



UNIVEN CAMPUS WATER UPGRADE PHASE 2 (INCLUDING INSTALATION OF TANKS PER STUDENT RESIDENCE)

TENDER NO : IN/02/2023

C3.1 STANDARD SPECIFICATIONS

The standard specifications on which this contract is based are:

SABS 1200 A 1986	:	General
SABS 1200 AB 1986	:	Employer's Agent 's Office
SABS 1200 C 1980 (Amended 1982)	:	Site Clearance
SABS 1200 D 1988 (Amended 1990)	:	Earthworks
SABS 1200 DB 1989	:	Earthworks (Pipe Trenches)
SABS 1200 DK 1996	:	Gabions and Pitching
SABS 1200 G 1982	:	Concrete (Structural)
SABS 1200 HA 1982	:	Structural Steelwork (Sundry items)
SABS 1200 L 1982	:	Medium Pressure Pipelines
SABS 1200 LB 1983	:	Bedding (Pipes)

(Note: "SABS" has been changed to "SANS"; the SABS 1200 specifications are due to be replaced in the foreseeable future by SANS 1200)

The following SANS specifications are also referred to in this document and the Contractor is advised to obtain them from Standards South Africa (a division of SABS) in Pretoria:

SANS 1921 – 1 (2004)	:	Construction and Management Requirements for Works Contracts Part 1: <i>General Engineering and Construction Works</i>
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UNIVEN CAMPUS WATER UPGRADE PHASE 2 (INCLUDING INSTALATION OF TANKS PER STUDENT RESIDENCE)

TENDER NO : IN/02/2023

C3.2: PROJECT SPECIFICATIONS

STATUS

The Project Specification, consisting of two parts, forms an integral part of the contract and supplements the Standard Specifications.

Part A contains a general description of the works, the site and the requirements to be met.

Part B contains variations, amendments and additions to the Standardized Specifications and, if applicable, the Particular Specifications.

In the event of any discrepancy between a part or parts of the Standardized or Particular Specifications and the Project Specification, the Project Specification shall take precedence. In the event of a discrepancy between the Specifications, (including the Project Specifications) and the drawings and / or the Bill of Quantities, the discrepancy shall be resolved by the Employer's Agent before the execution of the work under the relevant item.

The standard specifications which form part of this contract have been written to cover all phases of work normally required for civil contracts, and they may therefore cover items not applicable to this particular contract.



C3.2 PROJECT SPECIFICATIONS

PART A: GENERAL

PS1 PROJECT DESCRIPTION

The UNIVERSITY OF VENDA envisaged the UNIVEN CAMPUS WATER UPGRADE PHASE 2 (Including Installation of Tanks Per Student Residence). The process of the upgrade started and stopped with certain works in particular the Earthworks for the Tank started but incomplete. The Works to be undertaken on this contract comprises the construction of the following work:

- ◇ Construction of Bulk earth works and Soil raft (Completion of the remainder of the earthworks)
- ◇ Concrete works for the foundation
- ◇ Construction of 1.5 Mℓ Structural steel tank on concrete plinth/walls
- ◇ Interconnecting pipe works
- ◇ Connection to existing Infrastructure.
- ◇ Access road to the tanks

PS2 DESCRIPTION OF THE SITE AND ACCESS

2.1 Location of site

The limits of the project are as shown on the locality plan bound into the book of drawings to be received together with this document.

This project is situated in the University of Venda, Thohoyandou Campus.

2.2 Access to site

Access to the site can be obtained from the Punda Maria Road.

The contractor shall be responsible for the maintenance and reinstatement of damage caused by him or his Agents/deliveries to vehicular access tracks and rights of way. No damage to fauna and flora located outside the limits of the construction will be permitted on the contract.

The contractor shall take cognizance of the aforementioned items concerning roads and tracks and allow for any costs in his Tender under the relevant section in the Bill of Quantities.

PS3 DETAILS OF THE WORKS

A brief detail of the works for which this specification is applicable is as follows:

3.1 Proposed steel tank

The proposed steel tank is to be a rectangular structure with a total volume of 1.5 Mℓ. The steel tank is to have inlet, outlet, overflow and scour connection and Access ladder.

Pipe works to this opening is to Constructed as well to ensure functionality of the tank. Interconnecting pipe work to the existing in the form of Upvc pipe work will also be construed.

3.2 Bulk Earth works

The works will consist of Clear & grub and layers constructed of G7 materials obtained either from the Contractors own borrow pit or commercial sources. Layer works to be constructed in 150mm thickness.

Bulk earthworks were done but incomplete and there will be a need for complete the bulk earthworks to the required levels as it can be seen on the pictures below:



The table below depict the minimum required specification on the material and compactions required on the earthworks to be constructed.

MATERIAL REQUIREMENTS							
Layer no.	Layer Thickness	Layer Description	Compaction (% of MOD AASHTO)	P.I. (Max)	G.M. (Min)	CBR at % MOD AASHTO	UCS (kPa) at % MOD AASHTO
1	150mm	G7 Natural Gravel	95%	2GM + 10	1.2	25	-

3.3 Nature of ground conditions and subsoil conditions

The site is covered with 300 to 400mm reddish brown clay with roots. The reddish clay overlies Basalt, which is part of the Sibasa Formation of the Beit Bridge Complex.

The area is drained entirely by means of surface flow to the Dzindi River which later drains to the more significant Luvuvhu River. The area falls into the catchment area of the Luvuvhu River. The area is approximately 6.6km north-west of the Luvuvhu River.

3.4 Climatic conditions

The area is located in the summer rain fall zone of the Republic of South Africa. The mean annual precipitation of the area is approximately 794 mm according to the weather station at Sibasa. The maximum temperature seldom rises above 36 degrees Celsius and the minimum seldom reach -2 degree Celsius.

3.5 Labour recruitment conditions

The recruitment of the local Labour can be done through the University of Venda.

3.6 Construction in confined Areas

It may be necessary for the Contractor to work within confined areas. Except where provided for in the specifications, no additional payment shall be made for work done in restricted areas. In certain places the width of the fill material may decrease to zero and the working space may be confined. The method of construction in these confined areas largely depends on the Contractor's constructional plant.

However, the Contractor shall note that, unless provided for in terms of the scheduled payment items in the SABS 1200 Standard Specifications or these project specifications, measurement and payment shall be in accordance with the specified cross sections and dimensions only, irrespective of the method used for achieving these cross sections and dimensions, and that the Tendered rates and amounts shall include full compensation for all special equipment and construction methods and for all difficulties encountered when working in confined areas and narrow widths, and at or around obstructions, and that no extra payment shall be made nor shall any claim for additional payment be considered in such cases.

PS4 CONSTRUCTION AND MANAGEMENT REQUIREMENTS

4.1 General



The Contractor is referred to **SANS 1921: 2004 parts 1, 2 and 3: Construction and Management Requirements for Works Contracts**. These specifications shall be applicable to the contract under consideration and the Contractor shall comply with all requirements relevant to the project.

Certain aspects however require further attention as described hereafter.

4.2 Drawings (Read with SANS 1921 – 1: 2004 clauses 4.1.7; 4.1.11 and 4.1.12)

The reduced drawings form part of the Tender documents as mentioned under Part T1 and shall be used for Tendering purposes only.

The contractor shall be supplied with three complete paper copies of the construction drawings free of charge. The Contractor shall at his own expense re-produce further paper prints required for the construction of the work.

At the completion of the Contract, the Contractor shall return to the Employer's Agent all drawings, provided or made, during the contract period.

Any information which the Contractor has control over and which is required by the Employer's Agent Representative to complete the as-built drawings shall be made available to the Employer's Agent Representative before the Certificate of Completion is issued.

Only written dimensions may be used. Dimensions are not to be scaled from drawings unless ordered by the Employer's Agent. The Employer's Agent will supply all figures / dimensions which are not shown on the drawings. The levels or dimensions given on the drawings are subject to confirmation on site. The Contractor shall submit all levels and dimensions to the Employer's Agent for confirmation before he commences with any structural construction work. The Contractor shall also check all dimensions which are given on the drawings and inform the Employer's Agent of any conflicting dimensions.

4.3 Responsibilities for design and construction (Read with SANS 1921 – 1:2004 Clause 4.2)

4.3.1 The responsibility strategy followed in this contract shall be A.

4.3.2 The structural and civil Employer's Agent responsible for the design in accordance with the specification is: Endecon Ubuntu (Pty) Ltd

4.4 Planning, Programme and Method Statements (Read with SANS1921-1:2004 clause 4.3)

4.4.1 Preliminary programme

The Contractor shall include with his Tender a preliminary programme on the prescribed form to be completed by all Tenders. The programme shall be in the form of a simplified bar chart with sufficient details to show clearly how the works will be performed within the time for completion as stated in the Contract Data.

Tenders may submit tender for an alternative Time for Completion in addition to a Tender based on the initial Tendered Time for Completion. Each such alternative Tender shall include a preliminary programme similar to the programme above for the execution of the works, and shall motivate his proposal clearly by stating all the financial implications of the alternative completion time.

The Contractor shall be deemed to have allowed fully in his Tendered rates and prices as well as in his programme for all possible delays due to normal adverse weather conditions and special non-working days as specified in the Special Conditions of Contract, in the Project Specifications and in the Contract Data.

4.4.2 Programme in terms of Clause 5.6 of the General Conditions of Contract

It is essential that the construction programme, which shall conform in all respects to Clause 5.6 of the General Conditions of Contract, be furnished within the time stated in the Contract Data. The preliminary

programme to be submitted with the Tender shall be used as basis for this programme. The following must be stated on the programme:

- (a) The quantity of work applicable to each bar item as well as the rate at which the work will be completed.
- (b) A budget of the value of completed work, month by month, for the full contract period.
- (c) The critical path.
- (d) Work to be undertaken by Local Contractor (if applicable)
- (e) Training Courses
- (f) Schedule of plant and resources to be utilized

The Contractor's attention is also drawn to clause 5.7.3 of the General Conditions of Contract 2015.

4.4.3 Time for Completion

The Tenderer shall indicate under section C1.2.2: **Data provided by Contractor** the time within which the contract shall be completed.

4.4.4 Delay in Completion

The Contractor shall organise the Works in such a manner that no delays occur. Delays due to faulty organisation or lack or shortage of materials or labour or co-operation with other parties or to any other cause within the control of the Contractor will not be countenanced and full power is reserved by the Employer's Agent to order the Contractor to expedite the work should the work, in the opinion of the Employer's Agent, not progress in a satisfactory way.

4.5 Quality Assurance (QA) *(Read with SANS 1921 – 1: 2004 clause 4.4)*

The Contractor will be solely responsible for the production of work that complies with the Specifications to the satisfaction of the Employer's Agent . To this end it will be the full responsibility of the Contractor to institute an appropriate Quality Assurance (QA) system on site. The Employer's Agent will audit the Contractor's quality assurance (QA) system on a regular basis to verify that adequate independent checks and tests are being carried out and to ensure that the Contractor's own control is sufficient to identify any possible quality problems which could cause a delay or failure.

The Contractor shall ensure that efficient supervisory staff, the required transport, instruments, equipment and tools are available to control the quality of his own workmanship in accordance with his QA-system. His attention is drawn to the fact that it is not the duty of the Employer's Agent or the Employer's Agent 's representative to act as foreman or surveyor.

4.6 Management and disposal of water *(Read with SANS 1921 - 1: 2004 clause 4.6)*

The Contractor shall pay special attention to the management and disposal of water and stormwater on the site. It is essential that all completed works or parts thereof are kept dry and properly drained. Claims for delay and for repair of damage caused to the works as a result of the Contractor's failure to properly manage rain and surface water, will not be considered.

4.7 Earthworks *(Read with SANS 1921 - 1: 2004 clause 4.10)*

4.7.1 Borrow pits and spoil areas

It is not foreseen that borrow pits will be made available to the Contractor and allowance is to be made for the importation of material from commercial sources if required.

The spoil sites shall be determined on site in conjunction with the Employer's Agent and the Employer. The Contractor shall be permitted to use only those spoil areas approved by the Employer's Agent.

Should the Contractor wish to use any other spoil area for the disposal of soil, rubble, vegetation, etc, its



use shall be subject to the approval of the Employer's Agent and the landowner.

