

19.4.8 Plastics

Plastic glazing material must be acrylic or polycarbonate to specified thickness.

19.4.9 Hardware

Hardware must be of aluminium, stainless steel or other corrosion resistant material which is compatible with adjoining materials.

19.4.10 Weather-Stripping, Gaskets, Sealants

Gaskets, sealants, etc. must be of approved material and type.

19.4.11 Finishes

When specified, aluminium must be anodised to SANS 999, of specified grade and colour.

Powder coating must be to SANS 1274, of type, finish, colour as specified.

Steel must be galvanised to SANS 121, of specified thickness

Paint must be alkyl enamel as specified under Painting.

19.4.12 Drawings, Testing and Fixing

The appointed skylight contractor must provide drawings showing design and installation details for approval by the Representative/Agent.

Securely anchor and seal the skylight(s).

If required by the Representative/Agent, test the skylight to the required performance class before installation. Provide a test performance certificate.

19.5 Patent Glazing

Proprietary glazing systems shall be fixed strictly in accordance with the manufacturer's instructions under the supervision of qualified personnel. SANS 613 applies.

Skylight shapes may be sloped, pitched, arched, domed, single or composite.

Category 1: exposed terrain;

2: open terrain with

scattered obstructions; 3:

terrain with closely spaced

obstructions like houses; 4:

city centres. Height of

skylight above ground must

be specified

To ensure proper condensation and water

infiltration control, and to

minimize the accumulation

of dirt, inclination of glazing

materials should be 15°

Laminated glass minimum

85% - 99% of UV radiation,

depending on type

Plastic sheeting is light-

weight and can be bent.

Provide for markedly greater

thermal movement than

glass.

Polycarbonate sheeting is

virtually unbreakable and is

self-extinguishing if exposed

to fire

Performance class as laid

down by the Skylight

Association of Southern

Africa: 1 (500 Pa design wind

pressure); 2 (1000 Pa); 3

(1500 Pa); 4 (2000 Pa)

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

20. PAINTWORK

20.1 General

20.1.1 Paint

Painting is to comply with SANS 10305.

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

Arrange a meeting with the painting contractor, a representative of the paint manufacturer and the Representative/Agent well in advance of the start of painting work and discuss every aspect of the paint work. After this meeting, obtain from the manufacturer a written paint specification and a statement that their specification complies with this specification. Exceptions must be *specified* separately where the manufacturer's specification differs from this specification, and will be acceptable only with the approval of the Representative/Agent.

Restrict all paint for one contract to one manufacturer. All containers must reach the site unopened and must bear the SANS-mark and specification number.

The complete paint system - primer, undercoat and finishing coat - must be as recommended by the same manufacturer.

The paint manufacturer must visit the site at least twice during the paint work, and confirm his approval of the paint work in writing in the site instruction book.

20.1.2 Preparation

Clean all surfaces before painting. Use sandpaper of the correct grit. Always sandpaper wood with the grain. Remove hemp from pipe joints.

When so directed by the Representative/Agent, remove ironmongery, light fittings and other removable fittings that can be contaminated. Mark, store and refix after completion.

Protect surfaces not to be painted.

20.1.3 Colours

The colours of undercoats must match the finishing coat closely but with enough difference to be able to distinguish between all coats.

Prepare colour samples of all finishing coats for *approval* before any bulk paint is purchased.

20.1.4 Painting in General

Sandpaper all coats of paint and varnish and leave time to dry before the next coat is applied.

Do not paint when conditions are unsuitable, e.g. dust, insufficient light, direct sunlight or inclement weather.

Spray-paint only where this is the accepted method. Mask all surrounding surfaces when spray-painting.

20.2 Painting

20.2.1 Paint on Woodwork

In the case of existing woodwork that has to be redecorated, wash down if paint is still firm, or remove blistered or broken down paint with a blow-torch or

MATERIAL SPECIFICATIONS FOR GOLF BUILDING CONTRACT

paint remover. Scrape out cracks, holes and crevices and make good with hard stopping.

Sand down surfaces with suitable grit abrasive paper, cloth or steel wool.

Treat knots with wood knotting.

Stop nail and screw heads, cracks with suitable hard stopping.

Prime or seal joinery before building in. This applies inter alia to frames, all six sides of a door, and to rebates and the backs of beads in glazing apertures.

Prime external structural timber before fixing.

