



REPUBLIC OF KENYA

MINISTRY OF AGRICULTURE, LIVESTOCK
FISHERIES AND COOPERATIVES

KENYA LEATHER DEVELOPMENT COUNCIL

PROPOSED CONSTRUCTION OF 2NO. INDUSTRIAL
WAREHOUSES, EACH 2500SM, FOR LEATHER
PRODUCTS MANUFACTURE AT KENYA LEATHER
PARK KENANIE, EPZ SITE, MACHAKOS COUNTY

W.P. ITEM NO. D117/EN/MKS/ 1902 – JOB NO. 10753A

VOLUME 5 OF 6

SPECIFICATIONS AND BILLS OF QUANTITIES
FOR
SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISSIONING
OF
PLUMBING, DRAINAGE AND FIRE PROTECTION WORKS

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VOLUME 5

**SPECIFICATIONS AND BILLS OF QUANTITIES
FOR
SUPPLY, DELIVERY, INSTALLATION, TESTING AND
COMMISSIONING
OF
SANITARY FITTINGS, PLUMBING, DRAINAGE AND FIRE
PROTECTION WORKS**

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SPECIAL NOTES

1. These notes shall form part of the Instructions to Tenderers and Conditions of Contract.
2. The tenderer is required to check the number of pages in this document and should he find any missing, or in duplicate, or indistinct he should inform the Chief Mechanical Engineer (BS), Ministry of Transport, Infrastructure, Housing and Urban Development.
3. Should the tenderer be in any doubt about the precise meaning of any item or figure, for any reason whatsoever, he must inform the Chief Mechanical Engineer (BS), Ministry of Transport, Infrastructure, Housing and Urban Development, in order that the correct meaning may be decided before the date of submission of tender.
4. No liability will be admitted nor claim allowed, in respect of errors in the tender due to mistakes in the specification, which should have been rectified in the manner, described above.
5. All tenderers must make a declaration that they have not and will not make any payment to any person which can be perceived as an inducement to enable them to win this tender.
6. Any tenderer whose firm uses the titles “Engineer” and “Engineers” must produce evidence of registration of at least one of the directors by the Engineers Registration Board of Kenya to avoid disqualification.

SECTION A:

INSTRUCTIONS TO TENDERERS

TENDER EVALUATION CRITERIA

Note: The tenderer, who shall be domestic subcontractor to the Main Contractor upon award of the tender, must comply with the following conditions and instructions failure to which the tender shall be rejected.

After tender opening, the tenders will be evaluated in **2 stages**, namely:

1. Preliminary Evaluation;
2. Technical Evaluation;

STAGE 1: PRELIMINARY EVALUATION

This stage of evaluation shall involve examination of the mandatory requirements as set out in the Tender Advertisement Notice or Letter of Invitation to Tender and any other conditions stated in the bid document.

These conditions shall include the following:

- i) Company Certificate of incorporation/registration;
- ii) Current National Construction Authority Registration certificate (NCA 5 and above in Plumbing and Drainage Works) and current annual practicing license;
- iii) Valid Tax Compliance Certificate;
- iv) Provide a copy of valid business permit;
- v) Dully filled (in ink) Bills of quantities in the format provided;
- vi) Compliance with Technical Specifications;

Note:

On compliance with Technical Specifications, bidders shall supply equipment /items which comply with the technical specifications set out in the bid document. In this regard, the bidder will be required to submit relevant technical brochure/catalogues with the tender document, highlighting (using a mark-pen or highlighter) the Catalogue Number/Model of the proposed items. Such brochure/catalogues should indicate comprehensive relevant data of the proposed equipment/items which should include but not limited to the following:

- (i) Standards of manufacture;
- (ii) Performance ratings/characteristics;
- (iii) Material of manufacture;
- (iv) Electrical power ratings; and
- (v) Any other necessary requirements so as to comply with the bid technical specifications.

The bid will then be analyzed, using the information in the technical brochures, to determine compliance with key technical specifications for the works/items as indicated in the tender document. Bidders not complying with **any** of the key Technical Schedule specifications shall be **Non-Responsive** while those meeting all the key technical specifications shall be **Responsive** (evaluation committee may add more key requirements from the bid technical specifications).

The tenderer shall also fill in the Technical Schedule as Specified in the tender document for Equipments and items indicating the Country of Origin, Model/Make/Manufacturer and catalogue numbers of the Items/ Equipment they propose to supply.

The tenderers who do not satisfy any of the above mandatory requirements shall be considered Non-Responsive and their tenders will not be evaluated further.

STAGE 2 TECHNICAL EVALUATION

A) Assessment for eligibility

The tender document shall be examined based on a detailed scoring plan shall be as shown in table 1 below.

The award of points for the STANDARD FORMS considered in this section shall be as shown below

<u>PARAMETER</u>	<u>MAXIMUM POINTS</u>
(i) Key personnel -----	20
(ii) Contract Completed in the last Five (5) years -----	20
(iii) Schedules of on-going projects -----	8
(iv) Schedules of contractors equipment -----	20
(v) Litigation History -----	2
TOTAL	<u>70</u>

TABLE 1: Assessment for Eligibility

Item	Description	Point Scored	Max. Point	
i	Key Personnel (Attach evidence)			20
	Director of the firm • Holder of degree in relevant Engineering field ----- 6 • Holder of diploma in relevant Engineering field ----- 5 • Holder of certificate in relevant Engineering field ----- 3 • Holder of trade test certificate in relevant Engineering field ----- 2 • No relevant certificate ----- 1		6	
	At least 1No. degree/diploma of key personnel in relevant Engineering field • With over 10 years relevant experience ----- 6 • With over 5 years relevant experience----- 4 • With under 5 years relevant experience ----- 2		6	
	At least 1No certificate holder of key personnel in relevant Engineering field • With over 10 years relevant experience----- 4 • With over 5 years relevant experience ----- 3 • With under 5 years relevant experience ----- 1		4	
	At least 2No artisan (trade test certificate in relevant Engineering field) • Artisan with over 10 years relevant experience ----- 2 • Artisan with under 10 years relevant experience ----- 1 • Non skilled worker with over 10 years relevant experience ----- 1		4	
ii	Contract completed in the last five (5) years (Max of 5 No. Projects)- <u>Provide Evidence</u> • Project of similar nature, complexity and magnitude ---- 4 • Project of similar nature but of lower value than the one in consideration ----- 3 • No completed project of similar nature ----- 0		20	
iii	On-going projects – <u>Provide Evidence</u> • Four and above Project of similar nature, complexity and magnitude ----- 8 • Three and below Project of similar, nature complexity and magnitude ----- 6 • No project of similar, nature complexity and magnitude -----4		8	
iv	Schedule of contractors equipment and transport (proof or evidence of ownership/Lease) a) Relevant Transport (at least 2No.) • Means of transport (Vehicle) ----- 10 • No means of transport ----- 0		10	20
	b) Relevant Equipment (at least 5No.) • Has relevant equipment for work being tendered----- 10 • No relevant equipment for work being tendered----- 0		10	

v	Litigation History <ul style="list-style-type: none"> • Filled ----- 2 • Not filled ----- 0 		2
	TOTAL		70

Any bidder who scores 40 points and above shall be considered for further evaluation

SECTION B:

GENERAL MECHANICAL SPECIFICATIONS

SECTION D**GENERAL MECHANICAL SPECIFICATION**

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GENERAL MECHANICAL SPECIFICATION

2.01 General

This section specifies the general requirement for plant, equipment and materials forming part of the Sub-contract Works and shall apply except where specifically stated elsewhere in the Specification or on the Contract Drawings.

2.02 Quality of Materials

All plant, equipment and materials supplied as part of the Sub-contract Works shall be new and of first class commercial quality, shall be free from defects and imperfections and where indicated shall be of grades and classifications designated herein.

All products or materials not manufactured by the Sub-contractor shall be products of reputable manufacturers and so far as the provisions of the Specification is concerned shall be as if they had been manufactured by the Sub-contractor.

Materials and apparatus required for the complete installation as called for by the Specification and Contract Drawings shall be supplied by the Sub-contractor unless mention is made otherwise.

Materials and apparatus supplied by others for installation and connection by the Sub-contractor shall be carefully examined on receipt. Should any defects be noted, the Sub-contractor shall immediately notify the Engineer.

Defective equipment or that damaged in the course of installation or tests shall be replaced as required to the approval of the Engineer.

2.03 Regulations and Standards

The Sub-contract Works shall comply with the current editions of the following:

- a) The Kenya Government Regulations.
- a) The United Kingdom Institution of Electrical Engineers (IEE) Regulations for the Electrical Equipment of Buildings.
- b) The United Kingdom Chartered Institute of Building Services Engineers (CIBSE) Guides.
- c) British Standard and Codes of Practice as published by the British Standards Institution (BSI)
- e) The Local Council By-laws.
- f) The Electricity Supply Authority By-laws.
- g) Local Authority By-laws.
- h) The Kenya Building Code Regulations.
- i) The Kenya Bureau of Standards

2.04 Electrical Requirements

Plant and equipment supplied under this Sub-contract shall be complete with all necessary motor starters, control boards, and other control apparatus. Where control panels incorporating several starters are supplied they shall be complete with a main isolator.

The supply power up to and including local isolators shall be provided and installed by the Electrical Sub-contractor. All other wiring and connections to equipment shall form part of this Sub-contract and be the responsibility of the Sub-contractor.

The Sub-contractor shall supply three copies of all schematic, cabling and wiring diagrams for the Engineer's approval.

The starting current of all electric motors and equipment shall not exceed the maximum permissible starting currents described in the Kenya Power and Lighting Company (KPLC) By-laws.