4.8 Testing *(Read with SANS 1921 – 1: 2004 clause 4.11)*

4.8.1 Process control

The Contractor shall arrange for his own process control tests. The Contractor will be expected to employ the services of an accredited laboratory to perform the control testing. The Contractor must submit the results of tests carried out on materials and workmanship when submitting work for acceptance by the Employer's Agent. The costs for these tests shall be deemed to be included in the relevant rates and no additional payment will be made for testing as required.

4.8.2 Acceptance control

The process control test results submitted by the Contractor for approval of materials and workmanship may be used by the Employer's Agent for acceptance control. However, before accepting any work, the Employer's Agent may have his own acceptance control tests carried out by an independent laboratory. The cost of additional tests for acceptance testing shall be to the account of the client.

4.9 Site Establishment *(Read with SANS 1921 - 1: 2004 clause 4.14)*

4.9.1 Contractor's camp site and depot

The Contractor is responsible to provide a suitable site for his camp and to provide accommodation for his personnel, labourers, clerk of works and contracts manager.

The Contractor shall provide security watchmen for the contract as he deems fit at no extra cost for the Employer. The Contractor must ensure that all his employees as well as the employees of his subcontractors are able to identify themselves as members of the construction team.

The area available for the Contractor's will be indicated during the site inspection. The Contractor must take note that the other Contractor's as well as the Employer's Agent's facilities will also be in the same area. The Contractor shall conform to all local authority, environmental and industrial regulations.

4.9.2 Power Supply

The Contractor shall make his own arrangements concerning the supply of electrical power at the contractor's campsite. No direct payment shall be made for the provision of electrical services. Electrical power cannot be guaranteed by the service provider. During power failures and shortages, the Contractor must make his own arrangements for the provision of electricity.

The rates Tendered for the relevant items in the Preliminary and General Section of the schedule shall include all costs for the establishment and maintenance of a power supply to the works.

4.9.3 Water Supply and Sewer

The Contractor shall erect and maintain on the site proper ablution facilities. The Contractor shall service and maintain the facilities in a clean and hygienic state for the duration of the contract period and on completion of the works from the site.

The Contractor shall make his own arrangements concerning the supply of water and sewer disposal at the contractor's campsite. No direct payment shall be made for the provision of water or sewer disposal.

The Contractor must supply all necessary materials for the water connection at a position pointed out by the Employer's Agent. The availability of water cannot be guaranteed by the Employer and in the event of water no longer being freely available, the Contractor must make his own arrangements to acquire it.

The rates Tendered for the relevant items in the Preliminary and General Section of the schedule shall include all costs for the establishment and maintenance of water supply to the works and the Contractor shall make his own arrangements for the possible conveyance and storage of water if necessary. The Contractor will be held responsible for any wastage of water due to negligence.

4.9.4 Accommodation of Employees

No employees except for security guards will be allowed to sleep or be accommodated on the site.

No housing is available for the Contractor's employees and the Contractor shall make his own arrangements to house his employees and to transport them to site.

No informal housing or squatting will be allowed.

The Contractor shall provide the necessary ablution facilities at his camp site and the site of the works for the use of his employees. Chemical toilets will only be allowed where temporary facilities have to be provided.

4.9.5 Water for construction

The availability of water cannot be guaranteed by the Employer and in the event of water no longer being freely available, the Contractor must make his own arrangements to acquire it.

The rates Tendered for the relevant items in the schedule of quantities shall include all costs for the establishment and maintenance of water supply for the works and the Contractor shall make his own arrangements for the possible conveyance and storage of water if necessary. The Contractor will be held responsible for any wastage of water due to negligence.

4.9.6 Facilities for the Employer's Agent

One site office as well as a meeting facility, as described under Clause PSAB1.1, is required for the Employer's Agent.

No housing is required for the Employer's Agent or his Representative.

4.9.7 Telephone Facilities

Telephone and facsimile facilities are needed on the site (refer Clause PSAB2.1).

4.9.8 Survey beacons (*Read with SANS 1921 - 1: 2004 clause 4.15*)

The Contractor shall take special precautions to protect all permanent survey beacons or pegs such as bench-marks, stand boundary pegs and trigonometrical beacons, regardless whether such beacons or pegs were placed before or during the execution of the Contract. If any such beacons or pegs have been disturbed by the Contractor or his employees, the Contractor shall have them replaced by a registered land surveyor at his own cost.

4.10 Existing Services (*Read with SANS 1921 - 1: 2004 clause 4.17*)

The Contractor shall make himself acquainted with the position of all existing services before any excavation or other work likely to affect the existing services is commenced.

The Contractor will be held responsible for any damage to known existing services caused by or arising out of his operations and any damage shall be made good at his own expense. Damage to unknown services shall be repaired as soon as possible and liability shall be determined on site when such damage should occur.

Services belonging to the following service owners will be encountered:

SERVICE OWNER	TYPE OF SERVICE
University of Venda	Electrical/Power lines Communication cables Waterlines and reticulation within the university

Two weeks prior to commencing construction activities in a particular area, the Contractor shall also diligently enquire of University as to whether there are any other known services which have not been shown on the drawings but which may be affected by the construction activities in that area, and any such services shall be brought to the attention of the Employer's Agent immediately. The contractor shall make provision in his programme for the location and/or shifting of services.

Time lost due to delayed commencement or suspension of the work as a result of the Contractor's failure to obtain approval/ Sub contractors for the relocation of the Known service requiring relocation, shall not be used as a reason to claim for extension of time or standing time and related costs.

4.11 Health and Safety *(Read with SANS 1921 - 1: 2004 clause 4.18)*

4.11.1 General statement

It is a requirement of this contract that the Contractor shall provide a safe and healthy working environment and to direct all his activities in such a manner that his employees and any other persons, who may be directly affected by his activities, are not exposed to hazards to their health and safety. To this end the Contractor shall assume full responsibility to conform to all the provisions of the Occupational Health and Safety Act (OHSA) No 85 and Amendment Act No 181 of 1993, and the OHSA 1993 Construction Regulations 2014 issued on 7 February 2014 by the Department of Labour.

For the purpose of this contract the Contractor is required to confirm his status as mandatory and employer in his own right for the execution of the contract by entering into an agreement with the Employer in terms of the Occupational Health and Safety Act in the form as included in section C1.4.

4.11.2 Health and Safety Specifications and Plans

(a) Employer's Health and Safety Specification

A Health and Safety Specification is included in Section C3.3, Part PE of the Tender documents as part of the Particular Specifications.

(b) Tenderer's Health and Safety Plan

The Tenderer shall submit within 14 days after award of Tender, his own documented Health and Safety Plan proposed to be implemented for the execution of the work under the contract. The Health and Safety Plan must at least cover the following:

- (i) a proper risk assessment of the works, risk items, work methods and procedures in terms of Regulations 9 to 30;
- (ii) Pro-active identification of potential hazards and unsafe working conditions;
- (iii) Provision of a safe working environment and equipment;
- (iv) Statements of methods to ensure the health and safety of subcontractors, employees and visitors to the site, including safety training in hazards and risk areas (*Regulation 7*);
- (v) monitoring health and safety on the site of works on a regular basis, and keeping of records and registers as provided for in the Construction Regulations;
- (vi) details of the Construction Supervisor, the Construction Safety Officers and other competent persons he intends to appoint for the construction works in terms of Regulation 8 and other applicable regulations; and
- (vii) details of methods to ensure that his Health and Safety Plan is carried out effectively in accordance with the Construction Regulations 2014.

The Contractor's Health and Safety Plan will be subject to approval by the Employer, or amendment, if necessary, before commencement of construction work. The Contractor will not be allowed to commence work, or his work will be suspended if he had already commenced work, before he has obtained the Employer's written approval of his Health and Safety Plan.

Time lost due to delayed commencement or suspension of the work as a result of the Contractor's failure to obtain approval for his safety plan, shall not be used as a reason to claim for extension of time or standing time and related costs.

4.11.3 Cost of compliance with the OHS Act Construction Regulations

The rates and prices Tendered by the Contractor shall be deemed to include all costs for conforming to the requirements of the Act, the Construction Regulations and the Employer's Health and Safety Specification as applicable to this contract.

Should the Contractor fail to comply with the provisions of the Construction Regulations, he will be liable for penalties as provided in the Construction Regulations and in the Employer's Health and Safety Specification.

4.12 Management of the environment (Read with SANS 1921 - 1: 2004 clause 4.19)

Respect for the environment is an important aspect of this contract and the Contractor shall pay special attention to the following:

4.12.1 Natural Vegetation

Only those trees and shrubs directly affected by the works and such others as the Employer's Agent may direct in writing shall be cut down and stumped. The natural vegetation, grassing and other plants shall not be disturbed other than in areas where it is essential for the execution of the work or where directed by the Employer's Agent.

4.12.2 Fires

The Contractor shall comply with the statutory and local fire regulations. He shall also take all necessary precautions to prevent any fires. In the event of fire, the Contractor shall take active steps to limit and extinguish the fire and shall accept full responsibility for damages and claims resulting from such fires which may have been caused by him or his employees.

4.12.3 Environmental Management Plan

In addition to the above all requirements according to the Environmental Management Plan as detailed in C3.3, Particular Specifications Part C, will be adhered to.

4.13 Contract Name board

If required, one official contract name board, as per C4.2 *Site Information: Construction Notice Board*, is will be erected for this contract.

PS5 SECURITY CLEARANCE OF PERSONNEL

Tenders should note that the Employer may require that Security Clearance investigations be conducted on any number of the Tender's personnel.

If so required, the er must remove personnel as indicated immediately and ensure that they have no access to the works or documentation or any other information pertaining the site.

The Employer shall not be liable for any cost concerning the removal of personnel or the effect thereof on

the execution of the work.

PS6 SUPPLY OF MATERIALS

All material to be used in the Works is to be supplied by the Contractor.

The Contractor shall ensure that the work is not delayed due to the lack of materials on Site, by placing orders for material required under this Contract as soon as possible. No extension of time will be allowed for any delay due to the supply of materials.

Although the quantities have been carefully calculated, it must be considered as approximate only and the Contractor, before ordering any materials, should check the quantities required. The bill of quantities is provisional.

PS7 EXECUTION OF THE WORKS

7.1 Inspection by the Employer's Agent

No portion of the work shall be proceeded with until the Employer's Agent or his representative has examined and approved the previous stage. If any work is covered or hidden from view before the Employer's Agent or his representative has inspected the work, the Contractor shall at his own cost expose the covered or hidden work for inspection. The Contractor shall also be responsible for making good any work damaged during the uncovering.

C3.2 PROJECT SPECIFICATIONS

PART B: AMENDMENTS TO THE STANDARD SPECIFICATIONS

PSA GENERAL (SABS 1200 A)

PSA 1 MATERIALS (Clause 3)

PSA 1.1 Standardisation mark (Clause 3.1)

Add the following to the Clause:

All material delivered to the site shall bear the Official Standardisation Mark.

PSA 2 PLANT (Clause 4)

PSA 2.1 Restrictions on employee accommodation (Sub-clause 4.2)

No housing is available for the Contractor's employees. The Contractor shall make his own arrangements to house his employees.

The Employer shall place an area at the disposal of the Contractor to enable him to erect his site offices, workshops and stores. Any facilities shall comply with the requirements of the local authority. The Contractor shall provide his own fencing and site security.

PSA 3 CONSTRUCTION (Clause 5)

PSA 3.1 Dealing with water (Sub-clause 5.5)

In addition to the items as set out in Subclause 5.5, the Contractor shall also provide pumping equipment, pipes and other equipment as may be necessary.

PSA 4 MEASUREMENT AND PAYMENT (Clause 8)

PSA 4.1 Fixed charge and Value Related Items (Sub-clause 8.2.1)

Replace the sub-clause with the following:

“Payment shall be a lump sum to provide for the Contractor's expenses in connection with:

- (a) setting up and maintaining his organisation, camps and plant on the site;
- (b) effecting the insurances and indemnities required in terms of the General Conditions of Contract
- (c) meeting all other general obligations and liabilities which are not specifically measured for payment in these contract documents.

The lump sum total of items (a), (b) and (c) as measured and Fixed Charge Items and time Related Items shall not exceed 15% of the nett total Tender Amount. If the er should Tender a higher amount for this item, it shall be reduced to the amount allowed above and all other Tendered prices increased in the proportion required to retain the same Nett Total Tender Amount.

