

# WORKS INFORMATION DOCUMENT FOR THE RATIONAL DESIGN OF WATER PIPED SERVICES

JANUARY 2011

**Directors:**

M.C. du Plooy (Managing)\*\*\*, G.J. Page (C.O.O.)\*\*, R.W. Baard, K. Ferreira\*, P.D. Hodgkinson\*, A.R. Keen<sup>B</sup>\*,  
D.R. Kennaugh\*, N.J. King\*, G.L. Mazzuchetti\*, G.M. Nichollas\*

**Principal Associates (Regional):**

S.J. Barrett, C. Cecchi, M.D. Collier\*, J.M. Houston\*\*, R.E. Howell, M.F. Veldon<sup>B</sup>

**Associates (Regional):**

M.D. Anderson, G.A. Arnold, G.J. Bothma, L.D. Dodrill, S.J. Kemsley, A. Kotze, J.A. La Grange, C. Pieters\*\*, F.E. Wiggill

(<sup>B</sup> British) (\* Pr Eng) (\*\* Pr Tech Eng)

<b>1</b>	<b>DESIGN PHILOSOPHY</b>	<b>3</b>
1.1	INTRODUCTION	3
1.2	Domestic Cold Water System	3
1.2.1	<b>Supply &amp; Storage</b>	3
1.2.2	<b>Pressure</b>	4
1.2.3	<b>Flow Rate to Fixtures</b>	4
1.3	Non-Potable Cold Water System	4
1.4	Domestic Hot Water System	4
1.4.1	<b>Proposed Operation of Hot Water System</b>	4
1.4.2	<b>Flow Rate to Fixtures</b>	4
1.5	Sanitary Drainage System	4
1.6	Rainwater System	5
1.7	Grey Water System (Not applicable)	5
1.8	Fire Water Reticulation	5
<b>2</b>	<b>DESIGN, ENGINEERING &amp; SPECIFICATION</b>	<b>5</b>
2.1	General	5
2.2	Material Specification	6
2.2.1	<b>Water Supply Piping (Internal)</b>	6
2.2.2	<b>Water Supply Piping (External)</b>	6
2.2.3	<b>Rainwater Piping</b>	6
2.2.4	<b>Fire Water Piping</b>	7
2.3	Construction and Investigation	7
2.4	Supply of Plant & Materials	7
2.5	Fixing of Materials	7
2.6	Special Valves	9
2.7	Special Backstops	9
2.8	Grease Trapping	9
2.9	Floor Drains	9
2.10	Special Items	9
2.11	Tanks	10
2.12	Pumps	10
2.13	BMS Connections	11
<b>3</b>	<b>STANDARD DETAILS</b>	<b>11</b>
<b>4</b>	<b>OPERATION &amp; MAINTENANCE (O&amp;M) MANUALS</b>	<b>11</b>
<b>5</b>	<b>QUALITY ASSURANCE (QA) AND QUALITY CONTROL (QC) PROCESS</b>	<b>11</b>
5.1	Scope	12
5.2	Sanitary Drainage – Work To Be Done By The Contractor	12
5.3	Plumbing Hot & Cold Water – Work To Be Done By The Contractor	13
5.4	Duties of QA Supervisor	14
5.4.1	<b>References</b>	14
5.4.2	<b>“Kick-Off Meeting”</b>	15
5.4.3	<b>Pressure Testing of Completed Sections of the Installation</b>	15
5.4.4	<b>Site Meetings &amp; Inspections</b>	16
5.4.5	<b>Progress Reports</b>	16
5.5	Check Lists	16
<b>6</b>	<b>PLUMBERS CERTIFICATE</b>	<b>16</b>

**This document must be read in conjunction with the Model Preambles for Trades as included in the BOQ and all relevant drawings.**

## 1 DESIGN PHILOSOPHY

### 1.1 INTRODUCTION

The following water piped services shall be designed and installed under this works information document.

- Domestic water system, (hot and cold water internally)
- Domestic water reticulation (externally)
- Solar water heating
- Grey water drainage system
- Sanitary drainage system (internally).
- Sanitary drainage system (externally – designed by the Nelspruit Branch of WSP civils).
- Potable Water storage facilities and pressure boosting plant and equipment

The plumbing and drainage system is the subject of a rational design by a professional engineer employed by the *employer*. The rational design is based on the engineering criteria of SANS 10400 P, T, W, SANS 10252-1 AND SANS 10252-2 and SANS 10254 and other relevant institutional requirements.