All electrical plant and equipment supplied by the Sub-contractor shall be rated for the supply voltage and frequency obtained in Kenya, that is 415 Volts, 50Hz, 3-Phase or 240Volts, 50Hz, 1-phase.

Any equipment that is not rated for the above voltages and frequencies shall be rejected by the Engineer.

2.05 Transport and Storage

All plant and equipment shall, during transportation be suitably packed, crated and protected to minimise the possibility of damage and to prevent corrosion or other deterioration.

On arrival at site all plant and equipment shall be examined and any damage to parts and protective priming coats made good before storage or installation.

Adequate measures shall be taken by the Sub-contractor to ensure that plant and equipment do not suffer any deterioration during storage.

Prior to installation all piping and equipment shall be thoroughly cleaned.

If, in the opinion of the Engineer any equipment has deteriorated or been damaged to such an extent that it is not suitable for installation, the Sub-contractor shall replace this equipment at his own cost.

2.06 Site Supervision

The Sub-contractor shall ensure that there is an English-speaking supervisor on the site at all times during normal working hours.

2.07 Installation

Installation of all special plant and equipment shall be carried out by the Sub-contractor under adequate supervision from skilled staff provided by the plant and equipment manufacturer or his appointed agent in accordance with the best standards of modern practice and to the relevant regulations and standards described under Clause 2.03 of this Section.

2.08 Testing

2.08.1 General

The Sub-contractor's attention is drawn to Part 'C' Clause 1.38 of the "Preliminaries and General Conditions".

2.08.2 Material Tests

All material for plant and equipment to be installed under this Sub-contract shall be tested, unless otherwise directed, in accordance with the relevant B.S Specification concerned.

For materials where no B.S. Specification exists, tests are to be made in accordance with the best modern commercial methods to the approval of the Engineer, having regard to the particular type of the materials concerned.

The Sub-contractor shall prepare specimens and performance tests and analyses to demonstrate conformance of the various materials with the applicable standards.

If stock material, which has not been specially manufactured for the plant and equipment specified is used, then the Sub-contractor shall submit satisfactory evidence to the Engineer that such materials conform to the requirements stated herein in which case tests of material may be partially or completely waived.

Certified mill test reports of plates, piping and other materials shall be deemed acceptable.

2.08.3 Manufactured Plant and Equipment – Work Tests

The rights of the Engineer relating to the inspection, examination and testing of plant and equipment during manufacture shall be applicable to the Insurance Companies or Inspection Authorities so nominated by the Engineer.

The Sub-contractor shall give two week's notice to the Engineer of the manufacturer's intention to carry out such tests and inspections.

The Engineer or his representative shall be entitled to witness such tests and inspections. The cost of such tests and inspections shall be borne by the Sub-contractor.

Six copies of all test and inspection certificates and performance graphs shall be submitted to the Engineer for his approval as soon as possible after the completion of such tests and inspections.

Plant and equipment which is shipped before the relevant test certificate has been approved by the Engineer shall be shipped at the Sub-contractor's own risk and should the test and inspection certificates not be approved, new tests may be ordered by the Engineer at the Sub-contractor's expense.

2.08.4 Pressure Testing

All pipe work installations shall be pressure tested in accordance with the requirements of the various sections of this Specification. The installations may be tested in sections to suit the progress of the works but all tests must be carried out before the work is buried or concealed behind building finishes. All tests must be witnessed by the Engineer or his representative and the Sub-contractor shall give 48 hours notice to the Engineer of his intention to carry out such tests.

Any pipe work that is buried or concealed before witnessed pressure tests have been carried out shall be exposed at the expense of the Sub-contractor and the specified tests shall then be applied.

The Sub-contractor shall prepare test certificates for signature by the Engineer and shall keep a progressive and up-to-date record of the section of the work that has been tested.

2.09 Colour Coding

Unless stated otherwise in the Particular Specification all pipe work shall be color coded in accordance with the latest edition of B.S 1710 and to the approval of the Engineer or Architect.

2.10 Welding

2.10.1 Preparation

Joints to be made by welding shall be accurately cut to size with edges sheared, flame cut or machined to suit the required type of joint. The prepared surface shall be free from all visible defects such as lamination, surface imperfection due to shearing or flame cutting operation, etc., and shall be free from rust scale, grease and other foreign matter.

2.10.2 Method

All welding shall be carried out by the electric arc processing using covered electrodes in accordance with B.S. 639.

Gas welding may be employed in certain circumstances provided that prior approval is obtained from the Engineer.

2.10.3 Welding Code and Construction

All welded joints shall be carried out in accordance with the following Specifications:

a) Pipe Welding

All pipe welds shall be carried out in accordance with the requirements of B.S.806.

b) General Welding

All welding of mild steel components other than pipework shall comply with the general requirements of B.S. 1856.

2.10.4 Welders Qualifications

Any welder employed on this Sub-contractor shall have passed the trade tests as laid down by the Government of Kenya.

The Engineer may require to see the appropriate certificate obtained by any welder and should it be proved that the welder does not have the necessary qualifications the Engineer may instruct the Sub- contractor to replace him by a qualified welder.

SECTION C:

PARTICULAR SPECIFICATIONS

FOR

PLUMBING AND DRAINAGE

PARTICULAR PLUMBING AND DRAINAGE SPECIFICATIONS

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PARTICULAR SPECIFICATIONS FOR PLUMBING AND DRAINAGE

3.1 GENERAL

This section specifies the general requirements for plant, equipment and materials forming part of the plumbing and drainage installations.

3.2 MATERIALS AND STANDARDS

3.2.1 Pipe work and Fittings

Pipe work materials are to be used as follows:

a) PP-R Pipe-work

PP-R pipe-work upto 63mm bore shall be manufactured in accordance with the current British Standards i.e. DIN 8077 and DIN 8078 for PN 20 tubing, with metallic joints to DIN 8076, joints and fittings for tubings to DIN 16962. All threaded inserts in the fittings and joints shall be made of nickel brass OT58 and are turned from bars and manufactured in accordance with DVGW 534E.

Pipe joints shall be screwed and socketed and sufficient coupling unions shall be allowed so that fittings can be disconnected without cutting pipe. Running nipples long screws shall not be permitted unless exceptionally approved by the Engineer.

b) Galvanized Steel Pipe work

Galvanized steel pipe work up to 65mm nominal bore shall be manufactured in accordance with B.S. 1387 Medium Grade, with tapered pipe threads in accordance with B.S. 21. All fittings shall be malleable iron and manufactured in accordance with B.S. 143.

Pipe joints shall be screwed and socketed and sufficient coupling unions shall be allowed so that fittings can be disconnected without cutting the pipe. Running nipples and long screws shall not be permitted unless exceptionally approved by the Engineer.

Galvanized steel pipe work, 80mm nominal bore up to 150mm nominal bore shall be manufactured to comply in all respects with the specification for 65mm pipe, except that screwed and bolted flanges shall replace unions and couplings for the jointing of pipes to valves and other items of plant. All flanges shall comply with the requirements of B.S. 10 to the relevant classifications contained hereinafter under Section 'C' of the Specification.

Galvanizing shall be carried out in accordance with the requirements of B.S. 1387 and B.S. 143 respectively.

c) Copper Tubing

All copper tubing shall be manufactured in accordance with B.S. 2871 from C.160 'Phosphorous De-oxidized Non-Arsenical Copper' in accordance with B.S. 1172.

Pipe joints shall be made with soldered capillary fittings and connections to equipment shall be with compression fittings manufactured in accordance with B.S. 864.

Short copper connection tubes between galvanized pipe work and sanitary fittings shall not be used because of the risk of galvanic action.

If, as may occur in certain circumstances, it is not possible to make the connection in any way than the use of copper tubing, then a brass straight connector shall be positioned between the galvanized pipe and the copper tube in order to prevent direct contact.

d) P.V.C. (Hard) Pressure Pipes and Fittings

All P.V.C. pipes and fittings shall be manufactured in accordance with B.S. 3505: 1968.

Joining

The method of joining to be employed shall be that of solvent welding, using the pipe and manufacturer's approved cement. Seal ring joint shall be introduced where it is necessary to accommodate thermal expansion.

Testing

Pipelines shall be tested in sections under an internal water pressure normally one and a half times the maximum allowable working pressure of the class of pipe used. Testing shall be carried out as soon as practical after laying and when the pipeline is adequately anchored. Precautions shall be taken to eliminate all air from the test section and to fill the pipe slowly to avoid risk of damage due to surge.

e) A.B.S. Waste System

Where indicated on the Drawings and Schedules, the Sub-contractor shall supply and fix A.B.S. waste pipes and fittings.

The pipes, traps and fittings shall be in accordance with the relevant British Standards, including B.S. 3943, and fixed generally in accordance with manufacturer's instructions and B.S. 5572: 1978.

Joining of pipes shall be carried out by means of solvent welding, the manufacturer's instructions and B.S. 5572: 1978.

Joining of pipes shall be carried out by means of solvent welding. The manufacturer's recommended method of joint preparation and fixing shall be followed.

Standard brackets, as supplied for use with this system, shall be used wherever possible. Where the building structure renders this impracticable the Sub-contractor shall provide purpose made supports, centres of which shall not exceed one meter.

Expansion joints shall be provided as indicated. Supporting brackets and pipe clips shall be fixed on each side of these joints.

f) PVC Soil System

The Sub-contractor shall supply and fix PVC soil pipes and fittings as indicated on the Drawings and Schedules. Pipes and fittings shall be in accordance with relevant British Standards, including B.S. 4514 and fixed to the manufacturer's instructions and B.S. 5572.