Paint wood as follows:

- Prime with wood primer to comply with SANS 678, type 2.
- Paint one universal undercoat to comply with SANS 681, grade 1.
- Finish with two coats alkyd enamel paint to comply with SANS 630, type 1 for interior use, or type 2 for exterior use, and of specified finish.

Alkyd paints are available in either enamel or egg-shell finish.

20.2.2 Clear Finish on Woodwork

Sand down surfaces with suitable grit abrasive paper in the direction of the grain. Remove all pencil marks or other surface discolourations. Clean down existing hardwood that has to be redecorated.

Stop nail and screw heads and cracks with tinted stopping to match wood and rub down.

Stain wood if specified with approved stain. Apply stain according to the manufacturer's instructions. Provide a separate sample panel for approval of colour and application.

Prime backs of skirtings with clear varnish to comply with SANS 887 type 1 before being nailed to the wall.

Finish interior wood with one of the following clear finishes, as specified:

- Apply three coats clear eggshell varnish for interior wood to comply with SANS 887 type 1. Thin down the first coat with mineral turpentine according to the manufacturer's instructions, and allow each coat to dry overnight, or
- Apply polyurethane varnish to comply with SANS 887 type 2. Thin down the first coat with mineral turpentine according to the manufacturer's instructions, and allow each coat to dry overnight.

Polyurethane is suitable for hardwearing areas like worktops

Finish exterior wood as follows:

- Apply approved wood preservative to exposed exterior wood to saturate the surface, allowing each coat to soak in before applying further coats. Apply to end grain until no further soaking in takes place.

20.2.3 Alkyd Paint on Plaster

MATERIAL SPECIFICATIONS FOR GOLF BUILDING CONTRACT

Trapped dampness may cause blistering because alkyd paint does not breathe. The filling of gypsum plaster should be avoided. The use of gypsum based filler under alkyd paint may lead to saponification of the gypsum filler in the presence of water.

Make sure walls are dry.

Remove loose paint from previously painted surfaces.

Fill and stop cracks on one coat plaster only with suitable filling or with plaster of the same mix, and rub down. Do not fill gypsum plaster.

Paint plaster as follows:

- Apply one coat bonding liquid on gypsum plaster (two coat plaster)
- Apply one coat alkali resistant plaster primer on one coat plaster, to comply with SANS 1416
- Apply one universal undercoat to comply with SANS 681, grade 1
- Finish with one or two coats alkyd enamel paint to comply with SANS 630, type 2, and of specified finish.

20.2.4 Emulsion Paint on Plaster

Remove loose paint from previously painted surfaces.

Ensure complete drying depth of plaster before applying paint.

Rake out cracks and prime with emulsion paint to comply with SANS 1586 grade 2.

Paint walls as follows:

- Apply one coat emulsion paint to comply with SANS 1586, grade 2, thinned down with 10% clean water
- Apply two coats emulsion paint to comply with SANS 1586, of grade and gloss designation as specified.

Paint plastered ceilings as follows:

- Apply two coats emulsion paint to comply with SANS 1586, of grade and gloss designation as specified.

20.2.5 Emulsion Paint on Fibre Cement Fascias, Barge Boards, Cladding

Remove loose paint from previously painted surfaces.

Touch up steel screw heads and metal cover strips with zinc phosphate primer to comply with SANS 1319.

Touch up brass screw heads with vinyl wash primer.

Paint fascias, barge boards etc. as follows:

- Apply one coat emulsion paint to comply with SANS 1586, grade 2, thinned down with 10% clean water
- Apply two coats emulsion paint to comply with SANS 1586, of grade and gloss designation as specified.

20.2.6 Emulsion Paint on Fibre Cement and Gypsum Ceilings

Remove loose paint from previously painted surfaces.

Touch up nail heads and metal cover strips with zinc phosphate primer to comply with SANS 1319. Spot fill all nail heads and indentations.

Paint ceilings as follows:

- Apply two coats emulsion paint to comply with SANS 1586, of grade and gloss designation as specified.

Emulsion paints are alkali resistant, which makes them useful for applying to fresh cement work. Emulsion paint grades are 1 to 4, 1 having high hiding power, 4 being for interior use only.

MATERIAL SPECIFICATIONS FOR GOI BUILDING CONTRACT

20.2.7 Alkyd Paint on Structural Steel

In the case of structural steel that could not be factory primed, or where shop-primed steel has been damaged on site, or in the case of previously painted surfaces where the paint system has failed, prepare steel surfaces for priming to shiny metal state according to SANS 10064. Paint steel components with the full paint system before fixing in positions where painting will not be possible after fixing.