The Tendered lump sum shall not be subject to any variation if the actual value of work done under the Contract exceeds, or falls short of, the Tender Amount, or as a result of an extension of time for completion in terms of Clause 10 of the General Conditions of Contract.

Any payment made under this item shall not be taken into account when determining whether the value of a certificate complies with the "minimum amount of monthly certificate" laid down in the Appendix.

Before any payment is made under this item the Contractor shall satisfy the Employer's Agent that he has provided on site an establishment and plant of good quality and in value exceeding that of the first instalment. The Contractor may be asked to furnish documented proof that he owns the offices and plant on site, the value of which should exceed the amount claimed in the first certificate. In the event that the Contractor cannot satisfy the Employer's Agent as to the value or ownership, the Employer's Agent shall have the right to withhold part of any payments to be made under this item, until the Works have been completed.

Payment of the lump sum shall be made in three separate instalments as follows:

- (a) The first instalment, 50% of the lump sum, will be paid in the first payment certificate after the Contractor has met all his obligations under this sub-clause and has made a substantial start on construction in accordance with the approved programme.
- (b) The second instalment, 35% of the lump sum, will be paid when the value of the work done reaches one half of the Nett Total Tender Amount.
- (c) The third and final instalment, 15% of the lump sum, will be paid when the works have been completed and the Contractor has fulfilled all requirements of this sub-clause. No payment for the scheduled Fixed Charge Items for this contract will not be made until the requirements regarding and the erection of name boards have been met.”

PSA 4.2 Time-Related Items (Sub-clause 8.2.2)

Replace this sub-clause with the following:

Subject to the provisions of 8.2.3 and 8.2.4, payment of item 8.4 (time-related item) will take place in equal monthly amounts, calculated on the Tendered amount for the item, divided by the contract period in months, with the understanding that the total of the monthly payments which was paid for this specific item does not exceed the proportion that the progress of the works to date bears in relation to the works as a whole.

Should the Employer's Agent grant an extension of time, the Contractor is entitled to an increase in the amount Tendered for time related items, and this increase must be kept in the same proportion

to the original Tender amount as the extension of time is to the original time of the completion of the works.

Payment for such increased amounts will be considered as full compensation for all time related, provisional and general costs which arise as a result of the extension of time.

PSA 4.3 Exposing of existing services (add the following Sub-clause 8.9)

Add the following new pay item:

Item:

Excavation by hand in all materials to expose existing services Unit: m³

The Tendered sum must include full compensation for all hand excavation as per the dimension approved by the Employer's Agent for the locating, exposing and moving of existing services. Excavation outside of approved dimensions will not be paid. The rate must also include for backfill and compaction to 90% of mod AASHTO density and, if applicable, the removal of excess material not used for backfill, the securing of excavations, for handling surface and subsurface water, for protection of existing services and for any other activity necessary to complete the work. Free haul of 1,0 km will be applicable on the transport of excess material.

No distinction will be made between classes of material or types of services.

Note: The Contractor must provide sufficient supervision over labourers when services are exposed.

PSA 4.4 Occupational Health and Safety (add the following Sub-clause 8.10)

Add the following new pay items:

Item:

Provision for the cost related to the Occupational Health and Safety Act, 85 of 1993, and the relevant Regulations:

- | | | |
|----|--|-----------|
| a) | Preparation of a Health & Safety Plan | Unit: Sum |
| b) | Compilation of a Risk Assessment prior to Construction | Unit: Sum |
| c) | Health & Safety induction Training of employees | Unit: Sum |
| d) | Compilation and keeping up to date the Health & Safety file which shall include all documentation required in terms of the act | Unit: Sum |
| e) | Implementation of the Health and Safety Plan over the entire construction period | Unit: Sum |

The Tendered sum shall include full compensation for providing the above services as required from the Occupational Health & Safety Act. The rate shall include all related costs incurred by the Act, remuneration of personnel, trainers, etc. and equipment required for the execution of the required services as depicted by the Act. The Tendered amount for items a, b, c and d shall only be paid on the successful completion of the task as approved by the client. The Tendered amount for item e shall be paid on a monthly basis.

PSA 4.5 Facilities for Employer's Agent (Fixed Charge) (Sub-clause 8.3.2.1)

PSA 4.5.1 Furnished office (Sub-clause 8.3.2.1 a)

Add the following to the pay item:

The rate shall include for all costs to provide one office and a meeting facility as described under PSAB 1.1 and PSAB .2.2.

PSA 4.5.2 Telephone (Sub-clause 8.3.2.1 b)

Add the following to the pay item:

The rate shall include for all costs to provide telephone and fax facilities as described under PSAB 2.1.

PSA 4.6 Facilities for Employer's Agent (Time Related) (Sub-clause 8.4.2.1)

PSA 4.6.1 Furnished office (Sub-clause 8.4.2.1 a)

Add the following to the pay item:

The rate shall include for all costs to maintain one office and a meeting facility as described under PSAB 1.1 and PSAB .2.2.

PSA 4.6.2 Telephone (Sub-clause 8.4.2.1 b)

Add the following to the pay item:

The rate shall include for all costs to maintain the telephone and fax facilities as described under PSAB 2.1.

PSA 4.6.3 Survey assistant and materials (Sub-clause 8.4.2.1 d)

Add the following to the pay item:

The Contractor shall make available for the duration of the contract period, when required by the Employer's Agent, one skilled and one unskilled survey labourers.

PSAB EMPLOYER'S AGENT 'S OFFICE (SABS 1200 AB)

PSAB 1 MATERIALS (Clause 3)

PSAB 1.1 Office building(s) (Sub-clause 3.2)

Add the following to the Clause:

In addition to the requirements of Sub-clause 3.2 the following is required:

OFFICE BUILDING:

One (1) office as well as a meeting facility is required for the Employer's Agent on site. The meeting facility to be of sufficient size and to have a table and chairs to house twelve (12) people comfortably.

CARPORTS:

A carport to provide for two motor vehicles shall be provided adjacent to the Employer's Agent 's office for his exclusive use. The carport shall have side cladding and shall be constructed in such a way as to shelter the parked vehicles from the prevailing winds and rain.

ABLUTION AND LATRINE FACILITIES:

The Contractor shall, in addition to catering for his own staff, provide ablution and latrine facilities adjacent to the Employer's Agent 's office for the exclusive use of the Employer's Agent and his staff. The facilities shall consist of a shower with locker room, hand washbasin and a latrine. The facility shall be maintained in a clean and hygienic condition.

HEATING AND COOLING FACILITIES: (Sub-clause 3.2(j))

The Contractor shall supply and install in the offices and meeting facility an air-conditioning unit with cooling and heating capacity of at least 2 500 k/cal.

REFRESHMENTS FOR THE EMPLOYER'S AGENT AND HIS STAFF:

Tea and/or coffee shall be provided by the Contractor for the Employer's Agent, and the Employer's Agent 's staff, at reasonable intervals throughout any working day for the duration of the construction period.

PSAB 2 PLANT (Clause 4)

PSAB 2.1 Telephone (Sub-clause 4.1 and 5.4)

Add the following to the Clause:

In terms of Sub-clause 4.1 a telephone, if possible, shall be installed in the Employer's Agent 's Office.

The Contractor shall provide the Employer's Agent with a cellular phone for the duration of the Contract.

The Contractor shall arrange for the installation of the telephone and/or provision of cellular phone and the full amount of telephone accounts shall be payable by the Contractor for the duration of the construction period. The Contractor will be required to bear the cost of the telephone calls made by the Employer's Agent.

A facsimile facility, which can transmit and receive must be installed in the Employer's Agent 's Office and shall be linked to an individual telephone line (cellular line, if required). The Contractor shall arrange for the supply and installation of the fax machine. The cost of the supply of the fax facility shall be included in his Tendered rate. The Contractor will be required to bear the cost of transmissions and printing paper.

Upon completion of the Works the ownership of the facsimile facility shall revert to the Contractor.



PSAB 2.2 First Aid Kit and Protective Clothing (additional Sub-clause 4.2)

Add the following Clause:

The Contractor shall provide to the Employer's Agent a first-aid kits to deal with accidents, illnesses and snakebite which may occur during the normal course of Site operations.
The Contractor shall provide two sets of safety helmets and rubber boots for the exclusive use of the Employer's Agent and his staff.

PSC **SITE CLEARING (SABS 1200 C)**

PSC 1 **CONSTRUCTION (Clause 5)**

PSC 1.1 **General (add the following sub-clause 5.9)**

The areas where work is to be carried out must be kept clean for the duration of the contract. All rubbish must be removed without delay and the site must be left clean and tidy on completion of the service.

PSC 1.2 **Dumping site (add the following sub-clause 5.10)**

No dumping is allowed on site other than at the designated and approved fill areas.

PSC 1.3 **Cutting of trees (sub-clause 5.2)**

Add the following to the clause:

No trees may be removed without prior permission from the Employer's Agent.

PSC 1.4 **Demolition of structures (add the following sub-clause 5.11)**

PSC 1.4.1 **Demolition of concrete**

The Contractor is to ensure that forces caused by the demolition process do not induce stress on the remaining parts of the structures or on other existing structures that may cause cracking. Use is to be made of suitable energy absorbing materials during the demolition process. The structures/sections of structures to be demolished will be indicated by the Employer's Agent or on drawings. The strength of the existing reinforced concrete is to be expected to be in excess of 30 MPa.

The Contractor may only proceed to cut reinforcing upon written instruction of the Employer's Agent.

The Contractor is to submit a proposed work method and planning schedule for each type of demolition to the Employer's Agent for approval before work commences.

The following types of structures are to be demolished:

- Mass concrete
- Reinforced concrete demolition
- Brickwork.

The breaking of concrete will be to lines as indicated on the drawings.

Where pipe work cast into existing concrete is to be removed, the section removed is to be done in a neat manner and to straight lines.

The following methods of demolition will not be allowed:

- The use of thermal lancing
- The use of any explosion method
- The use of poisonous chemicals
- The following methods of demolition may be acceptable:
 - Diamond impregnated wire or blade sawing
 - Jack hammers
 - Wood peckers or nibblers
 - Hydro cutting
 - Air cutting

- Any other method as indicated by the Employers Agent

PSC 1.4.2 Demolition of Building Work

The Contractor is to ensure that the demolition process does not induce stresses on the existing structure that may cause cracking of the concrete or brickwork. Use is to be made of energy absorbing materials under the demolition area to protect existing surfaces. The building work to be demolished will be indicated by the Employers Agent or on the drawings. All material to be stored in a designated store and no materials shall be taken off site without consent from the Employers Agent or Employer.

PSC 2 MEASUREMENT AND PAYMENT

PSC 2.1 Clear & Grub (Clause 8.2.1)

Add the following to the clause:

Item:

Clear site.

Unit: m²

“The rate shall include for transport and disposal of material and debris to unspecified site and disposal thereof.”

PSC 2.2 Demolition of structures (add the following sub-clause 8.2.11)

Demolition of concrete

Add the following new pay items:

Item:

Bulk reinforced concrete demolition:

- a) Demolition of complete structure
- b) Demolition of section of structure

Unit: m³

Unit: m³

Mass concrete demolition:

- a) Mass concrete demolition
- b) Removal of pipe work cast into concrete

Unit: m³

Unit: m³

Separate items will be scheduled for different pipe diameters.

The rates for the above shall include, where applicable, all plant, labour, the protection of the structures and equipment, the trimming of the concrete to the lines as indicated on the drawings, scaffolding as may be necessary to prop floors, propping of walls, demolition and removal of concrete, the cutting and removal of reinforcement, the removal of pipe work, the disposal of all concrete, pipe work, rubble and waste material to an approved disposal site and everything else that may be necessary to complete the works.

Demolition of Building Work

Add the following new pay items:

Item:

- a) Demolition of brick work

Unit: m³

The rates for the above shall include, where applicable, all plant, labour, protection of the existing structures, scaffolding, demolition and removal of building work, removal of windows/doors,



delivery to the Client's stores, the disposal of all rubble and waste material to an approved disposal site and everything else that may be necessary to complete the works.

PSD SABS 1200 D: EARTHWORKS

PSD 1 CONSTRUCTION (Clause 5)

PSD 1.1 Excavation for working space (Sub-clause 5.2.2.1 b) and c)

Add the following to the clause:

Other than for the sides of strip or pad footings or where specifically authorized by the Employers Agent, no concrete shall be placed against the sides of excavations.