The soil system shall incorporate synthetic rubber gaskets as provided by the manufacturer whose fixing instructions shall be strictly adhere to.

Connections to WC pans shall be effected by the use of a WC connector, gasket and cover, fixed to suit pan outlet.

Suitable supporting brackets and pipe clips shall be provided at maximum of one metre centres.

The Sub-contractor shall be responsible for the joint into the Gully Trap on Drain as indicated on the Drawings.

3.2.2 **Valves**

a) **Draw-off Taps and Stop Valves (Up to 50mm Nominal Bore)**

Draw-off taps and valves up to 50mm nominal bore, unless otherwise stated or specified for attachment or connection to sanitary fitment shall be manufactured in accordance with the requirements of B.S.1010.

a) **Gate Valves**

All gate valves 80mm nominal bore and above, other than those required for fitting to buried water mains shall be of cast iron construction, in accordance with the requirements of B.S. 3464. All gate valves required for fitting to buried water mains shall be of cast iron construction in accordance with the requirements of B.S.1218.

All gate valves up to and including 65mm nominal bore shall be of bronze construction in accordance with the requirements of B.S. 1952.

The pressure classification of all valves shall depend upon the pressure conditions pertaining to the site of works.

c) **Globe Valves**

All globe valves up to and including 65mm nominal bore shall be of bronze construction in accordance with the requirements of B.S.3061.

The pressure classification of all globe valves shall depend upon the pressure conditions pertaining to the site of works.

3.2.3 **Waste Fitment Traps**

a) **Standard and Deep Seal P & S Traps**

Where standard or deep seal traps are specified they shall be manufactured in suitable non-ferrous materials in accordance with the full requirements of B.S. 1184.

In certain circumstances, cast iron traps may be required for cast iron baths and in these instances bath traps shall be provided which are manufactured in accordance with the full requirements of B.S.1291.

b) Anti-Syphon Traps

Where anti-syphon traps are specified, these shall be similar or equal to the range of traps manufactured by Greenwood and Hughes Limited, Deacon Works Littlehampton, Sussex, England.

The trade name for traps manufactured by this company is 'Grevak'.

3.2.4 Pipe Supportsa) General

This sub-clause deals with pipe supports securing pipes to the structure of buildings for above ground application.

The variety and type of support shall be kept to a minimum and their design shall be such as to facilitate quick and secure fixings to metal, concrete, masonry or wood.

Consideration shall be given, when designing supports, to the maintenance of desired pipe falls and the restraining of pipe movements to a longitudinal axial direction only.

The Sub-contractor shall supply and install all steelwork forming part of the pipe support assemblies and shall be responsible for making good damage to builders work associated with the pipe support installation.

The Sub-contractor shall submit all his proposals for pipe supports to the Engineer for approval before any erection works commence.

b) PP-R Pipe-work

PP-R pipe-work upto 63mm bore shall be manufactured in accordance with the current British Standards i.e. DIN 8077 and DIN 8078 for PN 20 tubing, with metallic joints to DIN 8076, joints and fittings for tubings to DIN 16962. All threaded inserts in the fittings and joints shall be made of nickel brass OT58 and are turned from bars and manufactured in accordance with DVGW 534E.

Pipe joints shall be screwed and socketed and sufficient coupling unions shall be allowed so that fittings can be disconnected without cutting pipe. Running nipples long screws shall not be permitted unless exceptionally approved by the Engineer.

c) Steel and Copper Pipes and Tubes

Pipe runs shall be secured by clips connected to pipeangers, wall brackets, or trapeze type supports. 'U' bolts shall not be used as a substitute for pipe clips without the prior approval of the Engineer.

An approximate guide to the maximum permissible supports spacing in metres for steel and copper pipe and tube is given in the following table for horizontal runs.

Size Nominal Bores	Copper Tube to B.S. 659	Steel Tube to B.S. 1387
15mm	1.25m	2.0m
20mm	2.0m	2.5m
25mm	2.0m	2.5m
32mm	2.5m	3.0m
40mm	2.5m	3.0m
50mm	2.5m	3.0m
65mm	3.0m	3.5m
80mm	3.0m	3.5m
100mm	3.0m	4.0m
125mm	3.0m	4.5m
150mm	3.5m	4.5m

The support spacing for vertical runs shall not exceed one and a half times the distances given for horizontal runs.

d) Expansion Joints and Anchors

Where practicable, cold pipework systems shall be arranged with sufficient bends and changes of direction to absorb pipe expansion providing that the pipe stresses are contained within the working limits prescribed in the relevant B.S. specification.

Where piping anchors are supplied, they shall be fixed to the main structure only. Details of all anchor design proposals shall be submitted to the Engineer for approval before erection commences.

The Sub-contractor when arranging his piping shall ensure that no expansion movements are transmitted directly to connections and flanges on pumps or other items of plant.

The Sub-contractor shall supply flexible joints to prevent vibrations and other movements being transmitted from pumps to piping systems or vice versa.

3.2.5 Sanitary Appliances

All sanitary appliances supplied and installed as part of the Sub-contract works shall comply with the general requirements of B.S. Code of Practice 305 and the particular requirements of the latest B.S. Specifications.

3.2.6 **Pipe Sleeves**

Main runs of pipework are to be fitted with sleeves where they pass through walls and floors. Generally the sleeves shall be of P.V.C. except where they pass through the structure, where they shall be mild steel. The sleeves shall have 6mm - 12mm clearance all around the pipe or for insulated pipework all around the installation. The sleeve will then be packed with slag wool or similar.

3.3 **INSTALLATION**

3.3.1 **General**

Installation of all pipework, valves, fittings and equipment shall be carried out under adequate supervision from skilled staff to the relevant codes and standards as specified herein. The Sub-contractor shall be responsible to the Main Contractor for ensuring that all builders work associated with his piping installation is carried out in a satisfactory manner to the approval of the Engineer.

3.3.2 **Above Ground Installation**

a) **Water Services**

Before any joint is made, the pipes shall be hung in their supports and adjusted to ensure that the joining faces are parallel and any falls which shall be required are achieved without springing the pipe.

Where falls are not shown on the Contract Drawings or stated elsewhere in the Specification, pipework shall be installed parallel to the lines of the buildings and as close to the walls, ceilings, columns, etc., as is practicable. All water systems shall be provided with sufficient drain points and automatic air vents to enable them to function correctly.

Valves and other user equipment shall be installed with adequate access for operation and maintenance. Where valves and other operational equipment are unavoidably installed beyond normal reach or in such position as to be difficult to reach from a small step ladder, extension spindles with floor or wall pedestals shall be provided.

Screwed piping shall be installed with sufficient number of unions to facilitate easy removal of valves and fittings and to enable alterations of pipework to be carried out without the need to cut the pipe.

Full allowances shall be made for the expansion and contraction of pipework, precautions being taken to ensure that any force produced by the pipe movements are not transmitted to valves, equipment or plant.

All screwed joints to piping and fittings shall be made with P.T.F.E. tape.

The test pressure shall be maintained by the pump for about one hour and if there is any leakage, it shall be measured by the quantity of water pumped into the main in that time. A general leakage of 4.5 litres per 25mm of diameter, per 1.6 kilometres per 24 hours per 30 metres head, may be considered reasonable but any visible individual leak shall be repaired.

b) **Sanitary Services**

Soil, waste and vent pipe system shall be installed in accordance with the best standard of modern practice as described in B.S. 5572 to the approval of the Engineer.

The Sub-contractor shall be responsible for ensuring that all ground waste fittings are discharged to a gully trap before passing to the sewer via a manhole.

The Sub-contractor shall provide all necessary rodding and inspection facilities within the draining system in positions where easy accessibility is available.

Where a branch requires rodding facilities in a position to which normal access is unobtainable, then that branch shall be extended so as to provide a suitable purpose made rodding eye in the nearest adjacent wall or floor to which easy access is available.

The vent stacks shall terminate above roof level and where stack passes through roof, a weather skirt shall be provided. The Sub-contractor shall be responsible for sealing the roof after installation of the stacks.

The open end of each stack shall be fitted with a plastic coated or galvanised steel wire guard.

Access for rodding and testing shall be provided at the foot of each stack.

c) Sanitary Appliances

All sanitary appliances associated with the Sub-contract works shall be installed in accordance with the best standard of modern practice as described in C.P. 305 to the approval of the Engineer.

3.4 TESTING AND INSPECTION

3.4.1 Site Tests – Pipework Systems

a) Above Ground Internal Water Services Installation

All water service pipe system installed above ground shall be tested hydraulically for a period of one hour to not less than one and half times to design working pressure.

If preferred, the Sub-contractor may test the pipelines in sections. Any such section found to be satisfactory need not be the subject of a further test when system has been completed, unless specifically requested by the Engineer.

During the test, each branch and joint shall be examined carefully for leaks and any defects revealed shall be made good by the Sub-contractor and the section re-tested.

The Sub-contractor shall take all necessary precautions to prevent damage occurring to special valves and fittings during the tests. Any item damaged shall be repaired or replaced at the Sub-contractor's expenses.

e) Above Ground Soil Waste and Ventilation System

All soil, waste and ventilating pipe system forming part of the above ground installation, shall be given appropriate test procedures as described in B.S. 5572, 1972.

Smoke tests on above ground soil, waste and ventilating pipe system shall not be permitted. Pressure tests shall be carried out before any work which is to be concealed is finally enclosed.

In all respects, tests shall comply with the requirements of B.S. 5572.

3.4.2 **Site Test – Performance**

Following satisfactory pressure test on the pipework system operational tests shall be carried out in accordance with the relevant B. S. Code of practice on the systems as a whole to establish that special valves, gauges, control, fittings, equipment and plant are functioning correctly to the satisfaction of the Engineer.