The above mentioned services shall be designed on a rational basis to render the most appropriate, cost effective and fit for purpose systems. One of the main objectives of the rational design is to contribute towards sustainable development by means of utilising rainwater and grey water on site to minimise the use of municipal water.

The plumbing and drainage *works* is engineered, specified and shown on drawings and set out in this *works* information document. Special items have been specified and their specifications include performance criteria.

Pressure boosting pumps will provide and guarantee the necessary pressure to operate the water reticulation and irrigation system. The domestic potable water fixtures will feed from the 350,000 L water storage tank and will be used for human consumption purposes.

The selection of materials and plant shall be appropriate to suit the level of comfort required by the owner and shall be of a suitable quality to last for a design life span of between 20 and 25 years without major refurbishment during this period.

The proposed materials of pipes fittings and plant shall be of a high quality, durable and require low maintenance.

### 1.2 DOMESTIC COLD WATER SYSTEM

The domestic water system is designed on the basis that there is **no water supply** from the Municipality.

It is also designed in accordance with the basic principles of SANS 10252-1.

#### 1.2.1 **Supply & Storage**

The primary supply of water shall be via boreholes and /or the adjacent rivers. The water will pass through a water purification system prior to storage into the water storage tank. Storage tanks shall be provided to ensure a stable water supply.

Please refer to the section for tanks in this document for further information.

#### **1.2.2 Pressure**

Pressure shall be maintained by means of 3 boosting pumps. The system pressure shall not exceed 600kPa (unless otherwise noted) and the pressure at the furthest point shall be not less than 300 kPa. This pressure shall be made available to the Domestic Hot Water System.

Please refer to the section for pumps in this document for further information.

#### **1.2.3 Flow Rate to Fixtures**

The pipes shall be designed in accordance with SANS 10252 and the manufacturer's technical information. Pipes will also be sized to suite the operational requirements of the chosen brassware and sanitary ware fixtures. No flow velocity shall exceed 1.5m/s inside buildings. The contractor shall strictly adhere to the diameters indicated on plan to achieve the desired flow rates.

### **1.3 NON-POTABLE COLD WATER SYSTEM**

A non-potable cold water system shall provide water for the irrigation system. The water will be made available from the blackwater treatment plant.

### **1.4 DOMESTIC HOT WATER SYSTEM**

**The proposed system is a conventional domestic solar geyser installation.**

This system will comprise locally installed geysers that will generate hot water. Geysers will be installed either vertically or horizontally, with all the required components as per SANS 10254.

#### **1.4.1 Proposed Operation of Hot Water System**

The primary source of energy shall be SOLAR PANELS with an approved solar system and the secondary or back-up system will be electricity from the town supply grid. The geyser shall generate hot water at a temperature of 55° C.

All piping shall be lagged to prevent heat loss, as per the pipe material section further in this document.

The system shall be complete with all electrical controls.

#### **1.4.2 Flow Rate to Fixtures**

The pipes shall be designed in accordance with SANS 10252 and the manufacturer's technical information. Pipes will also be sized to suite the operational requirements of the chosen brassware and sanitary ware fixtures.

No flow velocity shall exceed 1.5m/s inside buildings. The contractor shall strictly adhere to the diameters indicated on plan to achieve the desired flow rates.

### **1.5 SANITARY DRAINAGE SYSTEM**

The drainage system shall be a 1-pipe system with 110mm common stacks for soil and waste water.

The various types of fitting such as WCs, WHBs, Baths and Sinks, etc, shall all discharge into the 110mm diameter horizontal branch pipes by means of 110mm diameter branch

pipes with "floor drains " and in some cases, "stub stacks" and in some cases smaller diameter pipes all as shown on the drawings and details.

Floor outlets shall be installed in all bathrooms, toilets, kitchens, plant rooms, garbage disposal areas, water features, flower boxes and landscaped areas, etc, as shown on the drawings.

The contractor shall be responsible for the "construction engineering" of the works and for the secondary co-ordination on site.

The piping, where possible and appropriate, shall be recessed in the walls.

**Pipe falls shall be at a minimum of 1:60 or as indicated on plan.**

## 1.6 RAINWATER SYSTEM

The rainwater system shall be a conventional gravity system, relying on cast-iron full-bore outlets and rain water down pipes (where necessary). The contractor shall also adhere to the manufacturer's installation requirements. This system shall discharge into the non-potable cold water storage tanks or to the municipal storm water connection or to the retention pond.