Paint steel as follows:

- Apply two coats of zinc phosphate primer to comply with SANS 1319.
- Finish with two coats structural steel alkyd based paint to comply with SANS 10305.

20.2.8 Alkyd Paint on Non-Structural Steel

Clean unpainted steel surfaces to shiny metal state by scraping or brushing. Remove loose paint from previously painted surfaces.

Paint steel as follows:

- Apply one coat zinc phosphate primer to comply with SANS 1319.
- Apply one universal undercoat to comply with SANS 681 grade 1.
- Finish with two coats alkyd enamel paint to comply with SANS 630, type 2, and of specified finish.

20.2.9 Paint on Galvanised Steel

Remove loose paint from previously painted surfaces. Scrub and wash with galvanised iron cleaner. Rinse thoroughly with clean water.

Sand or abrade to remove any rust stains, wipe clean and treat affected areas with a rust remover.

Where galvanised steel was unavoidably welded on site, clean joint and cold galvanise to approval.

Paint galvanised steel with one of the following systems, as specified:

- Apply one coat vinyl wash primer to comply with SANS 10305, one coat universal undercoat to comply with SANS 681 grade 1, and finish with two coats alkyd enamel paint to comply with SANS 630, type 2, and of specified finish, or
- Apply two coats emulsion roof paint to comply with SANS 940, or
- Apply one coat vinyl wash primer to comply with SANS 10305, and two coats emulsion paint to comply with SANS 1586 grade 1.

Paint galvanised fence posts as follows:

- Apply one coat vinyl wash primer to comply with SANS 10305, and two coats aluminium finishing paint to comply with SANS 682, grade 2.

20.2.10 Alkyd Paint on Cast Iron

Remove bitumen until a clean, sound substrate is achieved.

Apply one coat vinyl wash primer to comply with SANS 10305. Finish with one coat alkyd paint to comply with

MATERIAL SPECIFICATIONS FOR GOLF BUILDING CONTRACT

SANS 630 type 2, or with two coats emulsion paint to comply with SANS 1586, of grade and gloss designation as specified.

20.2.11 Paint on Pvc

Clean PVC thoroughly with suitable degreasing agent. Abrade lightly. Remove loose paint from previously painted surfaces.

Paint PVC one of the following, as specified:

- Apply one coat vinyl wash primer to comply with SANS 10305, and two coats emulsion roof paint to comply with SANS 940, or
- Apply one coat vinyl wash primer to comply with SANS 10305, and two coats emulsion paint to comply with SANS 1586, of grade and gloss designation as specified.

Polyurethane is the better
but more expensive and
tricky alternative

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

21. PAPER HANGING

21.1 **Wallpaper**

21.1.1 Preparation

Ensure plaster surfaces are dry.

Clean down, fill with suitable filler to a smooth surface.

Remove loose or blistering paint on previously painted surfaces.

Paint one coat emulsion paint on plaster.

Knot, prime, stop and sand down wood surfaces.

21.1.2 Hanging

Hang wallpaper vertically with close-fitted and plumb vertical joints. No horizontal joints are allowed.

Tightly fit wallpaper against skirtings, ceilings, door frames and windows.

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

22. EXTERNAL WORKS

22.1 Landscaping

22.1.1 Topsoil

Topsoil shall vary between sandy loamy soil and sandy clayey soil with an ideal composition of 15% to 25% clay, 10% silt/sludge and 65% to 75% sand, with a minimum ratio of organic material of 2%. All material shall be free of harmful deposits as well as unwanted seeds

22.1.2 Compost

Compost shall be composed of properly decayed organic material, free from harmful deposits, salts, seeds and other waste material and shall have a pH of more than 4 and less than 7

22.1.3 Mulch

Mulch shall be approved organic material free from small particles of bark residue, fungus, disease, etc

22.1.4 Lime

Lime shall be agricultural lime of an approved manufacture

22.1.5 Fertilizer

Fertilizer shall be of the type specified, mixed thoroughly into the soil as prescribed. No fertilizer shall be added more than two weeks prior to planting

22.1.6 Backfilling

Backfilling in plant and tree holes shall be composed of two parts topsoil to one part compost mixed thoroughly together and compacted by foot in 100mm layers. Fertilizer shall only be added if prescribed