All hot water pipework shall be installed with pre-formed fibre glass lagging to a thickness of 25mm where the pipe runs above a false ceiling or in areas where the ambient temperature is higher than normal with the result that pipe “sweating”, due to condensation will cause nuisance.

All lagged pipes which run in a visible position after erection shall be given a canvas cover and prepared for painting as follows:

- i) Apply a coating of suitable filler until the canvas weave disappears and allow to dry.
- ii) Apply two coats of an approved paint and finish in suitable gloss enamel to colors approved by the Engineer.

All lagging for cold and hot water pipes erected in crawl ways, ducts and above false ceiling which after erection are not visible from the corridors of rooms, shall be covered with a reinforced aluminium foil finish banded in colours to be approved by the Engineer.

In all respects, unless otherwise stated, the hot and cold water installation shall be carried out in accordance with the best standard of modern practice and described in C.P.342 and C.P.310 respectively to the approval of the Engineer.

The test pressure shall be applied by means of a manually operated test pump or, in the case of long main or mains of large diameter, by a power driven test pump which shall not be left unattended. In either case precautions shall be taken to ensure that the required pressure is not exceeded.

Pressure gauges should be recalibrated before the tests.

The Sub-contractor shall be deemed to have included in his price for all test pumps, and other equipment required under this specification.

The test pressure shall be one and a half times the maximum working pressure except where a pipe is manufactured from a material for which the relevant B.S. specification designates a maximum test pressure.

3.5 **STERILISATION OF COLD WATER SYSTEM**

All water distribution system shall be thoroughly sterilised and flushed out after the completion of all tests and before being fully commissioned for handover.

The sterilisation procedures shall be carried out by the Sub-contractor in accordance with the requirements of B.S. Code of Practice 301, Clause 409 and to the approval of the Engineer.

SECTION D:

**PARTICULAR SPECIFICATION FOR PORTABLE FIRE
EXTINGUISHER BOOSTED HOSE REEL SYSTEM,
DRY RISER, FIRE HYDRANT INSTALLATIONS AND
FIRE SPRINKLER SYSTEM**

1.0 PORTABLE FIRE EXTINGUISHER AND HOSE REEL INSTALLATIONS

1.1 General

The particular specification details the requirements for the supply and installation and commissioning of the Portable Fire Extinguishers, Hose Reel, Fire Hydrant and Dry Riser. The Sub-contractor shall include for all appurtenances and appliances not necessarily called for in this specification or shown on the contract drawings but which are necessary for the completion and satisfactory functioning of the works.

If in the opinion of the Sub-contractor there is a difference between the requirements of the Specifications and the Contract Drawings, he shall clarify these differences with the Engineer before tendering.

1.2 Scope of Works

The Sub-contractor shall supply, deliver, erect, test and commission all the portable fire extinguishers, Hose Reel, Fire Hydrant and Dry Riser which are called for in these Specifications and as shown on the Contract Drawings.

1.3 Water/CO2 Extinguishers

These shall be 9-litre water filled CO2 cartridge operated portable fire extinguishers and shall comply with B.S. 1382: 1948 and to the requirements of B.S.4523: 1977. Unless manufactured with stainless steel, bodies shall have all internal surfaces completely coated with either a lead tin, lead alloy or zinc applied by hot dipping. There shall be no visibly uncoated areas.

The extinguishers shall be clearly marked with the following:

- a) Method of operation.
- b) The words 'WATER TYPE' (GAS PRESSURE) in prominent letters.
- c) Name and address of the manufacturer or responsible vendor.
- d) The nominal charge of the liquid in imperial gallons and litres.
- e) The liquid level to which the extinguisher is to be charged.
- f) The year of manufacture.
- g) A declaration to the effect that the extinguisher has been tested to a pressure of 24.1 bar (350 psi.).
- h) The number of British Standard 'B.S' 1382 or B.S. 5423: 1977.

1.4 Portable Carbon Dioxide Fire Extinguishers

These shall be portable carbon dioxide fire extinguishers and shall comply with B.S. 3326: 1960 and B.S. 5423: 1977.

The body of extinguisher shall be a seamless steel cylinder manufactured to one of the following British Standards; B.S. 401 or B.S. 1288.

The filling ratio shall comply with B.S. 5355 with valves fittings for compressed gas cylinders to B.S.341. Where a hose is fitted it shall be flexible and have a minimum working pressure of 206.85 bar (3000 p.s.i.). The hose is not to be under internal pressure until the extinguisher is operated.

The nozzle shall be manufactured of brass gunmetal, aluminium or stainless steel and may be fitted with a suitable valve for temporarily stopping the discharge if such means are not incorporated in the operating head.

The discharge horn shall be designed and constructed so as to direct the discharge and limit the entrainment of air. It shall be constructed of electrically non-conductive material.

The following markings shall be applied to the extinguishers:-

- a) The words “Carbon Dioxide Fire Extinguisher” and to include the appropriate nominal gas content.
- b) Method of operation.
- c) The words “Re-charge immediately after use”.
- d) Instructions for periodic checking.
- e) The number of the British Standard B.S. 3326: 1960 or B.S. 5423.
- f) The manufacturers name or identification markings

1.5 Dry Chemical Powder Portable Fire Extinguisher

The portable dry powder fire extinguishers shall comply with BS3465: 1962 and BS 5423. The body shall be constructed to steel not less than the requirements of BS 1449 or aluminium to BS 1470: 1972 and shall be suitably protected against corrosion.

The dry powder charge shall be not-toxic and retain its free flowing properties under normal storage conditions. Any pressurizing agent used as an expellant shall be in dry state; in particular compressed air.

The discharge tube and gas tube if either is fitted shall be made of steel, brass, copper or other not less suitable material. Where a hose is provided it shall not exceed 1,060mm and shall be acid and alkali resistant. Provision shall be made for securing the nozzle when not in use.

The extinguisher shall be clearly marked with the following information

- a) The word “Dry Powder Fire Extinguisher”
- b) Method of operation in prominent letters.
- c) The working pressure and the weight of the powder charge in Kilogramme.
- d) Manufacturers name or identification mark
- e) The words “RECHARGE AFTER USE” if rechargeable type.
- f) Instructions to regularly check the weight of the pressure container (gas Cartridge) or inspect the pressure indicator on stored pressure types when fitted, and remedy any loss indicated by either.
- g) The year of manufacture.
- h) The Pressure to which the extinguisher was tested.
- i) The number of this British Standard BS 3465 or BS 5423: 1977.
- j) When appropriate complete instructions for charging the extinguisher shall be clearly marked on the extinguisher or otherwise be supplied with the refill.

1.6 Air Foam Fire Extinguisher

These shall be of 9 litres capacity complete with refills cartridges and wall fixing brackets and complying with B.S. 5423 with the following specifications:-

Cylinder:	to B.S. 1449
Necking:	to be 76mm outside diameter steel EN 3A 2 ³ / ₄ X 8TPI female thread.
Head cap:	to be plastic moulding acetyl resin.
CO₂ Cylinder:	to be 75gm P.V.C coated.
Internal Finish:	to be polythene lining on phosphate coating.
External finish:	to be phosphated - One coat primer paint and one coat stove enamel B.S. 381 C.

1.7 Fire Blanket

The fire blanket shall be made from cloth woven with pre-asbestos yarn or any other fire proof material and to measure 1800 x 1210 mm and shall be fitted with special tapes folded so as to offer instantaneous single action to release blanket from storing jacket.

2.0 Boosted Hose Reel System**2.1 General**

The Particular Specification details the requirements for the supply, installation and commissioning of the hose reel installation. The hose reel installation shall comply in all respects to the requirements set out in C.O.P 5306 Part 1: 1976, B.S 5041 and B.S 5274. The System shall comprise of a pumped system.

2.2 Hose Reel Pumps

The fire hose reel pumps shall consist of a duplicate set of multi-line centrifugal pumps from approved manufacturers. The pumps shall be capable of delivering 0.76 lit/sec at a running pressure of 2 bars.

The pump casing shall be of cast iron construction with the impeller shaft of stainless steel with mechanical seal.

2.3 Control Panel

The control panel shall be constructed of mild steel 1.0mm thick sheet, be moisture, insect and rodent proof and shall be provided complete with circuit breakers and a wiring diagram enclosed in plastic laminate.

The pump shall be controlled by a flow switch therefore; the control panel shall include the following facilities:

- (a) 'On' push button for setting the control panel to live.
- (b) Green indicator light for indicating control panel live.
- (c) Duty / Stand-by pump auto change over.
- (d) Duty pump run green indicator light.
- (e) Stand-by pump run green indicator light.
- (f) Duty pump fail red indicator light.
- (g) Stand-by pump fail red indicator light.
- (h) Low water condition pump cut-out with red indicator light.

The pumps are to be protected by a low level cut-out switch to prevent dry pump run when low level water conditions occur in the water storage tank.

2.3.1 Hose Reel

The hose reel to the installation shall consist of a recessed, swing-type hose reel as Angus Fire Armour Model III or from other approved manufacturers.

The hose reel shall comply with B.S. 5274: 1975 and B.S 3161: 1970 and is to be installed to the requirements of C.P. 5306 Part 1: 1976.

The hose reel shall be supplied and installed complete with a first-aid Non-kinking hose 30 meters long with a nylon spray / jet / shut-off nozzle fitted. A screw down chrome - plated globe valve to B.S 1010 to the inlet to the reel is to be supplied. The orifice to the nozzle is to be not less than 4.8mm to maintain a minimum flow of 0.4 lit / sec to jet.