A suitable overflow pipe shall be provided for the storage tanks that connect to the bulk storm water pipe.

## 1.7 GREY WATER SYSTEM (NOT APPLICABLE)

## 1.8 FIRE WATER RETICULATION

The fire water system is designed in accordance with SANS 10252 and SABS 0400. The reticulation shall be designed and installed to ensure the following:

- 1200/min @ 300 kPa for hydrants
- 30l/min @ 300 kPa for hose reels

# 2 **DESIGN, ENGINEERING & SPECIFICATION**

## 2.1 GENERAL

All plumbing and drainage *works* shall be included in this subcontract.

The kitchen equipment and all sanitary ware including all fittings such as taps, mixers and showers shall all be the responsibility of the *plumber* to provide and install all necessary plumbing and drainage services and install all the abovementioned sanitary ware and fittings and taps etc, and be responsible for the correct operation of the complete installation.

All specialist installations such as the pumping systems, water treatment plant, equipment and solar water heating system etc, shall be PC items, not included in the Plumbing & Drainage BOQ, which shall be supplied and installed by the relevant specialist contractor as a sub-contractor of the main contractor. The main contractor shall be responsible for the on-site co-ordination of all these elements into the overall plumbing system to render a complete operating system that performs to the required criteria. DSB will provide all the required performance criteria and drawings to facilitate this process.

All work shall be carried out strictly according to the relevant SABS Specifications, Codes of

The engineering, quality control and inspections, selection of equipment and materials, preparation of workshop drawings, drawings, testing, adjusting, commissioning and preparation of operation and maintenance manuals, are to be executed in a systematic manner and programmed, under the *contractor's* general supervision and direction.

## 2.2 MATERIAL SPECIFICATION

The proposed materials of pipes fittings and plant shall be of a high quality, durable and require low maintenance.

The pipe manufacturer shall train all plumbers of the plumbing contractor to carry out the pipe installation and these approved trained plumbers shall carry suitable identification to prove that they are trained.

NO OTHER UNTRAINED PLUMBER SHALL BE ALLOWED TO WORK ON THE PROJECT.

COMPLETED SECTIONS OF THE PIPING SYSTEMS SHALL BE TESTED AND THE TESTING SHALL NOT BE POSTPONED TO THE FINAL COMPLETION OF THE SYSTEMS.

THE PIPING SHALL BE "PRESSURE" TESTED AS PER THE PIPE MANUFACTURERS REQUIREMENTS AND THE PRESSURE REQUIRED AS PER SANS 10252-1 WHICHEVER IS THE HIGHEST PRESSURE.

THE PRESSURE SHALL BE MAINTAINED FOR THE MAXIMUM PERIOD SPECIFIED.

THE PIPING SYSTEM SHALL BE CHARGED WITH WATER CONSTANTLY AND THE AS-BUILT POSITION SHALL BE MARKED ON A DRAWING TO PREVENT DAMAGE WHEN OTHER INSTALLATIONS ARE DOEN LATER ON.

**Only material from one supplier shall be used in the various categories below.**

This affords the supplier the oppurtunity to provide regular QA checks and issue reports.

### 2.2.1 Water Supply Piping (Internal)

The material of choice is COPRAX piping and fittings.

All bracketing, fixing and installation methods shall be as per the manufacturer's specification.

All hot water piping shall be insulated as per SANS 1025-2 to prevent heat loss.

- Internal diameter < 40mm = 25mm thick
- Internal diameter > 40mm, but < 80mm = 40mm thick
- Internal diameter > 80mm = 60mm thick

### 2.2.2 Water Supply Piping (External)

The material of choice is HDPE piping and fittings..

### 2.2.3 Rainwater Piping

The material of choice for the conventional rain water system is Class 6 u-PVC for the rain water down pipes and Class 34 u-PVC for the underground installation.

All the manufacturers' specifications shall be adhered to and the relevant SANS 1200 guidelines shall be followed for the correct installation and backfilling of the underground piping.

#### 2.2.4 **Fire Water Piping**

The material of choice is SABS approved medium class galvanised mild steel.  
The contractor is free to opt for "Victaulic" type joints or standard threaded joints.