For external concrete faces of manholes below ground level, (other than concrete placed against the sides of excavations as above) the Contractor shall over-excavate to provide sufficient working space for the erection of formwork.

Tenders shall allow in their rates for excavation for any over-excavation required for working space.

Excavation volumes for manhole and valve chamber structures will be calculated as the nett volume of the structure below ground level after general site excavations have been completed. No additional payment shall be made for working space.

PSD 1.2 Inspection (Sub-clause 5.2.2.1 d)

Add the following to the clause:

Excavation to final level, ready to achieve a binding layer or concrete footing, shall be completed less than 24 hours before such layer or footing is cast.

The Contractor shall arrange for the inspection by the Employer's representative or his Representative of all surfaces immediately before casting concrete.

PSD 1.3 Over-excavation to sides of excavation (Sub-clause 5.2.2.1 e)

Add the following to the clause:

Where the sides of excavations are over-excavated to establish safe slopes, provide access to excavations, or for other purposes not specifically required by the Employer's representative, such over-excavation shall be backfilled with material as required by the Employer's representative and compacted to a minimum density of 93% Mod AASHTO.

No separate payment will be made for this work.

PSD 1.4 Over-excavation (Sub-clause 5.2.2.1 e)

Add the following to the clause:

If the material in the bottom of an excavation is loosened, or if there is any over-excavation, any loose or disturbed soil shall be removed, and the over-excavation shall be replaced by mass concrete mix 15 MPa.

No separate payment will be made to replace over-excavation with concrete. No separate payment will be made for over excavation as defined in PSD 1.3 and PSD 1.4.

PSD 1.5 Trimming of surface of bulk earthworks (add the following sub-clause 5.2.2.1 f)

Where blinding, mass or structural concrete is to be cast or where precast elements are to be placed on surfaces established by bulk earthworks, the Contractor shall:

- a) Arrange his bulk excavation operation so that over-excavation is avoided, taking into account the requirements in PSD 1.3.
- b) Over-fill embankments while placing fills as necessary to allow for trimming and arrange his compaction operations to ensure that the specified density is achieved throughout the finally trimmed embankment; and
- c) Shortly before casting concrete or placing precast elements, carefully remove the final layer and trim such surfaces to the design levels and profiles within Grade II degree of accuracy.

PSD 1.6 **Disposal of surplus material (Sub-clause 5.2.2.3)**

Add the following to the clause:

All surplus material from bulk excavation for concrete units and for pipework shall be dumped, levelled and spread off site at the areas identified by the Contractor.

PSD 1.7 **Free haul (Sub-clause 5.2.5.1)**

Replace the following:

“... without separate compensation shall be **0,5 km**”

With the following:

“... without separate compensation shall be **1,0 km**”

The implication of this is that limited overhaul is no longer applicable and is regarded as free haul.

PSD 2 **MEASUREMENT AND PAYMENT (Clause 8)**

PSD 2.1 **Restricted excavation (add the following to sub-clause 8.3.3)**

Add the following to this item:

The volume of restricted excavation will be calculated from the net plan dimensions and the difference between the original ground profiles (or terraces), and the blinding layer (or no-fines) levels shown on the drawings. On the sides, the volume will only be calculated to the outside dimensions of the concrete structures. No additional payment will be made for the provision of working space, although it will be provided. As the rate for restricted excavation (as described under sub-clause 8.3.3) includes for the backfilling and compaction of the material, this rate will subsequently also include for the backfilling and compaction of the working space.

PSD 2.2 **Excavate (obtain from stockpile) in all materials and backfill to 95% Mod AASHTO density (add the following to sub-clause 8.3.3)**

Add the following to this item:

In addition to the requirements of sub-clause 8.3.3 of SANS 1200 D, this additional clause is only for purposes of backfilling excavations using the material obtain from the stock pile on site.

The Contractor is to obtain material from the stockpile already on site and all other requirements of sub-clause 8.3.3 are still applicable (selection, loading, transportation, offloading, watering, compaction, etc.). Only material regarded as selected fill is to be used as backfill. The quantity, for payment purposes, will be calculated as the volume backfilled (on the fill section of the bulk earthworks) and not the volume excavated from the stockpile.

PSDB SABS 1200 DB: EARTHWORKS (PIPE TRENCHES)

PSDB 1 SCOPE

The scope of work specified under this section covers the excavation for trenches for the installation of water pipes and sewer pipes to specific depths and gradients as specified by the Employer's Agent.

PSDB 2 CONSTRUCTION (Clause 5)

PSDB 2.1 Long-sections for quantities for all pipelines (add the following Sub-clause 5.11)

After clearing, grubbing and removal of topsoil the Contractor shall co-ordinate, take levels and prepare long sections along the centre line of the entire pipeline route at intervals not exceeding 10 metres.

These he shall present to the Employer's Agent before commencing any further excavation.

On approval by the Employer's Agent, these measurements shall form the sole basis for the computation of earthwork quantities. Only on approval may the contractor commence with the excavation of the pipeline in question.

The setting out of the pipeline and taking of cross section levels will be deemed to be included in the Tendered rates and no extra payment will be made for it.



PSG **SABS 1200 G: CONCRETE (STRUCTURAL)**

PSG 1 **SCOPE OF WORKS**

This specification covers the construction of all structural concrete elements.

PSG 2 **CONSTRUCTION**

PSG 2.1 **Classification of finishes (Sub-clause 5.2.1)**

Add the following to the sub-clause:

Concrete surfaces which will be in contact with the natural ground or which will otherwise be covered on completion of the works, shall have a rough finish as specified in sub clause 5.2.1 (a).

Horizontal surfaces and surfaces with a slope not exceeding one vertical to two horizontals shall be finished to a wood float finish. For this finish the surface must be given a finish as specified in sub-clause 5.5.10.1 and after the concrete has hardened sufficiently, it shall be floated to a uniform surface free of trowel marks.

The finished surface shall be accurate to degree 1 as defined in sub-clause 6.2.

The visible vertical or near vertical surfaces of valve chambers, and culvert head walls or parapets shall be finished to a smooth surface, repaired and rubbed to remove projections.

The bagging of concrete surfaces to repair defects will not be permitted.

All concrete edges shall be provided with 25 mm x 25 mm chamfers.

PSG 2.2 **Cover (Sub-clause 5.1.3 and 5.5.1.5)**

Add the following to the sub-clauses:

The exposure conditions for all structures in the works shall be deemed to be "severe". The minimum cover to reinforcement shall be 40 mm for water retaining concrete and 25 mm for all other concrete, unless otherwise specified on the Employers Agent drawings and bending schedules.

PSG 2.2.1 **Spacers for reinforcement (sub-clause 5.1.3)**

Add the following to the sub-clause:

Spacers of approved design include purpose made precast mortar blocks. No plastic spacer blocks will be allowed.

Where mortar blocks are used, they shall be properly shaped so as not to slip out of position and shall be made of the same mix as the mortar of the concrete in which they are to be placed.

The mortar shall be well compacted by approved means into the moulds to result in blocks with a density of at least 2 300 kg/m³; and which are free from honeycombing. They shall be cured in water for at least seven days. Mortar blocks which have not been manufactured and cured strictly in accordance with these requirements or which are in any other way considered unsatisfactory by the Employers Agent, will be rejected and shall be removed from the Site.

PSG 2.3 **Strength concrete (Sub-clause 5.5.1.7)**

Add the following sub-clause:

The grade of strength concrete for each portion of the works will be indicated on the drawings and/or specified in the Schedule of Quantities. The grade of concrete will be designated as "Class S/A", where "S" is the characteristic strength in Mpa and "A" is the maximum nominal size of coarse aggregate in mm.

With the exception of mixes weaker than 15 Mpa, all concrete for the Works shall be considered to be strength concrete in terms of Sub-clause 5.5.1.7.

No concrete shall be cast until the mix designs have been approved by the Employers Agent. The Employers Agent may call for revised mix designs at any stage during the contract.

Contractor to supply and test 6 No. cube test results for approval prior to commencement of the works.

Unless otherwise specified on the drawings or in the Schedule all structural concrete shall have a strength of 35 MPa.

The concrete to be used on this contract shall be as follows:

- (a) For all water retaining structures, 35/19 MPa with a minimum cement content of 360 kg/m³ and a maximum of 420 kg/m³. The maximum water content shall not exceed 210 litre/ m³. The slump limits shall be 10-60mm. The water/cement ratio shall not be greater than 0,53.
- (b) For other structures not in contact with water 25/19 MPa concrete.
- (c) For anchor blocks, benching and mass concrete, 15/19 MPa concrete.
- (d) For no-fines concrete 15/19 Mpa concrete

These mixes shall be designed for vibration. All data reports prepared by the Institute shall be submitted to the Employers Agent for information and approval.

DESIGN OF CONCRETE MIX

The concrete mix design shall be prepared by an approved independent laboratory and submitted to the Employers Agent for approval.

The successful er will be required to submit samples of the fine and coarse aggregate which he proposes using, to an approved laboratory for tests regarding the suitability of such aggregates. The laboratory shall prepare trial mixes of the two stronger grades of concrete required for the contract to establish acceptable design mixes.

PSG 2.4 Formwork and finishes (Sub-clause 5.2)

Add the following to the sub-clause:

FORMWORK TIES

The use of sleeves through the concrete for formwork ties will not be permitted. Ties, when cast in, shall have some form of positive shear key to prevent any rotation when loosening formwork.

The formwork ties and bolt holes shall be placed with regularity and precision.

The finish of exposed concrete surfaces of concrete structures shall be "smooth" as detailed in (b) of sub-clause 5.2.1.

FILLETS AND CHAMFERS

All internal and external angles in concrete works shall have 25 mm x 25 mm fillets and chamfers unless shown otherwise on the drawings.

The units' rate ed for formwork shall cover the cost of forming these chamfers and fillets.

PSG 2.5 Joints (Clause 5.5.7)

Add the following to the sub-clauses:

PSG 2.5.1 General

Notwithstanding Sub-clause 2.4.3 “designated joints” shall only be joints shown on the drawings and in the Schedule. Further joints required by the Contractor because of construction limitations or any other reason, shall be deemed to be “undesigned joints”.

The position and pattern of all joints (designated or undesigned) shall be to the Employers Agent’s approval.

All joints (designated or undesigned) except expansion and contraction joints shall be treated in accordance with Sub-clause 5.5.7.3.

The Contractor shall further note that the position and the type (where no identical designated joints exist) of undesigned joints shall be subject to the Employers Agent’s approval.

PSG 2.5.2 Construction joints (Sub-clause 2.4.3 and 5.5.7)

All joints other than expansion, contraction or other movement joints, shall be treated as follows:

As soon as practical, but not before 15 hours after placing, the joint surface shall be prepared to receive fresh concrete.

This preparation, as specified in Sub-clause 5.5.7.3 (a) to (d) shall be such as to remove all laitance or inert and strengthless material which may have formed and the specified chipping and sand blasting shall be such as to produce a roughened surface all over.

Concrete surfaces, where concreting is interrupted, shall be protected from the sun as specified in Sub-clause 5.5.8 (d).

PSG 2.5.3 Construction joints (Sub-clause 5.5.7.3)

No vertical construction joints other than those shown on the Drawings may be formed. Horizontal construction joints may be formed if the method of construction does not allow for one continuous pour. However, these construction joint will be indicated to and approved by the Employers Agent. It must be noted that should the Contractor wish to form a construction joint in water retaining concrete, the water tightness of this joint will remain the responsibility of the Contractor. In addition to the precautions to be taken as prescribed under clause 5.5.7.3, the Contractor may ensure water tightness by providing additional means (such as a bandage on the joints or wet to dry epoxy) to the approval of the Employers Agent. No additional payment will be made to the Contractor for ensuring that construction joints are watertight and the Contractor will have to include such costs in the rate for the concrete.

PSG 2.5.4 Expansion and construction joints

Expansion and contraction joints shall be made in the position and to the details shown on the drawings.

The specified filler strips shall be attached to the complete side of the straight or grooved concrete joint by means of an approved adhesive.

PSG 2.5.5 Joint sealant

All joints to be formed to the specified dimensions, properly prepared, primed and sealed with Flexothane two component polyurethane sealant obtained from African Bitumen Emulsions or similar approved and used strictly in accordance with the manufacturer's instructions.