The hose reels shall be installed complete with electro-galvanized cabinet recessed on the wall.

The hose reels shall be installed at 1.5 meters centre above the finished floor level in locations shown in the contract drawings.

2.3.2 Pipe Work

The pipe work for the hose reel installation shall be galvanized wrought steel tubing heavy grade Class B to B.S 1387: 1967 with pipe threads to B.S 21. The pipe work and all associated fittings shall be in approved colour for fire fittings.

2.3.3 Pipe Fittings

The pipe fittings shall be wrought steel pipe fittings, welded or seamless fittings conforming to B.S. 1740 or malleable iron fittings to B.S 143.

All changes in direction will be with standard bends or long radius fittings. No elbows will be provided.

2.3.4 Non-return Valves

The non-return valves up to and including 80mm diameter shall be to B.S. 5153: 1974.

The valves shall be of cast iron construction with gunmetal seat and bronze hinge pin.

2.3.5 Gate Valves

The gate valves up to and including 80mm diameter shall be non-rising stem and wedge disc to B.S 5154: 1974 with screwed threads to B.S. 21 tapes thread

2.3.6 Sleeves

Where pipe work passes through walls, floors or ceilings, a sleeve shall be provided one diameter larger than the diameter of the pipe, the space between them to be packed with mineral wool, to the Engineer's approval.

2.3.7 Earthing

The hose reel installation shall be electrically earthed by a direct earth connection.

The installation of the earthing shall be carried out by the Electrical Sub- contractor.

2.3.8 Finish Painting

Upon completion of testing and commissioning the hose reel installation, the pipe work shall be primed and finish painted with 2 No. coats of paints to the Engineer's requirements.

2.3.9 Testing and Commissioning

The hose reel installation shall be flushed out before testing to ensure that no builder's debris has entered the system. The installation is to be then tested to one and half times the working pressure of the installation to the approval of the Engineer. Simulated fault conditions of the pumping equipment are to be carried out before acceptance of the System by the Engineer.

2.3.10 Instruction Period

The Sub-contractor shall allow in his contract sum for instructing of the use of the equipment to the Client's maintenance staff. The period of instruction may be within the contract period but may also be required after the contract period has expired.

The period of time required shall be stipulated by the Client but will not exceed two days in which time the Client's staff shall be instructed on the operation and maintenance of the equipment.

2.0 Signage-Fire Instruction /Fire Exit

2.1 Fire Instruction Notice

Print fire instruction on the Perspex plates with White Colour Background measuring 510mm length x 380mm width x 4mm thick as follows;

FIRE INSTRUCTION NOTICE	
In the event of fire;	
1.	Raise the alarm by actuating the nearest alarm system point, Sound Siren /gong or Shout Fire
2.	Attack fire using the nearest available equipment
3.	Call nearest fire Brigade or Police 999 and inform your switchboard (PABX) Operator
4.	Ensure that all personnel not involved in fire fighting evacuation to safety outside the building.
5.	Close but DO NOT LOCK doors behind as you leave.
6.	Evacuate the building using stairs or fire escapes. Do not use Lifts/escalators. Walk calmly. Avoid panic. Do not stop or return for personal belongings.
7.	Assemble as per floor outside the building for roll call.

2.1.1.1 Fire Exit Sign

Print Fire Exit signs on the Perspex plate, 4mm thick, with white colour background as follows:-

1. Lettering **IN RED COLOR** of not less than 50mm in height.
2. A pendant sign bearing words, **FIRE EXIT** and with a directional arrow.

The sign must be capable of being read from both approaches to exit and so is double sided.

2.1.1.2 Hose Reel Label

Print Fire Exit signs on the Perspex plate, 4mm thick, with white colour background as follows:-

1. Lettering **IN RED COLOR** of not less than 50mm in height.
2. A pendant sign bearing words, **HOSE REEL** and with a directional arrow.

The sign must be capable of being read from both approaches to exit and so is double sided.

4.0 The Dry Riser Installation

4.1 Definition

Dry riser installation is a system where a pipe is installed vertically through a building with an inlet breeching provided at a street level through which the fire brigade can pump water.

4.2 Installation

The dry riser is installed with Fire Brigade Breeching inlet installed at street level in front of the building at a position where fire brigade can access and pump water into the building. Landing valves are then installed on each floor above the ground level to which the fire brigade can attach fire fighting hoses.

4.3 Landing Valves

The Hydrant outlets shall comply with the requirements of C.P 5306 Part 1:1976 and B.S 5041 Part 1. The hydrant Riser outlets shall be 2No minimum per floor including the roof and shall be mounted with their centre line between 910mm and 1060mm above finished floor level positioned at the entry lobby on each floor.

4.4 Fire Brigade Breeching Inlets

One of the Brigade Breeching inlets shall consist of four (4No.) 64mm internal diameter instantaneous male coupling for connection to the fire brigade pumps and other two shall consist of two (2No.) 64mm internal diameter instantaneous male coupling.

The breeching inlet shall incorporate a 100mm diameter flanged connection to the 100mm dry riser mains.

The breeching inlet shall be located 1000mm to the centre line of the box above ground level.

The breeching inlet shall be enclosed in a galvanized mild steel cabinet of suitable dimensions to contain all visible pipe work. A 7.5mm thick wired glass front shall be provided with 50mm high, red lettering, **DRY RISER BREECHING CONNECTOR**. The remainder of the box is to be finished in fire red enamel paint.

4.5 Pipework

The pipe work fittings shall be wrought steel pipe fittings welded or seamless fittings conforming to B.S 1740 Part 1971 or malleable iron fittings to B.S 193.

All changes in direction will be standard bends or long radius fittings. **No elbows will be permitted.**

4.6 Flanges

The flanges shall comply with B.S 4504:1969. All flanges shall comply with a nominal Pressure Rating of 16 bars and shall be of either grey cast iron or steel.

4.7 Gaskets

The gaskets for use with flanges to B.S 4504: 1969 shall comply with B.S 4865 Part 1: 1972 for pressure up to 64 bars.

4.8 Air Relief Valves

The dry riser shall terminate 1M above the roof landing valve with an air relief valve. The valve construction shall be of iron Grade E conforming to B.S 1452. Float Guide and Seat Ring shall be of A.B.S plastic with seal ring of moulded rubber, Maximum working pressure of the valve is to be 16 bar.

4.9 Non-Return Valves

The non-return valves up to and including 80mm diameter shall conform to B.S 5153:1974 with flanges to B.S 4504 PN 16. The valves shall be of cast iron construction with gunmetal seat and disc with spring of phosphor bronze.

Non return valves exceeding 80mm diameter and up to 300mm diameter shall be conform to B.S 5153:1974 with flanges to B.S 4504 PN 16. The valve shall be is Cast Iron Construction with Gunmetal seat to B.S 1400.

4.10 Gate Valves

The gate valves up to and including 80mm shall be non rising stem and wedge disc to B.S. 1952:1964 (B.S 5154:1974) with screwed threads to B.S.21(KS ISO 7 – 1) taper thread. The valves shall be of high grade bronze construction.

Gate valves exceeding 80mm and up to 300mm shall be to B.S 5163 with flanges to B.S 4504 PN 16. The valve is to be double flanged cast iron wedge gate valve for water works purposes with cast iron body to B.S 1452 GRADE 14 with rubber covered cast iron gate. The stem is to be of Forged Stainless Steel to B.S 970 with cast iron hand wheel.

4.11 Sleeves

Where Pipework pass through walls or floors or ceiling a sleeve shall be provided one diameter larger than the diameter of the pipe the space between to be the packed with mineral wool, to the Engineers approval.

4.12 Floor and Ceiling Plates

Where pipes pass through floors, walls and ceilings, floor, wall and ceilings plates shall be secured around the pipe. The plated shall be of stainless steel construction and will serve no other purpose than to present a neat finish to the exposed installations.

4.13 Earthing

The dry riser shall be electrically earthed by a direct earth connection. The installation of the earthing to be carried out by the electrical Sub-Contractor

4.14 Finish Painting

Upon completion, testing and commissioning of the dry rise installation the pipe work shall be primed and finish painted with 2No. Coats of paint by the Sub-Contractor to the Engineer's requirements.

4.15 Testing and Commissioning

The installation is to be tested to one and half times the working pressure of the installation, all to the approval of the Engineer. The pressure shall be maintained for about 1 hour ensuring that there is no change in pressure is observed

4.16 Canvas Hose

The canvas hose shall be 65mm diameter 30m long designed for a bursting pressure of 34 bars. The canvas hose shall have attached instantaneous hose coupling, branch pipes and nozzle to B.S 336: 1965.

4.17 Hose Cradle

The hose cradle shall be a high quality fitting designed for use in public buildings. The cradle **shall be made in aluminium** throughout and shall be supplied with a wall bracket and the finish shall be polished or chrome plated

5.0 Fire Hydrant**5.1 Fire Hydrant Details****5.1.1 Definition**

The fire hydrant is a system which is installed along the water mains to used as a means of providing water to the fire brigades through the connection of the hose from a stand pipe.

5.1.2 Installation

The fire hydrants are installed along the water mains with the first hydrant at a location which is not more than 60 m from the entry of any building and they should not be more than 120 m apart.

5.1.3 Hydrant body

The body of the hydrant shall be made of grey cast iron complying with the requirements of BS 1452 having a tensile strength not less than that given for grade 14.

5.1.4 Hydrant Valve

The valve shall be faced with suitable resilient material. The threaded part of the valve, which engages with the spindle, shall be of bronze.

Body seating for the valves shall be of copper alloy complying with the requirements of BS 1400 (KS 06 – 744 – 1:1991) or high tensile brass complying with the requirements of BS 2872 or BS 2874.