### 2.3 CONSTRUCTION AND INVESTIGATION

The construction will include the production of workshop drawings complete with pipe configuration, where the *subcontractor or engineer* deems it necessary, for approval by the *Engineer*.

**The subcontractor shall be responsible for all elements of the systems and the integration into the complete specified system according to the required performance. The subcontractor shall provide the total overall guarantee of the complete works.**

**The subcontractor shall carry out on-site investigations to obtain the "as-built" situation before construction of any system.**

The *subcontractor* shall be responsible to ensure that all necessary sleeves in concrete slabs and beams are installed before concrete is poured.

### 2.4 SUPPLY OF PLANT & MATERIALS

All materials, plant and equipment shall be generally available locally. All imports shall be subject to special permission being granted by the *Engineer*.

**The supplier of materials, plant and equipment shall provide full back-up guarantees for it. These written guarantees shall be submitted to the Engineer before ordering or procurement.**

**The pipe manufacturer/supplier shall provide guarantees for the pipe materials against defects and the subcontractor shall be liable for the costs of damages due to any failure relating to defective materials. THESE GUARANTEES SHALL BE SUBMITTED BEFORE WORK COMMENCE ON SITE.**

Plant and equipment such as pump-sets and the hot water generation plants shall be factory tested and inspected and approved by the *Engineer* before despatch to the site for installation.

### 2.5 FIXING OF MATERIALS

All pipes and fittings shall be installed strictly in accordance with the requirements of the relevant SABS Standards, Codes of Practice, Institutional Requirements and the Manufacturers'/Suppliers' requirements, all of which shall be approved by the *Engineer* prior to construction.

All pipes shall be marked with colour coding bands at regular intervals as specified by the SABS.

- Pipes shall be "fixed" and not allowed to "swing", and ONLY approved prefabricated double hanger pipe supports/brackets shall be used.
- The approved manufacturer shall specify and guarantee the method of fixing to concrete and other structures including the support spacing for the various pipe sizes and mass ( with it contents).
- Minimum support spacing shall be specified by the pipe manufacturer for the various pipe diameters.
- Appropriate insulation shall be provided to separate dissimilar materials.

- The complete pipe installation shall be cleaned and sterilised according to SABNS 10252-1.
- Appropriate provision shall be made for thermal expansion of the piping installation, air releasing and backflow prevention where necessary.
- Water hammer shall be eliminated by means of suitable water hammer arrestors and suitable pipe anchors and supports.
- Approved flexible couplings shall be provided between pumps and the pipe installation.
- Pipes shall only pass in sleeves through walls, columns and beams and other structures.
- Pipes in plaster and screed shall be wrapped in an approved material.
- All fittings and equipment shall be provided with a shut-off facility such as a valve, angle valve or ball-o-stop.
- Hot water pipes shall be installed at a slight gradient to allow air release with air release valves at the high points.
- Pipes shall be installed in such a manner as to allow easy access for maintenance and operation.
- All pipes where fixed or supported with metal supports or brackets, shall be insulated with a suitable material.
- Only pipes from one approved manufacturer shall be used and no other pipes from other manufacturers shall be allowed on site.
- The mark of the approved manufacturer shall be clearly displayed. If any problem occurs on the piping during or after the completion of the installation then it shall be deemed that the pipes have been provided by the approved manufacturer.
  
- The approved manufacturer shall provide guarantees for the integrity and suitability of the pipes for the water to be used and the installation.
- The pipes and fittings shall be guaranteed against any structural failure.
- The approved manufacturer shall submit in writing all his requirements and specifications for the *subcontractor* to install the pipe work and to enable him to provide the guarantee.
- The manufacturer shall specify the method of jointing and guarantee it.
  
- The *subcontractor* shall obtain inspection reports from the manufacturer and submit these to the *contractor* for approval at the following intervals of the work:
  - At 25%.
  - At 50%.
  - At 75%.
  - At completion of the work.
  
- The *subcontractor* shall provide and install a schematic diagram of the water pipe installation on block board with a plastic cover to be mounted on a wall in an appropriate position.
- All pipes installed across expansion joints of the building shall be provided with suitable expansion fittings.
- Pipes shall not be fixed in these positions but shall be supported to allow movement.



- All exposed pipes, supports and equipment shall be cleaned, treated and painted with one coat suitable primer, one undercoat and one finishing coat of high gloss enamel paint in the following colours:

## 2.6 SPECIAL VALVES

All special valves as indicated by the Engineer shall be approved and shall be marked with a metal tag, numbered by means of an engraved number and locked with a galvanised chain and a master keyed padlock in terms of the *contractor's* master key schedule.