22.1.7 Pebbles

Pebbles shall be smooth with a uniform colour and form and ranging in size from 50mm to 75mm diameter. Removal of pebbles from river beds shall be done selectively to avoid any major disruption to the ecology of the river and environment

22.1.8 Plant Material

a. General

All plant material (plants, shrubs, trees, etc) shall be obtained from a registered nursery and shall be free from damaged parts, parasites, fungus, other plant diseases or insects. No container-bound plants will be acceptable

b. Trees

The height of trees described in the bills of quantities shall be measured from the top of the root ball to the top of the tree. Where trees are pruned, such prune

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

wounds shall not be more than 25mm in diameter and be sealed with an approved sealing compound

c. Shrubs & Small Plants

Shrubs and small plants shall meet the requirements for height and spread as *specified*. Thin or sparsely branched plants shall not be accepted. Branches shall be well spread with ample young branches and the plant as a whole shall be growing well

d. Ground Cover

Groundcover shall be dense and healthy and shall comply with the minimum requirements for leaf density as *specified*. Formal grass shall be planted as runners in 50mm deep drills at 150mm centres unless otherwise described

22.1.9 Cultivation & Preparation of Planting Areas

All surface rocks and stones larger than 50mm shall be removed before commencing cultivation and preparation. The entire area shall be ripped and rotavated using approved machinery by breaking up the earth to a depth of 300mm at 600mm centres in both directions, unless otherwise described, and then levelled. Where fertilizer or compost is *specified*, it shall be worked into the topsoil after ripping and rotavation to a depth of 300mm and finished to final levels

All fertilizer to areas to be grassed shall be strewn on the final layer before final finishing is commenced and worked mechanically into the top 150mm soil

22.1.10 Planting Procedure

Holes for shrubs and groundcover shall be as follows:

Shrubs – 500 x 500 x 500mm deep

Groundcover – 300 x 300 x 300mm deep (if not planted in drills)

Holes for trees shall be square, of adequate size to accommodate the root system and suitable for the height of the tree

All plant material shall be watered thoroughly before careful removal from the container and planted in the prescribed planting medium with the top of the soil in the container finishing level with the surrounding area. Water dams size 800mm diameter x 150mm deep and 500mm diameter x 150mm deep shall be formed around trees and shrubs respectively and all planting material shall be watered immediately after planting. Trees, shrubs, etc shall be properly staked or stayed, depending on their size, on the prevailing windy side with patent tree ties

22.1.11 Maintenance

All planted areas shall be maintained for a period of three months after practical completion as defined in the contract with the exception shall be maintained for 12 months after an acceptable cover has been obtained

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

This maintenance shall consist of keeping clear of weeds and litter, loosening soil where necessary every two weeks, replacing damaged, diseased or dead plants, pruning, cutting and mowing as necessary and watering so as to keep the plant material in a healthy growing condition

22.2 Roadwork and Paving

22.2.1 Filling

Filling under roads etc shall be of inert material having a maximum plasticity index of 10, free from large stones etc spread, levelled, watered and compacted in layers not exceeding 200mm thick to a density of 98% MOD AASHTO

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GOI BUILDING CONTRACT

22.2.2 Preparation of Sub-Grade

The sub-grade shall be prepared by scarifying for a depth of 150mm and compacting to a density of 98% MOD AASHTO, including trimming to the correct levels and grades

22.2.3 Base Course

The base course shall consist of crusher run stone compacted to a density of 98% MOD AASHTO and finished to the correct levels and grades

22.2.4 Weed Killer

The completed sub-grade shall be treated with an approved total weed killer

22.2.5 Bituminous Premix Road Surfacing

Before spreading the premix material, the base course shall be swept clean and free from all dust, dirt and loose particles lightly wetted and sprayed with a prime coat of cutback bitumen complying with SANS 308 at the rate of 1 litre/m²

The material shall consist of semi-gap graded crushed stone aggregate having the following grading:

Sieve size (mm) % By mass passing sieve

13,2	100
4,75	45-60
2,36	42-55
1,18	40-52
0,3	25-45
0,075	5-12

The aggregate shall be mixed with bituminous road tar binder complying with SANS 748 at the rate of 1m³ of stone to 120 litres of emulsion at atmospheric temperature

The binder shall be added to the stone and mixed until the stone is uniformly coated. Thereafter 5% of clean, dry quartzitic sand shall be added and mixed until evenly distributed through the mixture

The premix shall be applied only after the primer has dried out completely and shall be spread immediately after mixing and rolled on the same day