Turning the spindle cap in a clockwise direction when viewed from above shall close valves and the direction of opening shall be permanently marked on the gland.

5.1.5 Spindle & Spindle Cap

The spindle note shall be either of the same material as the spindle, or of copper alloy complying with the requirements of BS 1400 (KS 06 – 744 – 1:1991). It shall have a squared top formed to receive either a cast iron spindle cap.

The spindle shall be made of copper alloy complying with the requirements of BS 2874 (KS 06 – 744 – 1:1991), and it shall have a threaded machined of trapezoidal form. The spindle cap shall be of a cast iron secured to the spindle by on M12 hexagon socket set screw conforming to BS 4168.

5.1.6 Hydrant Outlet

The outlet flange of the hydrant shall have above nominal diameter 65mm, and shall be fitted with a screwed outlet – Both flanges shall be 50 mm conforming to BS 4504: Part 1: 1969

The screwed outlet shall be provided with a cap of cast iron or other suitable material. The cap shall cover the outlet thread completely and shall be attached to the hydrant by a chain

The distance between the axis of the outlet and the nearest point on the spindle fitting shall be not less than 100 mm.

The screwed outlet shall be made of Copper alloy to BS 1400 (KS 06 – 744 – 1:1991), or Copper alloy to BS 2872, or Suitable Spheroidal graphite iron to BS 2789 protected against corrosion accordance with CP 2008.

5.1.7 Drain Boss

Each shall be provided with a suitable drain boss on the outlet side. This shall be located at the lowest practical point which will permit the filling of self-operating a drilled drip plug.

5.1.8 Jointing

The hydrants shall have machined joint faces through out and the fitting of adjoining parts shall be such as to make sound joints, corresponding parts of hydrants of the same design and manufacture shall be interchangeable.

5.1.9 Hydrant coating

The hydrant shall be coated in accordance to BS. 4164.

5.1.10 Surface Box

The clear opening of hydrant surface boxes at ground level shall not be less than 250mm x 380mm.

The depth of frame shall normally be:

- a) For boxes located on footpaths: 100mm
- b) For boxes located in roads: 125mm

5.1.11 Marking

Surface box covers shall be clearly marked by having the words '**FIRE HYDRANT**' in letter not less than 30mm high, or the initials '**FH**' in letters not less than 75mm high cast into the cover.

5.1.12 Surface Box Covers & Frames

The surface box frames and covers shall be graded in accordance with BS 497:1967 and shall meet the loading test requirement also given in BS 497

5.2 Stand Pipes

One end of these shall have internal threads to couple with the 80mm diameter external threads of the screw down type or above ground fire Hydrant (BS 750 type 2 hydrants) outlet. It shall have 65mm diameter internal threads to couple with the interconnect or hose of the pump set

5.3 Hose Pipe

Each cotton synthetic fibre rubberized fire hosepipe to be at least 30 metres long with 65mm diameter female instantaneous type connector complete with nozzle.

5.4 Testing

The hydrants shall be deemed to have undergone the necessary hydrostatic and flow test at time of manufacture. Necessary test certificates from the manufacturer shall be needed. The test, to conform to BS 750: 1977:

SECTION E

PARTICULAR SPECIFICATION FOR FIRE SUPPRESSION SYSTEMS

GENERAL SPECIFICATIONS FOR FIRE SUPPRESSION SYSTEM

1.1 General

The specifications described here make reference to FM 200 fire suppression system. However, alternative systems utilizing inert gases may be used subject to the condition that they meet all the requirements of this specification.

The FM 200 shall be used to extinguish fires in the rooms to be specified.

The gas shall be stored under pressure in liquefied form inside cylinders and piped to fire protected areas. Each FM 200 system in a given zone shall be supplied complete with its control Unit that shall receive the signal from smoke detectors or break glass and automatically release the gas after sounding an alarm bell and switching off any existing Ventilation systems . The fire detection system in all areas where FM 200 gas system is not installed shall be supplied and installed by, but the Sub-Contractor shall liaise with him and extend detection signal outputs into the Master Alarm Control Panel.

The Design, equipment, installation, testing and maintenance of the system shall be made in accordance with these specifications, drawings and the following standards:

- a) **NFPA 2001-Clean Agent Fire Extinguishing systems**
- b) **NFPA 70-National Electrical Code**
- c) **NFPA 72-National Fire Alarm Code**
- d) **Local authority requirements**

The fire suppression systems shall be designed by competent personnel who are trained and authorized by the equipment manufacturer for design of total flooding FM 200 systems and the integrated detection systems. Working Drawings shall be provided in sufficient detail to indicate the type, size, and arrangement of component materials and devices; and the dimensions needed for installations and correlation with other materials and equipment.

All Working Drawings shall be submitted for review and approval prior to installation.

Detailed literature outlining the operation, recharge and service of the system, Maintenance procedures for the owner shall be provided.

Equipment manufacturer shall provide a **12 month** warranty Details of this warranty shall be furnished upon request.

All devices, components and equipment shall be products of the same manufacturer and shall be U.L listed or FM approved.

1.1 SYSTEM ARRANGEMENT

FM 200 fire suppression system shall be of the engineered, permanently piped, fixed nozzle type with all pertinent components of the same manufacturer. All agent storage containers shall be centrally located as vertical, free-standing cylinders with wall mounted retaining brackets. Where multiple cylinders are required for the same hazard, a common manifold should be employed.

Manifolds shall be constructed from seamless schedule 80 piping. They shall be complete with a safety relief valve. Manifolder cylinders shall employ a flexible discharge hose to facilitate installation and system maintenance. Each cylinder on a manifold shall also include an agent check valve installed to the manifold inlet.

Where a set of manifolded cylinders shall be required to serve multiple zones, selector valves shall be used to direct the extinguishing agent to the respective zone.

Detection system shall be of the engineered type, suitable for direct interface with the FM 200 fire suppression system. Detectors shall be wired in Sequential Detection method of operation or standard Cross-Zoned detection.

For each hazard, both Ionization and Photoelectric type smoke detectors shall be used to provide automatic input to the control panel.

In addition, manual pull station(s) shall be provided for the direct electric release of the FM 200 Fire Suppression System.

Automatic operation of each protected area shall be as follows:

- a) Actuation of one (1) detector, within the system to:
 - i) Illuminate the "ALARM" LED on the control panel face.
 - ii) Energize the audible notification appliances within the protected space with a unique pattern to indicate a first alarm condition
 - iii) Transfer sets of 5 Amp rated auxiliary contacts which can perform auxiliary system functions such as: Operate door holder/closures on access doors, Transmit a signal to the fire alarm system, Shutdown HVAC equipment, etc
 - iv) Light an individual LED on an optional graphic annunciator.
- b) Actuation of a 2nd detector, within the system, to:
 - i) Illuminate the "PRE-DISCHARGE" LED on the control panel face; energize the audible notification appliances within the protected space with a unique pattern to indicate a second alarm (predischARGE) condition, Shut down the HVAC system and/or close dampers, Start time-delay sequence (not to exceed 60 seconds), enable System abort sequence, Light an individual LED on a graphic annunciator.
 - ii) After completion of the time-delay sequence, the system shall activate and the following shall occur: Illuminate a "RELEASE" LED on the control panel face, Energize the audible notification appliances within the protected space with a continuous on pattern to indicate a release condition, Shutdown of all power to high-voltage equipment, Energize a visual indicator(s) outside the hazard in which the discharge occurred, Energize a "System Fired" audible device.

The system shall be capable of being actuated by manual discharge devices located at each hazard exit. Operation of a manual device shall duplicate the sequence description above except that the time delay and abort functions SHALL be bypassed. The manual discharge station shall be of the electrical actuation type and shall be supervised at the main control panel.

1.2 DESIGN PARAMETERS – FM 200

Design of the total flooding FM 200 system shall be based upon the enclosure being sufficiently tight against agent leakage with all ventilation shut down and or fire dampered or provide for static air condition upon discharge.

Agent quantity calculations shall be determined from dimensions furnished on the construction drawings and or in the particular specification using a design concentration based on fire hazard class of the protected zone and the NFPA 2001 standards. As a minimum a concentration of 38% at the minimum anticipated hazard temperature of 20 °C shall be used.

Calculation for the maximum design concentration shall be based upon maximum anticipated hazard temperature of 32 °C.

When applicable, agent quantity shall be adjusted for:

- i) Altitudes of more than (915m) above sea level.
- ii) Non-flooded false ceiling volume.
- iii) Multiple hazards from a common agent supply.
- iv) Manufacturer standard tanks and fill increments
- v) Duct volume for HVAC system.

The system shall be designed to discharge the calculated agent quantity in a nominal 60 second period.

Nozzle spacing shall be in accordance with the listed approved coverage for each nozzle type. In all cases, the need for additional nozzle shall be considered based upon site conditions and manufacturer's recommendations.

Hydraulic calculations for each system shall be used upon two-phase flow equations for unbalanced systems as defined by NFPA regardless if a single nozzle or balanced piping network is used.

Computerized verification of hydraulic calculations shall be submitted for each FM 200 system.

The contractor shall provide data to indicate the free venting area required per NFPA standards for each hazard volume.

1.2.1 DESIGN PARAMETERS – DETECTION

The design of the detection/control system shall be based on a clean, vibration free, electrical non-hazardous environment

As a minimum detector spacing shall be based upon NFPA recommended practices for ceiling construction, air flow and manufacturer recommendations. At least one smoke detector of each type (ionization and photoelectric) shall be used in each protected area. Where multiple detectors are used, detection shall alternate such that ionization are adjacent to photoelectric.