All special valve numbers shall be indicated on the as-built drawings and three master keys shall be handed over upon completion to the *contractor*.

## 2.7 SPECIAL BACKSTOPS

Special KESSEL, or similar approved backstops shall be provided for the floor drain drainage system where it connects into the sanitary drainage system where indicated on the drawings.

## 2.8 GREASE TRAPPING

All grease trapping shall be by means of ENZYME DOSING by specialist subcontractors as part of the building operation.

## 2.9 FLOOR DRAINS

Floor drains shall be installed in all bath rooms, toilets, tea kitchens, ablution facilities, plant rooms and in kitchen and other areas. The floor drain positions are shown on the drainage drawings. The floor drains shall have 50 mm diameter to 100 mm diameter outlets as shown on the drawings and shall have removable covers to provide direct access into the drain pipes.

The floor drains shall have side inlets where necessary as shown on the drainage drawings.

## 2.10 SPECIAL ITEMS

The Subcontract includes a number of special items which shall form part of the plumbing and drainage installation.

The *specialist sub-contractor* shall be responsible for the procurement, construction, completion and commissioning of the complete systems which shall comply strictly to the performance specifications.

The *specialist sub-contractor* shall guarantee that each system fully complies with the performance specifications. **Full design details, shop drawings, and specifications shall be submitted to the Engineer for approval before any manufacturing.**

It shall be noted that the *specialist sub-contractor* is responsible for the “manufacturing, construction, engineering” of these systems and to guarantee that it shall operate as per the Engineers performance, design criteria, **but all these systems shall be approved by the Engineer before manufacturing and installation on site.**

The *specialist sub-contractor* shall be responsible for approval of the engineering and completed installations from the Local Authority or any other relevant institutional body. All certificates of approval shall be submitted to the *Engineer* for record purposes.

The *specialist sub-contractor* shall guarantee the required performance and the satisfactory operation of the special items. He shall demonstrate and operate and maintain in terms of the guarantee, the systems for a period of 52 weeks after *completion*.

All special items shall be able to be linked to the BMS and comprise the following:

- Water storage and pumping facilities which shall include the domestic and grey water systems.
- Solar hot water generation system with electrical back-up element.
- Solar water heating and under-floorheating system.
- Steam shower and equipment complete.
- Borehole and equipment complete.
- Water supply for irrigation system (irrigation system by others).
- Water supply to swimming pool and coordination with pool specialist.
- Water filtration system.
- Water feature equipment.
- Building management system (connections only).

## 2.11 TANKS

Where possible, all tanks shall be installed in such a manner that it could be dismantled and repaired if necessary without disturbing the operation of the system.

Where possible, the pipe arrangements of the tanks shall be installed in such a manner to allow the above mentioned maintenance to take place without disturbing or disrupting the normal operation of the system.

The tanks shall be complete with concrete plinths, inspection manholes, air, electronic water level indicator connected to the BMS and water level control valve.

The tank shall also have a scour valve, overflow pipe, inlet and outlet connections and be complete in all respects as per SANS 10252-1.

## 2.12 PUMPS

- Pumps to operate alternatively and change over after each operation.
- The pumps shall not start and stop more than ten (10) times per hour.
- The pumps shall operate automatically but shall also be provided with manual changeover switches.
- Amp meter shall be required per pump set including all necessary indicator lights, etc.
- All necessary alarms shall be provided to indicate alarm situations, such as high or low water levels etc.
- These alarm situations need to be signalled to the BMS.
- The Sub-subcontractor shall provide all necessary bases, base plates, frames, vibration pads, etc. for the pump sets and equipment.
- All cables shall be installed on approved cable trays or cable racks and supports.
- The pipe work shall be arranged in such a manner that the serviceable equipment, such as pumps and valves, etc. can be removed and replaced without disturbing or disrupting the operation of the system.
- Before ordering or manufacturing any pumps or equipment the Sub- contractor shall submit all necessary documentation for approval by the Contractor and thereafter the Subcontractor shall submit for further approval all necessary workshop/fabrication drawings.
- Pump and equipment data submitted for approval shall be for the specific installation and duty and not in general.
- Pump specific duty points shall be determined and indicated for approval by the specialist contractor.
- The Sub-subcontractor shall determine the specific hydraulic head for each pump set from the actual pipe installation. However for tendering purposes 25 % must be added to the static head to calculate the hydraulic head.