Spreading shall be done evenly over the prepared base course to a loose depth sufficient to ensure the consolidated thickness specified

Rolling shall commence as soon as the binder has set sufficiently, followed after three days by a final rolling

22.2.6 Precast Concrete Block Road Surfacing

Paving blocks shall be precast concrete blocks complying with SANS 1058

Blocks shall be laid to true levels and grades on and including a 25mm thick layer of river sand with joints exceeding 2mm and not exceeding 6mm wide

After laying, the paving shall be compacted by means of a vibrating plate compactor, with joints between the blocks filled in, after compaction, by sweeping in fine sand

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

Infill areas at edges of paving constituting less than 25% of a full block unit and of 25mm minimum dimension shall be filled with Class C prescribed mix unreinforced concrete with top surface trowelled smooth to match blocks. Smaller areas shall be filled with 1:4 cement mortar

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

22.2.7 Precast Concrete Kerbs and Channels

Precast concrete kerbs and channels shall comply with SANS 927, generally in 1m lengths and finished smooth from the mould on exposed surfaces. Kerbs and channels shall be bedded on and jointed in 1:3 cement mortar and pointed with keyed joints. Bases to kerbs shall be Class B prescribed mix unreinforced concrete

22.2.8 Process Control Tests

The Contractor shall be responsible for carrying out all necessary process control tests on the density and moisture content of the compacted sub-grade, base course, etc to ensure that the required compaction is being attained

22.3 **Retaining Structures**

22.3.1 Blocks

Concrete retaining blocks must be of type and size as specified.

22.3.2 Placing

Place blocks as follows:

- Prepare level and compacted earth foundation trench of depth as specified.
- Stack units by hand, without mortar, in an agreed pattern.
- Place approved granular backfill and compact to specified density.
- Fill units with fertile soil as each row is completed, and lightly tamp.

22.4 **Fencing**

22.4.1 Wire

Straining wire, binding wire and chain-link wire must comply with SANS 1373, with light zinc coating to comply with SANS 675, and of diameter and mesh size as specified.

Flat wrap razor security wire must comply with SABS-CKS 592. Wire and clips must be aluzinc coated.

22.4.2 Straining Eye Bolts

Straining eye bolts must be 10 mm diameter x 300 mm threaded mild steel bolt with eye, washer and nut, galvanised to SANS 935, general duty. Approved permanent wire pullers may be used instead.

22.4.3 Droppers

Droppers must be mild steel H-section with holes and a mass of 470 g/m, or T-section with ridged face and a mass of 550 g/m. The length of droppers must be 75 mm longer than the distance between top and bottom lines. Droppers must be finished as specified.

22.4.4 Standards

Standards must be mild steel H- , bulb T- or bell section, pointed to facilitate insertion into ground. Standards must be finished as specified.

Concrete retaining blocks are an economical, versatile and environmentally compatible method of retaining earth, and can also be used effectively for steps, seats, pavilions, erosion and scour control.

22 Also on sloping, or gravel or concrete foundation. Drawings should show this. Compacted earth foundation is usually sufficient for structures not higher than 1,5m. 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 professional Engineer. Ensure compliance with local building regulations

Use PVC coating in corrosive conditions

MATERIAL SPECIFICATIONS FOR GOI BUILDING CONTRACT

22.4.5 Posts and Stays

Steel posts must be mild steel tubing of minimum 65 mm nominal diameter and minimum 3,25 mm wall thickness, with 230 x 230 x 5 mm mild steel base plates welded on. Posts must be fitted with pressed steel mushroom cap welded on.

Steel stays must be mild steel tubing of minimum 40 mm nominal diameter and minimum 2,9 mm wall thickness, with 150 x 150 x 3 mm mild steel base plates welded on. One end of stays must be flattened, bent and holed for fixing to post with 12M bolt.

Posts and stays must be painted with two coats bituminous aluminium paint to parts above ground, and with approved tar to parts below ground, or as specified.

Concrete posts must be pre-stressed alkali aggregate reactive concrete.

Wood posts must be creosote or tanalith treated to comply with SANS 457.

Posts must be provided with holes for hinges, straining bolts or binding wire as specified.

22.4.6 Concrete

Concrete for bases must be 10mpa concrete.