Unless otherwise stated on the drawings manual pull station(s) shall be located at all points of exit from the protected area.

Unless otherwise stated on the drawings at least one alarm device shall be located within the protected area for the general alarm function.

Battery capacity shall be sufficient to permit normal non-alarm condition for 24 hours with subsequent general alarm for 5 minutes after loss of primary line power. The contractor shall be required to furnish calculations to back up the battery capacity to be installed.

1.3 EQUIPMENT AND MATERIAL

1.3.1 General

All materials and equipment shall be of new, unused, and undamaged condition in strict accordance with the requirement of this section. Equipment shall be required to meet the specified standards; **ISO 14520, NFPA.**

All equipment's and materials shall only be used for their intended application, in locations for which they were designed, and installed in accordance with the manufacturer's instructions and or recognized standard trade practice.

1.3.2 Pipe Material – FM 200 200 bar System.

FM 200 200 bar system piping shall be of non –combustible materials having physical and chemical characteristics such that its integrity under stress can be predicted with reliability. Materials other than listed below , such as stainless steel or nonferrous piping or tubing , may be used if the materials satisfy the applicable requirements of NFPA.

As a minimum, piping materials and manifolds shall be schedule 40 seamless steel pipes conforming To BS specifications and capable of 65 bar operating pressure (ASTM Grade A-106B). Under no conditions shall ordinary cast iron pipe, steel pipe or non- metallic pipe be used.

FM 200 system piping joints shall be suitable for the design conditions and shall be selected with consideration of joint tightness and mechanical strength.

As a minimum, fittings shall be black class 300 malleable iron fittings. Ordinary cast iron fittings shall not be permitted.

Piping shall be installed accordance with good commercial practice to the appropriate codes, securely supported with Listed hangers, and arranged with close attention to the design layout since deviations may alter the design flow performance as hydraulically calculated.

All Piping must be reamed, blown clear, and swabbed with appropriate solvent to remove mill varnish and cutting oils before assembly. The piping shall also be finished off with two coats of red paint after testing. Multi- outlet fittings other than tees shall not be permitted.

Assembly of all joints shall conform to the appropriate standards. Threaded pipe joints shall utilize Teflon tape applied to male thread s only.

1.3.3 Agent Storage Tank

FM 200 agent storage containers shall be of welded steel construction in accordance with **NFPA** Specification and finished in (baked red enamel) (red epoxy) paint. Tank assemblies shall be filled with FM 200 pressurized to 200 bar at (15 °C). Initial filling of the cylinders and recharge shall be done in accordance with the manufacturer's established procedures and shall not require replacements components for normal service.

The size and fill weights of all cylinders shall be of the following nominal sizes: _

- i) 80 litre 22.8kg
- ii) 80 litre 32.1kg

Nominal 270kg tank assembly shall be equipped with an internal liquid level measuring rod, marked in ¼ inch increments to allow direct reading of the liquid level and conversation to the weight of Argon within the tank.

Tank assemblies shall be vertical, free standing modules employing suitable wall mounted retaining brackets. Tank assemblies shall be listed or approved to perform in the temperature range -20C to 50C.

Aluminum **name plates** indicating manufacturer's name and part number , agent fill weight , total charged weight date of fill, shall be permanently bonded to each tank.

Each tank assembly shall have the means to accommodate lifting devices to facilitate weighing removal and replacing.

Tank assembly shall include a pressure gauge and a low pressure switch that operates at approximately 180 bar to facilitate continuous supervision of tank pressure.

1.3.3.1 Tank Valve

Agent storage tank assemblies shall include an integral, high flow valve assembly connected to the tank by a machined thread and sealed by an O-ring.

Valve outlet sizes shall be based on the nominal tank capacity with a one inch size for 18,33,54 and 72 pound assemblies, and three inch for 600 pound assemblies.

The valve design shall be of the differential pressure type which utilizes tank pressure to seal the valve assembly. The valve shall be compatible with separate, removable, stackable type actuators for electric, pneumatic, and or manual actuation. Operation of the valve by the stackable type actuator shall be such actuation.

Operation of the valve by the stackable type actuator shall be such that pressure is relieved from the upper chamber of the valve causing the valve to open. Valves shall be forged brass construction with an o-ring sealed brass spool incorporating the main electrometric seal surface.

The valve assembly shall include recessed pressure gauge 0 to 250 bar, overpressure safety relief disc assembly, normally pressurized connection port for an optional low pressure switch, normally unpressurized connection port used as pneumatic source for a slave cylinder valve actuation, and brass shipping caps on exposed thread connection.

When pneumatically operated main/reserve systems are used, pilot valves shall be equipped with actuation isolators.

All tank valves shall be F.M or LPCB Approved.

1.4.3.2 Tanks Brackets

Each FM 200 tank shall be furnished with a stainless steel, two part, strap type retaining bracket designed to secure the cylinders to the wall or any other suitable surface as may be recommended by the system manufacturer.

1.4.3.3 Valve Actuator system

FM 200 valve actuator system shall consist of a pneumatically operated cylinder actuator assembly and a and a **solenoid type** Electric actuator package.

The solenoid actuator package shall consist of the solenoid valve mounted either on a rechargeable slave nitrogen cylinder or on the Argon gas cylinder. A signal from the control panel shall operate the solenoid valve to discharge the gas in the pilot cylinder. The discharged gas shall then open the cylinder actuator assembly mounted on the FM 200 cylinder discharge valve. This process shall release the stored FM 200 gas for fire extinguishing.

Where multiple zones are protected from the same storage system, selector valves shall be used. These valves shall be actuated by the Nitrogen gas from the actuation package.

Manual override actuators shall be designed to attach to electric actuator or directly to the valve assembly and permit manual operation of the pilot cylinder tank assembly.

Manual actuator positions shall be clearly marked and operating instructions provided.

All actuators shall be LPCB Approved.

1.4.3.4 Discharge Nozzles

FM 200 discharge nozzles shall be of one piece (brass) construction sized to provide flow rates in accordance with system design hydraulics.

Orifice (s) shall be machined in the nozzle body to provide a horizontal discharge in 90⁰, 180⁰, or 360⁰ patterns based upon the approved coverage arrangements.

Separate, interchangeable orifice plates are not acceptable.

Nozzles shall be permanently marked with the manufacturer's part number, number of orifice and orifice code. The nozzle shall be threaded directly to the discharge piping without the use of special adaptors.

Nozzles shall be LPCB Approved.

1.4 Warning Signs

Etched aluminum Warning Signs shall be provided at all Entrance and Exits of the protected area.

Entrance sign shall read: "WARNING DO NOT ENTER ROOM WHEN ALARM SOUNDS, **FM 200** BEING RELEASED."

Exit sign shall read: "WHEN ALARM SOUNDS, VACATE AT ONCE, **FM 200** BEING RELEASED."

1.5 EQUIPEMENT AND MATERIAL –ELECTRICAL

1.6.1 General Materials

All electrical trunkings and conduits shall be employed in accordance with applicable codes and intended use and contain only those electrical circuits associated with the fire detection and control system and shall not contain any circuit that is unrelated to the system.

Unless specifically provided otherwise in each case, all conductors shall be enclosed in steel conduit, rigid or thin walled as conditions dictate, except in computer room where they shall be PVC conduit concealed in building fabrics. All wiring shall be of the proper size to conduct the circuit current. The use of aluminium wire is strictly prohibited. Splicing of circuits shall be kept to a minimum and are only to be found in an electrical device suited for the purpose. Wire spliced together shall have the same colour insulation. Wire splices shall be made with appropriate devices suited for the purposes.

All wire terminations shall be made with crimp terminals unless the device at the termination is designed for bare wire termination.

All electrical circuits shall be numerically tagged with suitable devices at its terminating point and/ or splice. All circuits numbers shall correspond with the installation drawings.

The use of coloured wires is encouraged. White coloured wire shall be used exclusively for the identification of the neutral conductor of an alternating current circuit.

Green coloured wire shall be used exclusively for the identification of the earth ground conductor of an AC and DC circuit.

1.6.2 Control Panels – General

All control panels shall be F.M Approved and be utilized with listed or approved operating devices and shall be capable of the following features,:

- a. Supervised Detection Circuits (s) with a first stage and a second stage circuit.
- b. Supervised Alarm Circuit allowing for a first stage alarm, second stage alarm and the third stage for gas release.
- c. Supervised Release Circuit
- d. Supervised Manual Electric Pull Circuit
- e. Supervised Manual mechanical Pull Circuit
- f. 0-60 second Programmable Time Delay
- g. Battery Standby
- h. Front Panel Indicating Lamps and 4x20 character display
- i. Key Lock Steel Enclosure with a glass panel covering the controls

The internal power supply shall operate from 240V 50Hz A.C power supply. A fused polarity reversing , 1 amp, 24VDC supervised dedicated release circuit for use with approved fire suppression system releasing devices shall be provided.

The control unit shall provide provisions for housing its own set of “on-line” float charged emergency batteries within the enclosure.; Battery supervision shall be provided for condition and placement of the batteries.

A supervised dedicated manual pull circuit designated for immediate operation of the release circuit shall be provided. An auxiliary trouble circuit for supervision of other normally closed accessory devices shall be provided. The control unit shall be housed in steel cabinet of approved type with conduit knockouts in a (red) (beige) enamel finish.

The control unit shall be F.M or LPCB Approved as an alarm releasing control unit

1.6.3 Smoke Detector - Ionization

Ionization type smoke detector shall be dual chamber type and compatible with the control unit. The detector shall have an LED in its base which is illuminated in a steady “on” mode when in alarm. Reset of the detector shall be performed by the control unit reset switch.