- The pump sets shall be put into operation by the Sub-subcontractor and he shall set and re-set and adjust the systems as many times as necessary until it operates to the satisfaction of the Engineer.
- The pump installation shall only be accepted as complete once the Engineer issues a completion/acceptance certificate.

## 2.13 BMS CONNECTIONS

- All special items shall be able to be connected to a BMS.
- All-important functions shall be relayed to the BMS to enable the operational staff to monitor, manage and control these systems.
- The Sub-subcontractor shall provide for a minimum of 6 signals in a terminal box adjacent to the plant or equipment.

## 3 STANDARD DETAILS

The following standard details must be studied carefully and correctly applied on site. Should any minor modification be necessary to suite any specific on-site condition, the plumber is instructed to contact DSB immediately for guidance and further instruction.

## 4 OPERATION & MAINTENANCE (O&M) MANUALS

The O and M manuals shall consist of the following:

- List of Contents (Index)
- Introduction
- General description of the functions of each of the systems of the plumbing and drainage works, ie:
  - Sanitary drainage systems.
  - Cold water system with pumps.
  - Hot water system with pumps.
  - Effluent treatment plant.
  - Rain water treatment plant.
  - Detailed description of each element of each system, how it functions, how it operates and how to maintain it and what attic stock or tools to carry.
- Full as-built drawings and detailed drawings, brochures and catalogues for each system and each element of each system.
- The format of the O & M documentation shall be A4 and shall be a specially bound document with hard cover and with metal ring binding. (All drawings and details shall be reduced to A3 format and folded into A4 format.)
- The names, addresses and tel/fax numbers of all responsible persons and manufacturers/suppliers shall be listed in the O& M document.
- A full list with reference numbers shall be included to enable the hotel O& M staff to order materials and equipment.
- Colour diagrams shall be provided to illustrate the operation and function of each system with reference to the relevant as-built drawings or brochures of equipment. These diagrammatic drawings shall also indicate the locations of valves with their numbers.

## 5 QUALITY ASSURANCE (QA) AND QUALITY CONTROL (QC) PROCESS

The importance of the QA checklist is to check what has been done, that it was done correctly, **but also to find out what was not done and left out by mistake.**

***Drawings and the works information document are part and parcel of the QA process and should be methodically checked against the work done.***

The checklist and checking of the work, is not “an activity” that must be carried out once the work has been completed, but is a “process” to be followed from the planning of the construction work right up to the completion and handing over of the project.

The duty and role of the design engineer is to carry out spot checks or audits.

The results of spot checks will indicate the effectiveness of the QA process and if not satisfactory, the engineer could require more detail or in depth auditing by the engineer himself or his representative.

The checklist should have space next to each item for signature by the plumber, the supervisor of the plumber, the auditor of the contractor and the design auditor.

## 5.1 SCOPE

- This section covers the activities to be carried out by the contractor both on and off the construction site to provide and install hot and cold water systems.
- The various activities shall be inspected and approved step by step and final approval shall only be given by Engineer.
- The Contractor shall notify the Engineer or his representative when each activity is completed and ready for inspection. No work shall be covered before inspection and approval in terms of the approved ( by the engineer) QA system.
- All work shall be carried out strictly in accordance with the requirement of the specifications and as shown on the drawings and detail drawings.
- All details shall be strictly adhered to and no deviations shall be allowed unless prior approval has been obtained in writing from the Engineer.
- All relevant statutory requirements and regulations shall be adhered to.
- Only competent artisans shall be employed to carry out the construction and installation work.
- The construction and installation procedures and activities shall be discussed at the start of the contract at a “kick-off” meeting and shall be mutually agreed upon by all relevant parties.
- The Contractor shall produce and submit a construction programme for approval before commencing with work on the site.
- All requests for inspections, approvals and information shall be in writing.
- For further details of contractual obligations, specifications and other requirements refer to the contract documentation.
- The Contractor is responsible for all safety measures and procedures.