22.4.7 Erection

Erect fences as follows:

- Clear the fence route of vegetation or other obstructions. Roughly level to obtain a uniform gradient
- Excavate holes 400 x 400 x 800 mm deep for posts and 300 x 300 x 600 mm deep for stays. Excavations are deemed to be in "soil". Notify Representative/Agent if harder material is encountered
- Plant posts and stays in concrete to 50 mm above ground level with chamfered top surface, at gates, corners, and at *specified* distances, or at acute changes in level. Provide stays to all straining posts in direction of the line of fence
- Drive standards 450 mm deep into ground at 3 m centres
- Thread straining wire through holes in standards, bind around posts or straining eye bolts and strain to *approval*
- Bind droppers to straining wire with binding wire
- Cover with wire mesh, tension and bind securely to straining wire at every third mesh. Join roll ends with a spiral to form a continuous fence. Tie or clip welded mesh to straining wire at 300 mm centres. Trim roll ends by overlapping 100 mm
- Fix flat wrap razor wire in loops of *specified* diameter and with barbed straining wires, with binding wire as *specified*
- If ground is soft or a post or stay cannot be securely fixed, improvise
- Make good any damaged protective coatings

MATERIAL SPECIFICATIONS FOR GOLF BUILDING CONTRACT

- Do not cut preservative treated timber where it will be in the ground.
- Check fence on completion. Grease hinges. Cut off projecting bolt threads. Burr over bolt ends to prevent nut removal and coat with bitumen paint.

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GoL BUILDING CONTRACT

22.4.8 Gates

Form gates of 50 mm diameter x 2,8 mm wall thickness mild steel pipe frame with all joints welded, with braces as specified, and filled in with wire mesh as described for fencing, strained and bound to the frame with binding wire.

Gates must be of sizes as specified.

Hang gates on hinges as specified.

Provide gates with catches, drop bolts and locking devices as specified.

Gates and accessories must be hot dip galvanised to comply with SANS 935, or painted two coats bituminous aluminium paint to comply with SANS 682, as specified.

22.5 Concrete & Clay Brick Paving

22.5.1 Concrete Paving

Pre-cast concrete segmental blocks must comply with SANS 1058 of type, class, nominal thickness and colour as specified.

22.5.2 Clay Pavers

Burnt clay paving units to comply with SANS 1575 of class and work size as specified. Supply a sample of ten units for comparison purposes.

22.5.3 Sand for Flexible Paving

Sand for bedding and jointing must be free of soluble salts or contaminants likely to cause efflorescence or staining, and have a moisture content of 5-8 %.

Bedding sand must comply with the following grading

limits:

Sieve size (mm)	% passing
9,25	100
4,75	95 - 100
2,36	80 - 100
1,18	50 - 85
0,60	25 - 60
0,30	10 - 30
0,15	5 - 15
0,075	0 - 10

Do not use mine sand.

Jointing sand must pass a 1,18 mm sieve and contain 10-50 % material passing a 0,075 mm sieve.

Provide written proof that the sand conforms to the above grading limits.

22.5.4 Mortar for Rigid Paving

Mortar for rigid paving must be class I mortar.

Use a minimum water and a sand with a fineness modulus in the region of 2,2 - 4,0 to minimize permeability.

22.5.5 Sub-Grade

Excavate to achieve specified finished levels and falls.

Remove soft spots and biodegradable material and replace with approved filling material.

Complete installation of all sub-soil drainage pipes.

Relevant sources of information:

Pre-cast concrete paving blocks - laying manual, The Concrete Masonry Association

Technical guide: Clay Pavers & Paving - selection and construction guidelines, Corobrik

A fall of 1:60 is regarded as an optimum fall

**MATERIAL SPECIFICATIONS FOR G6L BUILDING
CONTRACT**

Compact to 90% MOD AASHTO. Take special care to compact trenches and around manholes. Stabilise with 5% cement prior to compaction if necessary.

DRAFT FOR REVIEW ONLY

MATERIAL SPECIFICATIONS FOR GOI BUILDING CONTRACT

22.5.6 Sub-Base for Flexible Paving

Sub-base material must be approved by the Representative/Agent.

Compact to at least 90% MOD AASHTO, or as specified. Form the paving surface profile on the finished surface of the sub-base. Do not make up irregularities in the surface with bedding sand.

22.5.7 Concrete Sub-Base for Rigid Paving

Concrete for the sub-base of rigid paving must be 10 MPa concrete to thickness and reinforcement as specified.

Lay concrete on prepared subgrade, and form to paving surface profile.

Cure concrete for 8 days.