PSG 2.6 Items to be casted in or grouted into concrete (sub-clause 5.4)

Add the following to the sub-clauses:

PSG 2.6.1 Fixing for equipment supplied by others (mechanical/electrical)

- a) The Contractor will be responsible for the forming of pockets and grouting in of pipe items and/or holding down bolts for equipment supplied by others.
- b) Upon completion of the positioning and alignment of equipment, the Contractor shall, in collaboration with the Mechanical Contractor, grout up pipe items, pockets and base plates (subject to (c) below) necessary for the permanent installation of the equipment.
- c) Only after the Employers Agent is satisfied with the alignment and the level of each item of plant shall the Contractor grout up the base plate with an approved non-shrink grout.

PSG 2.6.2 Fixing for equipment supplied under this contract

Holding down bolts or other fixings required for the installation of hand stops, crane beams, ladders, handrails and other items supplied under the Contract, shall be provided by the Contractor. These fixings shall be cast in or grouted into pockets or installed by other means as approved by the Employers Agent.

Where anchor bolts are used which are installed into holes drilled into concrete or masonry, these shall be a type approved by the Employers Agent.

Anchor Bolts - hot dipped galvanised (mild steel). No electro plating will be allowed.

PSG 2.6.3 Pipes and conduits embedded in concrete

Except with the written approval of the Employers Agent, no pipes other than those shown on the drawings shall be embedded in concrete and the approval of the Employers Agent for the position of all services to be embedded shall be obtained before concreting commences. The clear space between pipes of any kind embedded in reinforcement concrete and the clear space between such pipes and reinforcement shall not at any point be less than:

- (a) 40 mm, or
- (b) 5 mm plus the maximum size of coarse aggregate, whichever is the greater.

PSG 2.6.4 Casting/Grouting in of pipes and specials

Where indicated on the drawings, the Contractor shall provide a box-out in the wall and grout the pipe special in at a later stage. When constructing such a box-outs, reinforcement shall not be cut, but shall run through the opening. Reinforcement shall be cut and/or bent out at a later stage to suit the item being cast in. After installation of the item the remaining reinforcement shall be bent back in position.

Where box-outs for pipes/specials have been provided in the walls, the Contractor shall be responsible for the grouting in of such pipes/specials regardless of whether or not these have been supplied by himself.

An approved non-shrink grout shall be used for the grouting in of pipes and specials after they have been positioned. The details and method statement is to be submitted to the Employers Agent for approval prior to the commencement of any grouting. The approval by the Employers Agent shall not relieve the Contractor from his obligation to provide a watertight joint between the

concrete and grout used.

PSG 2.7 Curing and protection (Sub-clause 5.5.8)

Add the following to the sub-clauses:

Level or gently sloping surfaces shall be cured by one of the methods described in Sub-clause 5.5.8 (a) or (b) and vertical surfaces by the methods described in Sub-clause 5.5.8 (e) for a period of five days after casting for an ambient temperature of 5°C or above and for eight days for an ambient temperature of below 5°C.

PSG 2.8 Concrete surfaces (Sub-clause 5.5.10)

Add the following to the sub-clauses:

PSG 2.8.1 Screed finish

After placing and compacting, the concrete on a top (unformed) surface shall be struck off with a template to the designated grades and tamped with a tamping board to compact the surface thoroughly and to bring mortar to the surface, leaving the surface slightly ridged but generally at the required elevation. No mortar shall be added, and noticeable surface irregularities caused by the displacement of coarse aggregate shall be made good by re-screeding after the interfering aggregate has been removed or tamped.

PSG 2.8.2 Wood float finish

Where wood floating is ordered or scheduled, the surface shall first be given a finish as specified in PSG 2.5. and, after the concrete has hardened sufficiently, it shall be wood-floated, either by hand or machine, only sufficiently to produce a uniform surface free from screed marks.

PSG 2.8.3 Steel float finish

The surface of tank bottoms, floors and roof slabs, etc. shall be given a steel float finish in accordance with Sub-clause 5.5.10. To Degree 1 accuracy.

PSG 2.8.4 Power floated finish

Where power floating is required the surface shall be treated as specified in PSG 3.11.2 to a degree necessary.

PSG 2.9 Screeds (add the following sub-clause 5.5.16)

GRANOLITHIC SCREED

Granolithic screed shall consist of: Cement - 1 part; Sand - 1.25 part; Coarse aggregate - 2 parts.

The coarse aggregate shall consist of granite or other approved chips which shall pass a 10 mm sieve and be retained on a 5mm sieve.

The cement/water ration of the mix shall be at least 2,0 mass.

PSG 2.10 Repairs and defects (add the following sub-clause 5.5.17)

All defects to the concrete shall be attended to, in full, as soon as possible after the formwork is removed. Further concreting of the element concerned may be prohibited by the Employers Agent until he is satisfied that this remedial work has been satisfactorily attended to.

PSG 2.11 Porous Concrete (add the following sub-clause 5.5.1.8)

Porous concrete shall be laid under foundations and floor slabs, and behind walls, etc., where shown on the drawings and where directed by the Employers Agent.

Porous concrete shall be placed behind shuttering to form a vertical layer against the external face of foundations, etc. where shown on drawings and where directed by the Employers Agent.

The thickness of the horizontal, sloping and vertical layers shall not be less than that shown on the drawings.

The exposed faces, both horizontal and vertical, of the porous concrete shall be finished with a cement mortar seal, as specified in Clause PSG2.11.3, where reinforced concrete is to be cast against it.

The schedule rates for porous concrete shall include the cost of the mortar seal and steel float finish.

Porous concrete shall comprise water, cement, coarse aggregate and not more than 5 % by mass of fine sand. Every size of aggregate shall be a single size aggregate, graded in accordance with SABS 1083.

The voids ratio of porous concrete shall not be less than 27,5 %.

No-fines concrete shall be classified by the prefix NF and the size of the aggregate to be used. Class NF19 means a no-fines concrete with a 19 mm nominal size. The volume of aggregate per 50 kg of cement is to be as follows:

Class	Aggregate Size	Aggregate per 50kg cement	Minimum Average Strength of a set of three test cubes after 28 days (Mpa)
NF38	38	0.33 m³	5.5
NF19	19	0.30 m³	5.5
NF13	13	0.27 m³	5.5

PSG 2.11.1 Batching and Mixing

The quantity of water to be added shall be just sufficient to form a smooth grout which will adhere to and coat completely each and every particle of aggregate, and which is just wet enough to ensure that at points of contact of aggregate the grout will run together to form a small fillet to bond the aggregate together. The mix shall contain no more than 20 litres of water per 50 kg of cement.

Mixing shall be carried out in an approved batch type mechanical mixer. The whole batch of aggregate together with half of the water shall be placed into the mixer and mixed together for at least half a minute. The cement, followed by the balance of water, shall subsequently be added and the mixing shall continue for at least 1,5 minutes or as much longer as is necessary to ensure that all aggregates are uniformly coated with cement grout.

Testing of porous concrete shall be carried out in accordance with test method 3 of BS 1881 Part 3: 1970.

PSG 2.11.2 Placing

The Employers Agent shall be timeously advised to enable him to inspect the excavations or form work before no-fines concrete is placed.

After the placing of the concrete has commenced, it shall be continued uninterrupted and may only be halted at the construction joints approved by the Employers Agent. Control shall be exercised to ensure that no placed green concrete lies for longer than 30 minutes before being covered with fresh concrete and that the concrete is placed in its final position within 20 minutes after the cement has been loaded into the mixer.

The concrete shall be worked sufficiently to ensure that it completely fills the space to be concreted and that adjacent aggregate particles are in contact with one another. Excessive tamping or ramming shall be avoided and under no circumstances shall the concrete be vibrated.

PSG 2.11.3 Mortar seal over porous concrete

Where concrete is to be cast against previously cast porous concrete, the surface of the porous concrete shall be sealed with a 5 mm thick layer of mortar composed of one part normal Portland cement to two parts of fine aggregate by mass, trowelled on before screed to provide a dense, smooth, uniform plane surface without filling any of the internal voids of the porous concrete. The surface of the seal shall have a steel float finish.

PSG 2.11.4 Protection

All no-fines concrete shall be protected from the elements, particularly from strong wind, flowing water, damage to the surface and loss of moisture. Protection against loss of moisture shall be accomplished by one or more of the following methods: -

- (a) Keeping form work in place.
- (b) Covering exposed surfaces with sacking or other approved material that is kept continuously wet.
- (c) Covering exposed surfaces with plastic sheeting.

PSG 2.11.5 Sealing of surface of no-fines concrete

Where indicated on the drawings or instructed by the Employers Agent, the surface of the no-fines concrete shall be sealed with a layer of 1:8 cement mortar to prevent loss of moisture from the structural concrete.

This seal shall be placed after the no-fines concrete has hardened and must be levelled off to the same level as the top of the no-fines concrete.

PSG 3 MATERIALS (Clause 3)

PSG 3.1 Concrete

PSG 3.1.1 Cement (Sub-clause 3.2.1)

Add the following to the sub-clause:

The type of cement to be used for concrete structures shall be approved by the Employers Agent.

PSG 3.1.2 Storage of cement (Sub-clause 3.2.3)

Add the following to the sub-clause:

Cement shall not be kept in storage for longer than eight weeks without the Employers Agent's permission.

Cement which has been damaged in any way or which has been stored on site for a period exceeding three months shall be condemned and removed from site.

PSG 3.1.3 Aggregates (Sub-clause 3.4)

Add the following to the sub-clause:

Concrete with reactive aggregates:

The Contractor shall supply a test certificate for the aggregate confirming that it is not reactive. With each delivery of materials under this clause the Contractor shall supply acceptable written evidence that this clause is being complied with.

PSG 3.1.5 Use of plumbs (Sub-clause 3.4.2)

Add the following to the sub-clause:

The use of plumbs shall not be permitted.

PSG 3.1.6 Admixtures (Sub-clause 3.5)

Replace this sub-clause with the following

Admixtures may only be used with the prior approval of the Employers Agent. Super plasticizers of the sulphenated naphthalene formaldehyde condensates are preferred. No air-retaining properties will be tolerated.

PSG 3.2 Joint materials (add the following new sub-clause 3.9)

PSG 3.2.1 Primer

An approved primer, fully compatible with and/or manufactured for the specified jointing and sealing materials shall be applied to the joint surfaces.

PSG 3.2.2 Filler

Fillers shall be closed-cell expanded polyethylene.

Fillers shall be pre-cut to suit the application with a tear-out strip for forming the specified recess for the bond breaker and sealant.

PSG 3.2.3 Sealer and breaker

The elastomeric sealant shall be a two-pack polyurethane type (gun grade for vertical joints) generally conforming with the physical properties specified in SABS 110, and used with primers as specified above.

The bond breaker placed immediately prior to application of the sealant shall be a self-adhesive vinyl type (or similar approved material) with a width the same as the joint recess into which it is to be applied.

PSG 4 TESTING (Clause 7)

PSG 4.1 **Grouting (add the following new sub-clause 7.4)**

The Contractor shall, where so ordered, carry out a site test for each grouting procedure and each grouting gang to be used. The tests shall be carried out on a dummy bedplate similar in configuration to that which is to be grouted, but not exceeding 1 m² in area unless otherwise ordered.

When the dummy bedplate is dismantled, the underside shall show a minimum grout contact area of 80 % with reasonably even distribution of the grout over the surface grouted except that, in the case of expanding grout, the minimum grout contact area shall be 95 %. The test shall show evidence of good workmanship and materials and the results shall be to the satisfaction of the Employers Agent.

The Contractor shall, when so ordered, make standard test cubes from various grout mixtures and also subject them to compression tests to determine whether the specified strength has been achieved.

Test procedures shall comply with the relevant requirements of Sub-clause 7.2.1 to 7.2.3.

PSG 5 **TOLERANCES (Clause 6)**

PSG 5.1 **Permissible deviations (Sub-clause 6.2)**

Add the following to the sub-clause:

The degrees of accuracy of construction shall be as follows:

- (a) All structures (including water retaining structures) – Degree II accuracy.
- (b) All weirs (concrete) and weir plates shall have a tolerance of +1/-1 mm

PSG 6 **MEASUREMENT AND PAYMENT (Clause 8)**

PSG 6.1 **Subsoil drainage (add the following sub-clause 8.9)**

Add the following pay item:

Item:

Subsoil drainage as detailed on drawings

Unit:m

Add the following:

The rate ed shall include the following items:

- a) Excavation for the filter drain (.25m³/m)
- b) Backfill around filter.
- c) Non-woven geofabric (u-24 or similar approved) – 900mm/m
- d) 19mm stone wrapped in geofabric (.14m³/m)
- e) 100mm Dia. Slotted PVC drain pipe

The rate ed shall include for the delivery to site and the installation of the filter to the satisfaction of the Employers Agent.