## 5.2 SANITARY DRAINAGE – WORK TO BE DONE BY THE CONTRACTOR

- Produce and submit a construction programme for approval.
- Produce workshop drawings where necessary or required by the engineer.
- Arrange for inspections of equipment at the place of fabrication before it is delivered to site and for formal approval. This includes for electrical control boards, etc.
- Samples of all equipment, material and fittings shall be submitted for approval before ordering and delivery to site.
- Constantly inspect all materials for compliance and conformance with the relevant specifications and keep record in an approved manner.
- The Contractor shall co-ordinate with all other services before installation of any pipes, fittings or equipment.
- The required inspections and tests shall be carried out on sections of completed work before it is covered. The sections and method of testing shall be discussed and approved by the Engineer.
- The Contractor shall carry out inspections and tests according to his own internal QA system and provide proof of it to the Engineer.

- If the Engineer is satisfied that the Contractor's QA officer did carry out the required inspections and tests, he will inspect the completed work and produce a snag list.
- The Contractor shall submit all as built drawings and maintenance and operation manuals as required by the Engineer.
- The Contractor shall provide all guarantees, certificates of compliance to statutory or other regulations, etc.
- It is the duty of the Contractor to keep all the records up to date and to provide copies to the Engineer when he requires it.
- All records shall be kept on site in an approved location at all times and shall not be removed from the site without written approval of the Engineer.
- The plumber must mark all pipe penetrations on concrete structures and obtain permission from the structural Engineer for it.
- All drainage pipes and fittings shall be Cast Iron and shall be installed strictly to the manufacturer's specifications, SABS Codes and other relevant requirements.
- Drains shall be installed according to SABS 1200.
- All pipe diameters shown on drawings are the MINIMUM INTERNAL diameter required for hydraulic flow in the pipes.
- Only pipes with the specified internal diameter or nearest larger diameter shall be used for the type of pipe material specified or accepted by the engineer.
- The plumber shall consult and co-ordinate with the air-conditioning and all other contractors before commencing with any work in any location.

**NOTE:**

The plumber shall determine the positions of sleeve pipes on site.  
Before concrete is placed the plumber shall confirm in writing that all sleeve pipes have been placed.

**5.3 PLUMBING HOT & COLD WATER – WORK TO BE DONE BY THE CONTRACTOR**

- Produce a construction programme for approval.
- Produce workshop drawings for approval for all equipment, which is to be fabricated prior to delivery to site or where required by the Engineer.
- Arrange for inspections of equipment at the place of fabrication before it is delivered and for formal approval. This includes for electrical control boards, etc.
- Samples of all equipment, material and fittings shall be submitted for approval before ordering and delivery to site.
- Constantly inspect all materials for compliance and conformance with the relevant specifications.
- Install the hot and cold water pipes with all fittings, supports, etc. complete.
- Pressure testing of the pipe system.
- Install the pipe insulation on hot water, paint and finish off.
- Each completed section shall be inspected, tested and approved by the Engineer or his representative before proceeding to the following activity.
- Produce a snag list and commence immediately with all remedial or outstanding work. Put all systems in operation and demonstrate to and train client's maintenance staff.
- Submit as built drawings and maintenance and operation manuals.
- Provide all guarantees.
- The Quantity Surveyor shall be informed of each step to make the necessary measurements for payment.
- List all other relevant activities as provided for in the construction programme.

## 5.4 DUTIES OF QA SUPERVISOR

This section covers the duties and activities which the QA Supervisor is expected to perform and carry out on site including the administration procedures and inspections for which he will be responsible.

The purpose of this section is to highlight certain aspects of site inspections and to guide the Supervisor to perform his duties in the most efficient manner.

It is an attempt to indicate to the Supervisor what to “look” for when he carries out inspections.

The QA Supervisor shall on a regular basis inspect, test and approve all activities and work on site. However the Engineer will be responsible for the final approval and Engineer's completion certificate.

The QA Supervisor shall be mainly responsible for checking and supervising the quality of workmanship and also that the materials and equipment comply with the specifications.

Variations and revisions of the designs shall be referred to the Engineer for approval.

It is not the duty of the QA Supervisor to do any redesign on site. .

He shall keep the Engineer fully informed of all his activities as well as those of the Contractor on a regular basis.

All his records shall be in writing and shall be submitted to the Engineer on a regular basis.

The QA Supervisor should never instruct the Contractor to carry out work, which is not specified or called for in the contract documents.

### 5.4.1 **References**

The following documents should be studied carefully and the instructions should be followed and strictly carried out:

- Works information document.
- Contract documents.
- Contract drawings and details.
- Contract programme.
- Contract site-meeting minutes.
- Site instruction book.
- Site request book.
- Relevant SABS codes of practice.
- Relevant SABS specifications.
- National Building Regulations.
- All other relevant documents.