22.5.8 Edge Restraints

Edge restraints must be as specified.

22.5.9 Infill Concrete

Infill concrete must be 25 MPa concrete with 10 mm aggregate.

22.5.10 Weed Killer

Treat the area to be paved with approved weed killer if specified.

22.5.11 Levels, Falls, Pattern

Ensure all kerbs and edge restraints are completed and levels and falls are correct. Agree laying patterns with the Representative/Agent before laying any paving.

22.5.12 Flexible Paving

Flexible paving is paving laid on sand, with joints filled with sand

Lay pavers true to line and level on loose and evenly spread sand bedding. Lay full units first. Joints must be between 2 and 6 mm wide.

Fill areas in which a full unit will not fit with clean-cut units or, if less than 25 % of a full unit, with concrete left for 24 h before compacting.

Compact the surface as soon as practicable and not closer than 1 m from free edges or working faces with a high frequency, low amplitude mechanical flat plate vibrator capable of producing a centrifugal force of 7-16 kN at a frequency of approximately 75-100 Hz on a plate size of 0,35-0,5 m². Make sufficient passes to compact the sand bedding to between 15 and 35 mm thickness. Make at least two passes.

Brush joint filling sand into joints after the first pass. Remove excess sand on completion.

22.5.13 Rigid Paving

Rigid paving is paving bedded in mortar on a concrete base

Clean base concrete.

Set out pavers to approved pattern with string, templates or gauge rods, or dry lay the entire area.

Brush a 1:1 cement: fine sand slurry over the surface.

Dip clay pavers with a high absorption rate in water before laying. Otherwise do not wet pavers.

MATERIAL SPECIFICATIONS FOR GOI BUILDING CONTRACT

Butter each paver, bed solid in mortar, and fill joint in one operation.

Tool joints flush or bucket handle to *approval*.

Provide 10 mm movement joints at 4,5 m intervals at right angles, against buildings or edge restraints, around manholes, columns, or as *specified*. Fill movement joints with polysulphide or silicone rubber sealant.

22.5.14 Cutting

Cut pavers with a masonry disc cutter.

22.5.15 Tolerance

Gradual allowed deviation under a 3 m straight edge is 10 mm maximum.

Allowed difference in level between adjacent units is 3 mm maximum.

Allowed deviation of line of pattern is 15 mm in 3 m maximum.

22.5.16 Cleaning

Leave the paving clean and free from stains.

22.6 **Concrete Kerbs & Channels**

22.6.1 Kerbs and Channels

Pre-cast concrete kerbs and channels to comply with SANS 927, of type as *specified*. Nominal length must be 1000 mm maximum for straight or curved kerbs with a maximum radius of more than 20 m, or 500 mm maximum for curved kerbs with a radius between 4 and 20 m, or 300 mm maximum for radii up to 4 m.

In situ concrete channels must be of 30 MPa concrete, to profile as *specified*.

22.6.2 Mortar

Mortar must be class I mortar.

22.6.3 Bedding Material

Bedding material must be crushed stone, sinter, slag, sand or *approved* porous material with a particle size of 13 mm maximum.

22.6.4 Backing Concrete

Backing concrete must be 15 MPa concrete.

22.6.5 Joint Sealant

Joint sealant, where *specified* for movement joints, must be polysulphide to comply with SANS 110.

22.6.6 Laying

Excavate trenches for kerbs and channels to below the required level and refill with at least 70 mm of bedding material. Compact to required level and slope to at least 90 % MOD AASHTO.

Bed kerbs and channels on 50 mm bedding material with 10 mm joints filled with mortar. Wet joints well before jointing.

MATERIAL SPECIFICATIONS FOR GOLF BUILDING CONTRACT

Provide 12 mm wide movement joints in channels at intervals not exceeding 20 m and leave open, or fill with polysulphide when dry, as *specified*.

Support backs of kerbs with a layer of well-compacted backing concrete.

Fill behind kerbs with approved material in layers not exceeding 150 mm, wet and compact to 90 % MOD AASHTO.

Protect concrete against damage and discolouration.

DRAFT FOR REVIEW ONLY

**MATERIAL SPECIFICATIONS FOR GOLF BUILDING
CONTRACT**

22.6.7 Tolerance

The maximum allowed deviation of any edge, centre line or vertical surface from specified position is 25 mm
The maximum allowed deviation of any invert level is 10 mm.

DRAFT FOR REVIEW ONLY