PSG 6.2 **Grouting / casting in of pipe specials (add the following sub-clause 8.10)**

Add the following pay item:

Item:

Grouting / casting in of pipe pieces in the following diameters (Refer to PSG 2.6.4)

- | | |
|--|-----------|
| i) Grouting in of 100 dia flanged steel pipe | Unit (No) |
| ii) Grouting in of 200 dia flanged steel pipe | Unit (No) |
| iii) Casting in mass concrete of 200 dia scour pipe
(underneath wall footing) | Unit (No) |
| iv) Casting in mass concrete of 200 dia overflow (underneath wall footing) | Unit (No) |
| v) Casting in of 110 dia uPVC telemetry pipe (reservoir roof) | Unit (No) |
| vi) Casting in of 40mm dia HDPE sleeve (reservoir roof) | Unit (No) |
| vii) Casting in of 40mm dia HDPE sleeve (reservoir wall) | Unit (No) |

The rate shall include all labour, plant and material for the grouting in of pipes of the above items as per PSG 2.6.4. Alternatively, the items can be cast directly into the concrete and the rates shall then include for all labour, plant and materials to cast the items into the concrete. Whatever procedure the Contractor wishes to follow, it will remain his responsibility to ensure a watertight cast-in item.

PSG 6.3 No-fines concrete (add the following sub-clause 8.12)

Add the following pay item:

Item:

No fines concrete (NF19) to a minimum thickness of 80mm underneath structures, complete with mortar seal Unit (m²)
The rate shall include all labour, material, plant and resources to provide a no-fines concrete layer complete with mortar seal as specified in clause PSG2.11 (porous concrete).

PSG 6.4 Chamfers and Fillets (add the following sub-clause 8.13)

No additional payment will be made for chamfers and fillets up to 40 mm wide. Larger fillets and chamfers (e.g. weirs) will be measured by length in accordance with Sub-clause 8.2.5

PSG 6.5 Step irons (add the following sub-clause 8.14)

Add the following pay item:

Item:

Access manhole step irons Unit (No)

The rate shall include all labour, material, plant and resources to provide step irons inside the access manholes as indicated on the drawings. The rate shall include for the supply and delivery of step irons (calcamite or similar approved), the drilling into the concrete and the fastening of the concrete with an approved epoxy.



PSHA SABS 1200 HA: STRUCTURAL STEELWORK (Sundry Items)

PSHA 1 TESTING (CLAUSE 7)

PSHA 1.1 Water tightness testing (add the following new sub-clause 7.4)

The following structures shall be defined as water retaining structures and shall be subject to water tightness testing:

a) Structural Steel Tank

Water for testing shall be taken from the Employer's water connection and pipes of a suitable size shall be provided by the Contractor to allow filling of the structures within a period of four days. The cost of water for the testing of water tightness will be for the Contractor's account. The availability of the water for testing is not guaranteed and if not available, the Contractor is to make arrangement for the supply for testing.

Prior to the filling of structures, the Contractor shall seal all pipes and openings below the top water level.

The structure to be tested shall be filled with water, and shall remain full for a period of seven days, sufficient water being added. The water level shall then be recorded and the structure allowed to stand for a further seven days without the addition of water. At the end of this period, the level shall again be recorded. If the difference in level, less the drop-in level due to evaporation, is less than 10 mm during the second period of seven days, the structure shall be considered watertight.

The evaporation shall be measured by recording the mean drop in level due to evaporation of water in three flat dishes floating in the water.

In the event of appreciable leakage being evident at any stage of the filling or testing or in the event of the Employer's Agent considering the final degree of water tightness to be unsatisfactory, the Contractor when ordered by the Employer's Agent, shall discontinue such filling or testing and shall, at his own expense, take steps immediately to rectify the leakage, and to make the work thoroughly sound to the complete satisfaction of the Employer's Agent and all such work of rectification shall be continued assiduously until a satisfactory test is obtained, which shall prove to the Employer's Agent that a sufficient degree of water tightness has been obtained.

No structure will be considered complete until it has been proved watertight in terms of the requirements of this clause.

Throughout the test and afterwards, whilst emptying the tank, the water level in the underdrainage sump shall be kept below the level of the tank floor.

When emptying the structure, the rate of flow shall be controlled such that the water-level in the structure does not drop faster than 100 mm per hour.

PSHA 2 MEASUREMENT AND PAYMENT (Clause 8)

PSHA 2.1 Water tight testing (add the following sub-clause 8.3.7)

Add the following pay item:

Item:

Water tight testing of structures

i) Structural steel Tank Unit (No)
The rate shall include all labour, material, plant and resources to secure water tight structures as per PSHA 1.1.

PSHA 2.2 Disinfection and cleaning of Structural Steel Tank (add the following new sub-clause 8.3.8)

Add the following pay items:

Item:

Disinfection and cleaning of Structural steel tank Unit: Sum

The rate shall cover all costs to disinfect and clean the Structural steel tank as prescribed below.

On completion of the cleaning process the tank must be assessed in order to check the quality of the cleaning by the Employer's Agent. Once it has been cleaned to the satisfaction of the Employer's Agent, the reservoir be filled with mains water, chlorinated to give a residual in the range of 0.4 – 0.6 mg/l free chlorine or 0.8 and 1.2 mg/l total chlorine and after the normal maximum operating level has been achieved, allowed to stand for a minimum of 16 hours. Once sampling has taken place no human should enter the Tank. The cost for cleaning, disinfection (including water and chlorine for disinfection) as well as sampling will be for the contractors account and deemed to be included in this rate.

PSL **SABS 1200 L: MEDIUM PRESSURE PIPELINE**

PSL 1 **SCOPE**

The pump main section in this contract shall be deemed to be medium pressure pipelines.

PSL 2 **MATERIALS (Sub-clause 3.1)**

PSL 2.1 **General (sub-clause 3.1)**

Add the following to this sub-clause:

a) Pipes

Pipelines for the water mains shall be uPVC, sizes and classes shown on the drawings and / or Schedule of Quantities. All pipe joints shall be of approved rubber ring flexible couplings.

b) Valves (Gate valves)

Except where otherwise specified, isolating valves shall be flanged ended, with a non-rising spindle and valve cap, shall be arranged for clockwise closing and shall be fitted with Type B trim.

c) Fittings

Generally, fittings are to be manufactured in uPVC, cast iron and mild steel as applicable. Fittings shall be compatible in respect of working and test pressure to those of the pipelines. All necessary fittings and adaptors to suit the water mains must be provided and fitted."

PSL 2.2 **Marking of valves**

The design pressure in Mega pascal (MPa) shall be engraved on the side of the valve where it is legible. Valves shall be marked with the item number of the schedules when delivered to site.

PSL 2.3 **Hand wheels and closure**

Where hand wheels are specified, edges shall be machined to a smooth surface. Wording "OPEN" and "CLOSE" will be casted into hand wheels. Valves will close clockwise except where it is otherwise specified. Spindles will be of the non-rising type.

PSL 2.4 **Protection of valves**

Valves shall be painted externally with a zinc chromate primer according to SABS 679 Type 1. (Dry film thickness of 50 mnc) After installation damaged primer shall be made good with compatible primer in accordance with valve suppliers' specifications.

Subsequently to making good of the primer the valve shall be painted with two layers of alkide based enamel according to SABS 630 Grade 1 (dry film thickness of 250 micro metre per layer) to match the colour of adjoining pipe work.

PSL 2.5 **Handling, delivery and installation**

All valves and related items shall be handled with the necessary care throughout all processes of manufacture, testing, delivery and installation. Valves furnished with lifting eyes shall be handled only by those eyes and other valves shall be handled solely with slings that will cause no damage.

In particular the inlet and escape orifices of air valves and special valves shall be effectively sealed after manufacture until completion of installation and this sealing shall be examined regularly to ensure that it is still effective.

Valves shall be effectively supported, packed or fastened down for transporting and care taken to avoid valves knocking together during transport.

Valves shall be stored in a safe place above ground and shall be protected against the ingress of foreign matter.

PSL 3 **CONSTRUCTION**

PSL 3.1 **Laying depths and cover (Sub-clause 5.1.4)**

Add the following to this sub-clause:

Water mains shall be laid to follow the grades of the existing adjoining roads, except where otherwise instructed by the Employer's Agent. The depth from finished sidewalk level to the top of the pipe barrel shall be as follows, except where otherwise directed:

- a) on sidewalks = 800 mm
- b) below carriageways = 1 000 mm
- c) outside road reserves = 700 mm

PSL 3.2 **Anchor / thrust blocks and pedestals (Sub-clause 5.5)**

Add the following to this sub-clause.

Dimensions at all anchor / thrust blocks shall be supplied by the Employer's Agent as and when required. The Contractor shall request such information not less than 7 (seven) calendar days in advance.

PSL 3.3 **Liaison with other contractors (Sub-clause 5.11)**

Add the following to this sub-clause.

"Other contractors could also execute works on the same site during the same construction period. All other contractors shall be liaised with each other on a regular basis in order to achieve progress.

The Contractor shall have the sole responsibility of liaising closely with other Contractors in respect of the matching and linking of adjoining pipe systems. No claims for delays or mismatching of levels in this regard will be entertained by the Employer's Agent."

PSL 3.4 **Crossing existing services (Sub-clause 5.1.4.3)**

There will be existing services that will be crossed. Generally, these areas can be identified and careful hand excavation will be required to expose these services.

PSL 3.5 **Pipe laying personnel (Sub-clause 5.1.1)**

The laying of pipes and ancillary fittings shall be performed only by a qualified person who is registered as an artisan in the pipe fitting or drain laying trades, or is qualified by reason of having

attended and passed the course on pipelaying of the Civil Engineering Industry Training Board.

PSL 3.6 Steel pipes, specials and fittings scope

This specification covers the manufacture, corrosion protection, delivery, erection, installation, making good of corrosion protection as well as over-coating as may be required, site-testing and commissioning of steel pipes, specials and fittings mostly for the conveyance of water, but also for air, at normal ambient temperatures between 5°C and +70°C.
Standards referred to in the Specification are listed in the Annexure to this Specification.

PSL 3.6.1 Manufacture of steel pipes

Steel pipes with normal bore up to 150mm diameter shall be manufactured to conform to all the requirements of SABS 62 whereas steel piping of larger diameter shall be manufactured to conform to all the requirements of SABS 719, all as may be amplified or amended below.

The requirements regarding pipe sizes and grades, wall thicknesses, pipe lengths and pipe and requirements are specified in the Pipe Schedule and / or stated in the Schedule of Quantities.

The following minimum wall thicknesses shall apply:

External Diameter (mm)	Minimum wall thickness (mm)
168 – 406	4,5mm
419 – 508	5,9mm
570 – 864	6,0mm

With regard to Sub-clause 4.2.2.1 in SABS 719 the Contractor shall, before commencing with pipe manufacture, satisfy the Employer's Agent that the welding methods to be used in the pipe manufacture are adequate by:

- a. The preparation of a weld sample employing precisely the same welding process, equipment and artisans by which the pipe shall be manufactured.
- b. The preparation and destructive testing of the sample in (a) above, as laid down in Clause 7.2 of SABS 719.

The results of the tests on the test pieces shall comply with the requirements of Clause 7.2 of SABS 719 in all aspects.

Such destructive testing shall be carried out for each grade of steel and for each thickness of steel in that grade.

With regard to sub-clause 4.2.2.2 and 4.2.2.3 in SABS 719 the height of the inner weld reinforcement shall not exceed 1mm.

PSL 3.6.2 Manufacture of pipe specials

Only pipe conforming to the requirements of Clause PSL 3.6.1 above, may be used for the manufacture of pipe specials.

For pipes of nominal bore, up to 150mm diameter T-pieces shall be heavy class pipe only, with the same wall thickness for both main and branch pipes. The manufacturing process and quality requirements are as specified in the relevant section of BS 806 (Section 3).