- Forms for records.

#### **5.4.2 "Kick-Off Meeting"**

Arrange a "kick-off" meeting with all concerned parties and discuss and explain the Quality assurance system and procedures which shall be adopted and which shall be strictly followed.

Discuss and agree on the various construction stages and when and how inspections are to be requested and approvals to be obtained.

The Contractor must be made aware of the fact that he shall not proceed from one construction stage to another without the written approval of the Engineer.

The various stages for which he must obtain the above mentioned approvals should be clearly indicated and minuted.

At this meeting the Contractor shall submit his QA system, which shall contain all the important aspects of a QA system.

The Contractor shall also submit his construction programme.

The minimum time of notification of inspections required by the Engineer shall be agreed and minuted (refer to contract document).

The frequency of site meetings and the time and dates thereof shall be agreed and minuted.

All other relevant aspects shall be discussed and agreed.

Verify that supports are at the specified intervals, etc.

Check for any damage done to pipes, fittings and other materials during construction and installation.

Upon completion of each section or stage, the QA Supervisor shall compile a snag list and keep checking it until the work is approved.

#### **5.4.3 Pressure Testing of Completed Sections of the Installation**

The Site Supervisor shall witness all testing procedures and report and record the results.

If the results are positive he shall pass and approve the work.

Pipes and equipment shall be submitted to a pressure test at least 1,5 times the working pressure as per SABS 0252.

The tests shall be prepared and demonstrated by the Contractor to the satisfaction of the QA Supervisor and or the Engineer.

The Contractor shall provide all the necessary testing equipment and materials, etc.

All specialised installations, installed by specialists shall be tested by the installer of these systems. Upon a successful test, the installer shall provide a test certificate stating the test procedure in detail and also furnish the guarantee for the equipment.



#### **5.4.4 Site Meetings & Inspections**

The QA Supervisor shall conduct regular site inspections.

At the inspection the progress of the Contractor shall be discussed and recorded.

Conformance with the construction programme shall be monitored and recorded. Reasons for delays if any shall be requested from the Contractor and it shall be minuted.

Regular site meetings and inspections shall be held. The QA Supervisor shall keep the minutes. Construction progress and all other relevant matters shall be discussed and recorded.

A general site inspection of the works shall be conducted and all interested parties must attend.

#### **5.4.5 Progress Reports**

The QA Supervisor shall compile and submit detailed reports for the Engineer's attention on a regular basis:

The reports shall cover the following aspects:

- Areas checked.
- Services checked.
- Quality of work inspected.
- Remedial action taken, if needed.
- Training of workers for pipe material.
- Inspection frequency of supplier and comments if any.
- Progress of works on site.
- General report back on all his/her duties as outlined above.

### **5.5 CHECK LISTS**

The checklists will be issued to the contractor at the beginning of the project and must be implemented by the sub-contractor immediately.

The following checklists are applicable:

### **6 PLUMBERS CERTIFICATE**

Once works completion, as defined by the JBCC Principle Agreement, has been achieved on all of the above mentioned services, the plumber shall issue the following completion certificate.

**Letterhead of Plumbing Co.**

**Date:** \_\_\_\_\_

**Project name:**



Subject: PLUMBING **INSTALLATION** COMPLETION CERTIFICATE

FOR INSTALLATION : \_\_\_\_\_

RESPONSIBLE PLUMBER: \_\_\_\_\_

REGISTRATION NO: \_\_\_\_\_

We hereby declare that the above mentioned installation was carried out under the control of the under-signed registered plumber who complies to the requirement of SABS 0400, AIS and the manpower Training ACT. 1931 (Act no 56 of 1981).

The work was inspected and tested by the responsible plumber in compliance with SABS PP2, SABS P7 (1) (2) (P7 (3) is not applicable due to the rational design) and SABS PP26/PP27.

The workmanship and installation was carried out in general compliance of SABS 0252. inspected, tested and disinfected according to SABS 0252 9.2.

The workmanship and the installation is guaranteed for a period of \_\_\_\_\_ from the completion date as on \_\_\_\_\_.

A complete set of AS-BUILT drawings is herewith submitted for record purposes, stamped and signed by the responsible plumber. (The set consists of one coloured set and two plain sets.)

Signed by.

(Registered responsible plumber,)