Dimensions and joint types for pipes specials are specified in the Pipe Schedule and / or stated in the Schedule of Quantities.

Welding shall be done by a welder holding a valid competence certificate (Grade 1) in terms of SABS 044 – Part V. Butt-welded joints shall conform to the requirements for welding for pipes under Clause PSL 4.2 above, and the Contractor shall prove all butt and fillet welded joints to be crack-free by carrying out dye penetrant tests, following the procedure laid down in BS 4416.

If at all practicable, pipe specials shall be subjected to hydraulic pressure tests as specified for pipe under Clause PSL 3.6.1 above. Where this is not feasible, butt-welds must be subjected to radiographic inspection over their full length, with inspection procedure and acceptability limits for defects as specified in API 1104, keeping a record of all weld inspection and repair.

Where working pressures allow the use of malleable cast iron fittings for nominal bore up to 150mm diameter, these shall conform to the requirements of SABS 509.

PSL 3.6.3 Pipe flanges, bolts and jointing

PSL 3.6.3.1 Material and dimensions for flanges

The requirements for the materials and dimensions for flanges are in all respects as specified in SABS 1123.

A raised joint face shall be provided on all flanges of pressure rating higher than 2,5 MPa unless otherwise agreed to by the Employer's Agent or as stated in the Schedule of Quantities, and the backs of cast or forged flanges shall be machined.

The machined surfaces of flanges shall be covered immediately after machining by a temporary rust preventative film of a suitable type as specified in BS 1133 (Section 6).

All flanges shall be drilled to SABS 1123 (Table 1600/3) or otherwise to the class as stated in the Schedule of Quantities or on drawings.

PSL 3.6.3.2 Welding on of flanges

The procedure for the welding-on of flanges, shall comply with the requirements of BS 806 (Section 3).

The proficiency of the welder and the quality requirements for the weld are the same as those specified in Clause PSL 3.6.2 above.

As a rule, the bolt holes in flanges for pipe specials shall not be on the vertical centre line.

When so specified in the Schedule of Quantities, flanged pipes shall be hydraulically tested after the welding-on of the flanges to a test pressure of 1,5 times the pressure rating of the respective flange.

PSL 3.6.4 Bolts

Materials and dimensional requirements of bolts and nuts are specified in SABS 135 or 136. These requirements shall correspondingly be prescribed by the Contractor when ordering.

The threaded length shall be adequate to allow two full threads to protrude beyond the nut after the latter is fully tightened.

Each bolt shall be fitted with a nut and steel washer and bolts, nuts and washers shall be cadmium plated in accordance with and to a thickness specified for Class A in BS 1706.

Unless otherwise indicated in the Pipe Schedule, the number of bolts to be supplied shall be determined on the basis that each flange is to be supplied with half the number of bolts required for

that flange.

PSL 3.6.5 Jointing

Insertion for flanges shall be of compressed asbestos fibre jointing and shall have a uniform thickness between 1,5mm and 3mm and the material shall comply with BS 2815 for the specific pressure rating.

PSL 3.6.6 Pipe joints and coupling other than flanges

Pipe ends shall be prepared for the type of jointing and coupling as specified in the pipe schedule and / or stated in the Schedule of Quantities with the requirements for and preparations as specified in SABS 62 and 719 as applicable.

Standard couplings and flange adapters shall be of the Viking Johnson type or equivalent and all loose bolts with nuts and washers shall be cadmium plated in accordance with and to a thickness specified for Class A in BS 1706 and shall be lined and coated as specified in Clause PSL 3.6.7 below.

PSL 3.6.7 Lining and coating of steel pipes, specials and fittings

Corrosion protection onto the inside of pipework

Pipework with diameters up to 150mm (Type A)

Hot dip galvanised in accordance with the relevant SANS standards.

Pipework with diameters greater than 150mm (Type B)

All pipes, specials and fittings, including couplings and flange adapters, shall be fully lined and coated by COPON 2300 with a minimum of three coats to a minimum total dry film thickness of 250 micrometres on a steel surface that has been prepared by sandblasting to Grade SA 2.5 as specified in SIS 055900, with a delay of not more than four hours between sandblasting and the application of the first paint coat.

Successive paint coats shall be of different colours, and the colour of the final coat shall be approved by the Employer's Agent prior to painting. Over-coating time between the application of successive coats, shall not exceed 24 hours.

Corrosion protection onto the outside of pipework Exposed pipework (Type C)

The surface should be prepared by sandblasting to Grade SA 2.5 as specified in SIS 055900, with a delay of not more than four hours between sandblasting and the application of the primer.

Primer: one coat zinc chromate plus one coat universal undercoat with dry film thickness of minimum 15 microns.

Thereafter two finishing coats of gloss enamel structural paint of approved manufacture of different colours to a total film thickness of 38 microns per coat.

The colour of the final coats shall be in accordance with SABS 1091.

Pipework with diameters greater than 150mm (Type D)

All pipes, specials and fittings, including couplings and flange adapters, shall be fully lined and coated by COPON 2300 with a minimum of three coats to a minimum total dry film thickness of 250 micrometres on a steel surface that has been prepared by sandblasting to Grade SA 2.5 as specified

in SIS 055900, with a delay of not more than four hours between sandblasting and the application of the first paint coat.

Successive paint coats shall be of different colours, and the colour of the final coat shall be approved by the Employer's Agent prior to painting. Over-coating time between the applications of successive coats, shall not exceed 24 hours.

Tape wrapping

All underground steel pipes joints (flanged, flexible coupling, etc.) shall be tape wrapped in accordance with this specification. No additional payment shall be made as the rate for the coupling shall include for the tape wrapping.

External steel pipe coating and wrapping specification:

External steel pipe coating and wrapping specification

A Denso Corroklad 750 tape or equivalent should be applied to the external surface of the steel pipeline.

The tape consists essentially of a specially formulated polyethylene film laminated to a pressure sensitive, non-hardening thermoplastic adhesive. The adhesive layer is generally one and a half times thicker than the polyethylene film.

The composite wrapping system provides a durable impact and cut resistant rockshiled for normal and rugged service conditions.

Technical Data

The following information pertains to the Corroklad 750 tape:

- The base layer is made of polyethylene and is 0,3mm thick.
- The adhesive layer consists of rubber modified bitumen and is 0,45mm thick.
- The product thickness is 0,75mm.
- The tape has a minimum tensile strength of 15 MPa.
- The minimum elongation at failure is 300%.
- The adhesive and peel strength of the tape at 25°C is 2,2N/mm and 1,65N/mm respectively.
- The minimum dielectric strength of the tape is 25 KV.
- Cathodic disbondment by ASTM G8 Method B is 425mm².
- The service temperature of the tape is -10°C to 65°C.

Application Procedure

Corroklad tape can be successfully wrapped by hand (maximum tape width 100mm) and by machine. The general application is detailed below.

Surface Preparation

- All dirt, loose ruste/mill scale and grease must be removed from the pipe surface.
- The minimum surface preparation acceptable for tape wrapping with Corroklad is ST2 (Swedish Standard SIS 055900-1967, Mechanical wire brushing).

Priming the Pipe Surface

- The primer to be used is Denso Primer D or equivalent Polymer Bitumen Solution, and is to be applied by means of a medium pressure cop gun.
- The primer may be thinned for application with white spirits or toluene.
- The primer should nominally cover 9m² litre.
- The minimum drying period at 20°C is 20 minutes.

- The flash point occurs above 23°C.
- If the pipes are prepared and primed off site, it may be necessary to apply a second coat of primer on site in order to rejuvenate the first application. This is only required if the pipe is being wrapped on site.
- The primer should be dust free prior to the application of the tape wrap system. Should the primer be contaminated, the surface must be reprimed.
- The primer should be allowed to dry for approximately 30 minutes at 20°C to 25°C prior to the application of the tape system.

Tape Application

- The Corroklad tape or equivalent should be spirally wrapped onto the primed pipe, utilising a 55% overlap.
55% Overlap will ensure a minimum of two layers of tape at any point.
- Ensure that a constant web tension of 10 to 15kg/100mm is maintained during wrapping.
- At no time is the shrinkage of the total width of tape to exceed 2%.

Pipe Handling

- Non-metallic slings are to be utilised when handling the wrapped pipe sections or pipe, in order to ensure that no mechanical damage occurs to the tape.

PSL 3.6.8 Making good and over-coating of steel pipes, specials and fittings

PSL 3.6.8.1 Steel pipes, specials and fittings

After erection, all damage to the COPON coatings, shall be made good strictly in accordance with the paint supplier's detail specification. Prior to making good, a copy of these specifications shall be submitted to the Employer's Agent .

Subsequent to the repair of COPON painted areas, all exposed pipework, as listed in the Schedule of Quantities, shall be cleaned of dirt, oil and such substances. These exposed pipe surfaces shall then be over-coated with two coats of polyurethane paint compatible with the COPON coating and in accordance with the paint supplier's detail specification including abrasion as may be necessary.

PSL 3.6.8.2 Handling, delivery and installation

All pipes, pipe specials and fittings shall be handled throughout the processes of manufacturing, corrosion protection, delivery and installation with all care necessary to prevent any damage.

After the corrosion protection of the outside of pipes and specials has been carried out, these items must be handled only by means of straps that will in no way damage the protection.

After completion of corrosion protection at the place of manufacture, all pipe ends shall be effectively closed off by at least a sheet of plastic held fast to the pipe and by binding wire.

This seal shall be checked specifically during delivery and after off-loading on site to confirm that it is still fully effective and shall immediately be repaired or replaced if damaged. Should there be the slightest danger of the ingress of foreign matter into the pipework during installation, the ends shall be kept sealed off all the time.

Pipes shall be supported during travelling on shaped and padded cradles while pipe specials shall be adequately supported and separated from each other to prevent any damage.

At the delivery points on site, pipes, pipe specials and fittings shall be supported by plastic sandbags of sufficient strength, such that the under sides of the pipes and pipe specials are at least 200mm off the ground. The number and positioning of supports under the pipes, shall be such as to prevent any undue pipe deflection.

Bolts, nuts, washers and jointing, shall be packed in strong metal or wooden containers with effective lids, with each different sizes of bolts grouped separately in hessian bags all clearly labelled as to their

contents.

Pipe work shall be securely clamped in its final position by means of galvanised fittings.

PSL 3.7 Flexible couplings at structures

Flexible couplings shall be provided at the point where pipelines enter all structures.

PSL 3.8 Valves (Sub-clause 3.10)

PSL 3.8.1 Scope

This specification covers the requirements for material, manufacture, delivery, installation, over-coating as may be required, site-testing and commissioning for gate valves for use in pipe work, mainly for the delivery of raw and purified water, but also for air supply, at ambient temperatures up to 70°C.

PSL 3.9 Break into main

The Contractor shall break into and connect up to the existing water pipeline after all the work on the water main has been completed and tested. The Contractor shall arrange in co-operation with the local authority for the emptying of pipes and canal, excavations, etc. complete as required for the connection.

PSL 3.10 Testing of pipelines (Sub-clause 7.3)

PSL 3.10.1 Test pressure (Sub-clause 7.3.1(a))

Replace the Sub-clause 7.3.1 with the following:

All pipes shall be tested at 1.25 the working pressure at the specific point where the pressure test be executed. The Contractor shall identify the points on the pipeline where the hydrostatic pressure test be executed and shall notify the Employer's Agent in advance in order for the Employer's Agent to be able to furnish the Contractor with the required test pressure at the specific test point.

PSL 3.10.2 Method of testing (Sub-clause 7.3.1(b))

Add the following new clauses:

- a) The Contractor shall provide an approved test pump, an accurate water meter, sealed pressure gauge, tested and certified by an independent testing organisation, and all other equipment, materials and labour required for the test.
- b) The section of pipeline to be tested shall be clean and closed off at the ends by isolating valves, end caps or approved end-closure pieces
- c) During the initial filling stage, the pipe section joints and all specials, fittings and valves shall be visually inspected for visible leaks and same rectified before proceeding with the test.
- d) The pressure shall be maintained for one hour and if a pressure drop occurs, more water shall be added to reinstate the test pressure and the valve closed again. The quantity of water added shall be measured by recording the readings before and after pumping. This procedure shall be repeated for a period of 24 hours, with water added at hourly intervals where necessary to reinstate pressure and water meter reading recorded. At the end of the 24-hour period, the aggregate quantity of water required to reinstate pressure over 24 hours shall be determined.

- e) The Contractor shall give the Employer's Agent 48 hours written notice of his intention to commence pressure testing and the Employer's Agent may attend and supervise all or any part of tests. All records and recording charts shall be handed to the Employer's Agent as soon as tests over any section have been completed.
- f) All valves, specials, fittings and exposed joints, shall be inspected visually during the 24 hours pipeline test and all visible signs of leaks, sweating and distress shall be reported and attended to without delay.
- g) Immediately after completion of the prescribed 24 hours hydrostatic test, all air valves shall be tested in turn before test pressure in the pipeline is released. Each air valve shall be isolated and the drain plug removed. The air valve shall work freely without restraint. The isolating valve shall be checked for leakage before replacing the plug. Finally, the automatic resealing of the air valves shall be checked by re-opening the isolating valve.
- h) After completion of tests on air valves, the section of pipeline under test shall be completely refilled with water, if necessary, and pressured to the static head shown on the drawings or indicated by the Employer's Agent. Each scour valve shall be checked by opening isolating valves where applicable for a duration sufficient to check the complete opening and closing cycles. If necessary, the pipeline shall be refilled after each individual test and re-pressurised to the prescribed static pipeline head in order to test all scours within the section under test.

PSL 3.10.3 Remedial measures (Sub-clause 7.3.1 (c))

Add the following new clauses:

- a) Should the maximum leakage limits as specified be exceeded, the Contractor shall determine the position and cause of the leaks and shall take remedial measures at his own expense and to the satisfaction of the Employer's Agent to stop such leaks and ensure the specified degree of water tightness.
- b) If during the contract period of maintenance, the number of leaks and other defects is considered by the Employer's Agent to be more than could reasonably be expected from a well laid pipeline operating under normal conditions, he may order the Contractor to re-test parts or the whole of the pipeline at the Contractor's own expense and no claims for escalation in costs or for whatever other reasons the Contractor might consider to submit claims shall be considered, except where such re-tests are the result from damages caused to the pipeline by the Employer.

PSL 3.11 Concrete work (New Sub-clause 5.11)

Add the following new clauses:

PSL 3.11.1 General

- a) All concrete work shall be finished to the lines, levels, slopes and outlines shown on the drawings or as otherwise directed.
- b) All exposed concrete surfaces shall be finished such that surface irregularities shall not exceed a tolerance of 8 mm and shall be rubbed down with a carborundum stone to present a surface of even colour and a smooth and pleasing appearance. All exposed edges shall be chamfered by a 40 mm chamfers fixed to shuttering. Unless otherwise specified all floors shall have a wood-float finish.

- c) Surfaces shall be free from honeycombing and excrescences. Honeycombing to the extent that in the opinion of the Employer's Agent the strength of the structure is impaired or the reinforcement is subject to corrosion or lack of bond, shall be removed and replaced with satisfactory concrete at the Contractor's expense within 72 hours of the concrete originally being placed.
- d) The minimum concrete cover to reinforcement of concrete surfaces permanently in contact with ground shall be 50 mm and for all other surfaces shall be 40 mm.
- e) All pre-cast units shall be steel-trowel led on upper surfaces to present a dense, homogenous surface.
- f) Slight spalling of top edges of manholes to be covered by precast or cast-in-situ cover slabs shall be permitted, provided the maximum dimension of the spall measured along any face shall not exceed 10 mm and provided further that no reinforcement is exposed. The maximum permissible difference in any of the two measurements taken to opposite corners diagonally across rectangular or square structures shall not exceed 2 % of that measurement calculated from the drawing. The tolerance in thickness of walls or cover slabs shall be ± 15 mm. All top edges of manholes shall be provided with 25 mm x 25 mm chamfering.

PSL 3.11.2 Valve chambers

- a) Chambers for isolating valves, air valves, scour valves, meters, access manholes etc. shall be constructed in accordance with approved drawings.
- b) Care shall be taken that the elevation of air bricks and tops is such that no ingress of surface run-off or ground water into chambers can occur.

PSL 3.11.3 Encased pipe work

- a) Where pipes and / or specials are permanently encased in concrete, e.g. in thrust blocks, walls of concrete valve chambers, stream crossings, etc., the coating over the portion to be so encased shall be to the same standard as the rest of the pipeline, except where indicated to the contrary in the Schedule of Quantities or on the drawings.
- b) Whenever it is necessary to encase pipes in concrete, the flexible joints shall not be encased and the concrete shall terminate 300 mm from the flexible joint.
- c) All specials encased in concrete shall be painted with one coat of bitumen primer and two coats of bit mastic paint to a dry film thickness of 180 micrometers.

PSL 3.12 Brickwork (New Sub-clause 5.12)

Add the following new clauses:

- a) Brickwork is to be built to the dimensions, thicknesses and heights as shown on the drawings.
- b) All exposed brickwork shall be plastered and shall have joints raked out to a depth of 12 mm to ensure good plaster bond.
- c) Mortar shall consist of one-part cement to four parts approved sand by volume and shall be used within one hour of mixing.
- d) Brickwork shall be built in stretcher bond and all common bricks shall be well wetted before being laid.

PSL 3.13 Fabricated steelwork (New Sub-clause 5.13)

Add the following new clauses:

- a) All fabricated steelwork for covers, locking bars, etc., shall be manufactured from mild steel plate, chequer plate and / or bar as detailed on the drawings.
- b) All welding shall be carried out in accordance with SABS 044 – “Code of Practice for Welding.

PSL 3.14 Applicable standards

The latest revisions of the following standard specifications shall apply:

SABS 144	-	Single Door Reflux Valves
SABS 191	-	Cast Steel Gate Valves
SABS 192	-	Cast Steel Single Door Reflux Valves
SABS 664	-	Cast Iron Valves for waterworks and Heavy Industrial applications.
SABS 5155	-	Cast Iron and Carbon Steel Butterfly Valves
SABS 1123	-	Steel flanges for pipes (Back of flanges spot faced)

PSL 4 MEASUREMENT AND PAYMENT

PSL 4.1 Steel specials and fittings (sub-clause 8.2.2)

Add the following payment item:

Item:

Fabrication, supply, transport and install and test the following pipe fittings. All items to be approved by Employer's Agent prior to ordering.

Unit: No

The unit of measurement for payment for the manufacture, corrosion protection and final over-coating as may be required, delivery, installation of pipes, site-testing and commissioning of pipes, pipe specials and fittings conforming with this Specification shall be measured by number for each type, class and size as stated in the Schedule of Quantities.

The rates Tendered and paid for valves and fittings must include the cost of the provision of an approved coating and the cost of any additional couplings other than those listed in the Schedule of Quantities to connect to the water mains.

All adapters and distance pieces required for the extension to the specified level and length as shown on the drawings for air and scour valves must be included in the rates for the units.

The cost of providing couplings, cutting pieces, etc. shall be allowed for in the rate Tendered for pipe work.

PSLB SABS 1200 LB: BEDDING (PIPES)

PSLB 1 MATERIALS

PSLB 1.1 Selected granular material (Sub-clause 3.1)

Add the following to this sub-clause:

Granular materials shall be selected from trench and reservoir excavations. If the contractor elects not to apply selection of material from excavations, he shall provide suitable material from any other approved source at his own expense. The Contractor will be expected to first pursue the possibility of utilising insitu material for bedding. The option and relevant test and results shall be presented to the Employer's Agent. The Employer's Agent will indicate to the Contractor what material to use in terms of insitu or imported materials. Should the Employer's Agent indicate that insitu materials must be sieved and used, and the contractor decide to rather import material, then the rate for insitu material will be paid.

Bedding material shall be either of the following type:

- a) Type A: Finally graded, composed of material with the following properties:
 - i) Percentage by mass passing:
4,75 mm screen - 100 %
0,425 mm screen - 80 to 100 %
0,002 mm screen - 0 to 45 %
 - ii) Liquid limit (LL) as determined in accordance with SABS Method 852 shall not be more than 15, when performed on all the material passing the 0,425 mm sieve.
 - iii) Plasticity index (PI) as determined in accordance with SABS Method 852 shall not be more than 15, when performed on all the material passing the 0,425 mm sieve.
 - iv) Linear shrinkage (LS) as determined in accordance with SABS Method 853 shall not exceed 5 %, when performed on all the material passing the 0,425 mm sieve.
- b) Type B: Medium graded, composed of material with the following properties:
 - i) Percentage by mass passing:
4,75 mm screen - 80 to 100 %
0,425 mm screen - 60 to 80 %
0,002 mm screen - 0 to 40 %
 - ii) Liquid limit (LL) as determined in accordance with SABS Method 852 shall not be more than 35 %, when performed on all the material passing the 0,425 mm sieve.
 - iii) Plasticity index (PI) as determined in accordance with SABS Method 852 shall not be more than 18, when performed on all the material passing the 0,425 mm sieve.
 - iv) Linear shrinkage (LS) as determined in accordance with SABS Method 853 shall not exceed 7 %, when performed on all the material passing the 0,425 mm sieve.
- c) Type C: Granular, composed of material with the following properties:

- i) Percentage by mass passing:
9,5 mm screen - 100 %
4,75 mm screen - 70 to 100 %
0,425 mm screen - 30 to 60 %
0,002 mm screen - 0 to 45 %
- ii) Liquid limit (LL) as determined in accordance with SABS Method 852 shall not be more than 40 %, when performed on all the material passing the 0,425 mm sieve.
- iii) Plasticity index (PI) as determined in accordance with SABS Method 852 shall not be more than 20, when performed on all the material passing the 0,425 mm sieve.
- iv) Linear shrinkage (LS) as determined in accordance with SABS Method 853 shall not exceed 10 %, when performed on all the material passing the 0,425 mm sieve.

Items a), b) and c) are conveniently summarised in the following table:

Material	PERCENTAGE BY MASS PASSING SCREENS				ATTERBERG LIMITS SHALL NOT EXCEED		
	9,5 mm	4,75 mm	0,425 mm	0,002 mm	Liquid Limit (LL) %	Plasticity Index (PI)	Linear Shrinkage (LS) %
Finely graded / A	100	100	80 - 100	0 - 45	30	15	5
Medium graded / B	100	80 - 100	60 - 80	0 - 40	35	18	7,5
Granular / C	100	70 - 100	30 - 60	0 - 35	40	20	10

PSLB 1.2 **Bedding** (Sub-clause 3.3)

Add the following to this sub-clause:

All steel pipes in the works shall be classed as “rigid” with flanged joints and shall be bedded on Class C bedding as described in sub-clause 5.2 of SABS 1200 LB, unless otherwise specified or instructed by the Employer’s Agent.

PSLB 1.3 **Backfilling of pipe trenches** (add the following Sub-clause 3.5)

Add sub-clause 3.5 as follows:

No backfilling of pipe trenches on top of the selected fill layer may commence without the written consent of the Employer’s Agent or his Representative.

PSLB 2 **CONSTRUCTION**

PSLB 2.1 **Waterlogged trench bottoms** (add the following Sub-clause 5.5)

Add sub-clause 5.5 as follows:

- “a) Where trench bottoms are too soft and water logged to permit placement and compaction of bedding material in the normal manner, such trench bottoms shall be excavated to a

depth of at least 300 mm below the underside of pipes and specials for the full width and length of the trench affected.

- b) The full width and length of the trench bottom and at least 500 mm height of both sides of trench walls shall be covered by an unwoven approved geotextile, similar to Kaymat U24.

The full width and length of the trench shall thereupon be covered by a 300 mm thick layer of coarse gravel, coarse sand or 19 mm nominal size crushed stone, fully compacted within the confines of the geotextile to take the mass of the pipe filled with water and all loads on the pipe without settlement.

The free drainage layer shall be covered over the full width of the trench by a single layer of geotextile with the cloth on trench walls folded over and overlapping to completely seal off the free drainage layer against ingress of sand or fine soil particle.

Pipes shall be laid directly on the bed prepared as above and pipe bedding and selected backfill completed as specified.

PSLB 3 MEASUREMENT AND PAYMENT (Clause 8)

PSLB 3.1 Volume of bedding material (Sub-clause 8.2)

Add the following general description:

The volume of bedding material will be determined from the dimensions of the pipe and the specified trench width according to the dimensions of drawing B-2. The volume occupied by the pipe barrel will not be measured as part of the bedding material quantities.