The design of the ionization detector compensating circuits shall provide stable operation with regard to minor changes in temperature, humidity, and atmosphere conditions.

The sensitivity voltage shall be factory set per U.L 268. A special locking screw shall be provided to lock the head to the base; the head to base connection shall be by use of bifurcated contracts. Terminal connections to the base shall be of the screw type. The detector shall be F.M or LPCB Approved.

1.6.4 Smoke Detector - Photoelectric

Photoelectric detector shall be a solid-state sensing chamber unit providing stable operations (sensitivity) and compatible with the control unit. The detector shall utilize a light sensing photodiode and a pulse signal processor to measure the density of the combustion products within

The sensing chamber - The detector head shall have a stainless steel mesh to prevent foreign objects from entering the sensing chamber. The sensitivity voltage shall be factory set.

A special locking screw shall be provided to lock the head to the base. The head to base connection shall be by use of bifurcated contacts. Terminal connections to the base shall be of the screw type.

The detector shall be F.M or LPCB Approved.

1.6.5 Alarm Bells

The vibrating Alarm Bell shall be approved for use with the listed control unit. The polarized alarm bell shall be rated at 24VDC and draw no more than .063 amps and shall contain a series diode for use in supervised systems. It shall also incorporate a flashing strobe light. It shall have a dB level of 86 – 90 at 3 metres.

The bell shall be constructed of high quality materials to ensure reliability and long life and have a baked red enamel finish. The device shall be F.M or LPCB Approved.

1.6.6 Manual Pull Stations (Fire man's switch)

The Manual Pull Station shall be provided for the release (electrical) of the FM 200 in case of an emergency. The unit shall be contained within a metal body having a (single) (double) pole switch. The device shall be F.M or LPCB Approved.

1.6.7 Abort Switch

The abort switch shall be used where an investigation delay is desired between detection and actuation of the FM 200 System.

The Abort Station shall be the "Dead Man" type and shall be located next to each manual.

Switch. "Locking" or "Keyed" abort stations **shall not** be permitted. The Abort Station shall indicate a trouble condition at the Control Panel, if depressed, and no alarm condition exists. The Abort Station shall be located adjacent to each manual station and can be furnished in combination with a Manual Release Switch.

The device shall be U.L listed or F.M Approved for a delay switch.

1.6.8 Pressure Switch

This pneumatically actuated switch shall be used to give positive identification of release of FM 200 in the piping system.

The switch shall have one set of normally open and one set of normally closed contacts.

1.7 SYSTEM INSPECTION AND TESTING

The completed installation shall be inspected by authorized personnel and shall include a full operational test of all components per the equipments manufacturer recommendation including agent discharge.

This shall be done in the presence of the owner's representative and other insuring authority having jurisdiction.

All mechanical and electrical components shall be tested according to the manufacturer's recommended procedure to verify system integrity.

The inspection and testing shall be carried out by the contractor. The tests shall demonstrate that the entire control system functions as designed and intended. All circuits shall be tested: automatic actuation, solenoid and manual actuation, HVAC and power shutdowns, audible and visual alarm devices and manual override of abort functions. Supervision of all panel circuits, including AC power and battery power supplies, shall be tested and qualified. Inspection shall include a complete checkout of and certification of weight and cylinder pressure. A written report shall be filed with the Engineer.

Two copies of drawings shall be provided by Contractor indicating the installed details. All routing or piping and electrical conduit and accessories shall be noted. Equipment, Installation and Maintenance Manuals shall be provided in FOUR copies, in addition to the as-built drawings.

Prior to final acceptance, the contractor shall provide operational training in all concepts of this system to the owner's key personnel. Training shall consist of:-

- i) System Control Unit Operation
- ii) Troubleshooting Procedures
- iii) Abort Procedures
- iv) Emergency Procedures
- v) Safety Requirements
- vi) A functional test shall be completed prior to the concentration test consisting of detection, release alarm, accessories related to system, control unit, and a review of the tanks, piping, fittings, hangers and cylinder pressure.

1.8 WARRANTY

All system components shall be guaranteed against defects in design, materials and workmanship for the full warranty period which shall in no case be less than one (1) year from the date of system acceptance.

SECTION F:

BILLS OF QUANTITIES

AND

SCHEDULE OF UNIT RATES

BILLS OF QUANTITIES AND SCHEDULE OF UNIT RATES

<u>CLAUSE No.</u>	<u>CONTENTS</u>	<u>PAGE</u>
1.	GENERAL NOTES TO TENDERERS.....	F-1
2.	STATEMENT OF COMPLIANCE.....	F-2
3.	BILLS OF QUANTITIES	F-3 to F-27
4.	SUMMARY PAGE.....	F-28

SPECIAL NOTES

1. The Bills of Quantities form part of the contract documents and are to be read in conjunction with the contract drawings and general specifications of materials and works.
2. The prices quoted shall be deemed to include for all obligations under the sub-contract including but not limited to supply of materials, labour, delivery to site, storage on site, installation, testing, commissioning and all taxes (**including 16% VAT**).

In accordance with Government policy, the 16% VAT and 3% Withholding Tax **shall be deducted** from all payments made to the Tenderer, and the same shall be forwarded to the **Kenya Revenue Authority (KRA)**.

- 3 All prices omitted from any item, section or part of the Bills of Quantities shall be deemed to have been included to another item, section or part thereof.
4. The brief description of the items given in the Bills of Quantities are for the purpose of establishing a standard to which the sub-contractor shall adhere. Otherwise alternative brands of **equal** and **approved** quality will be accepted.

Should the sub-contractor install any material not specified here in before receiving **written approval** from the Project Manager, the sub-contractor shall remove the material in question and, **at his own cost**, install the proper material.

5. The grand total of prices in the price summary page must be carried forward to the **Form of Tender for the tender to be deemed valid**.
6. Tenderers must enclose, together with their submitted tenders, detailed manufacturer's Brochures detailing Technical Literature and specifications on all the equipment they intend to offer.

1. Statement of Compliance

- a) I confirm compliance of all clauses of the General Conditions, General Specifications and Particular Specifications in this tender.
- b) I confirm I have not made and will not make any payment to any person, which can be perceived as an inducement to win this tender.

Signed:*for and on behalf of the Tenderer*

Date:

Official Rubber Stamp:

BILLS No. 1**A) PRICING OF PRELIMINARIES ITEMS.**

Prices will be inserted against item of preliminaries in the sub-contractor's Bills of Quantities and specification. These Bills are designated as Bill 1 in this Section. Where the sub-contractor fails to insert his price in any item he shall be deemed to have made adequate provision for this on various items in the Bills of Quantities. The preliminaries form part of this contract and together with other Bills of Quantities covers for the costs involved in complying with all the requirements for the proper execution of the whole of the works in the contract.

The Bills of Quantities are divided generally into three sections:-

a. Preliminaries – Bill 1

Sub-contractors preliminaries are as per those described in section C – sub-contractor preliminaries and conditions of contractor. The sub-contractor shall study the conditions and make provision to cover their cost in this Bill. The number of preliminary items to be priced by the Tenderer has been limited to tangible items such as site office, temporary works and others. However the Tenderer is free to include and price any other items he deems necessary taking into consideration conditions he is likely to encounter on site.

b. Installation Items – Other Bills

- i. The brief description of the items in these Bills of Quantities should in no way modify or supersede the detailed descriptions in the contract Drawings, conditions of contract and specifications.
- ii. The unit of measurements and observations are as per those described in clause 3.05 of the section

c. Summary

The summary contains tabulation of the separate parts of the Bills of Quantities carried forward with provisional sum, contingencies and any prime cost sums included. The sub-contractor shall insert his totals and enter his grand total tender sum in the space provided below the summary.

This grand total tender sum shall be entered in the Form of Tender provided elsewhere in this document

BILL No. 1 PRELIMINARIES

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	cts
1	Discrepancies clause 1.02					
2	Conditions of sub-contract Agreement clause 1.03					
3	Payments clause 1.04					
4	Site location clause 1.06					
5	Scope of Contract Works clause 1.08					
6	Extent of the Contractor's Duties clause 1.09					
7	Firm price contract clause 1.12					
8	Variation clause 1.13					
9	Prime cost and provisional sum clause 1.14 (insert profit and attendance which is a percentage of expended PC or provisional sum.)					
10	Bond clause 1.15					
11	Government Legislation and Regulations clause 1.16					
12	Import Duty and Value Added Tax clause 1.17 (Note this clause applies for materials supplied only. VAT will also be paid by the sub-contractor as allowed in the summary page)					
13	Insurance company Fees clause 1.18					
14	Provision of services by the Main contractor clause 1.19					
15	Samples and Materials Generally clause 1.21					
	SUB-TOTAL CARRIED TO PAGE F-6					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	cts
16	Supplies clause 1.20					
17	Bills of Quantities clause 1.23					
18	Contractor's Office in Kenya clause 1.24					
19	Builder's Work clause 1.25					
20	Setting to work and Regulating system clause 1.29					
21	Identification of plant components clause 1.30					
22	Working Drawings clause 1.32					
23	Record Drawings (As Installed) and Instructions clause 1.33					
24	Maintenance Manual clause 1.34					
25	Hand over clause 1.35					
26	Painting clause 1.36					
27	Testing and Inspection – manufactured plant clause 1.38					
28	Testing and Inspection – Installation clause 1.39					
29	Storage of Materials clause 1.41					
30	Initial Maintenance clause 1.42					
31	Attendance Upon Tradesmen, etc. (Insert percentage only) clause 1.58					
32	Local and other Authorities notices and fees clause 1.60					
	SUB-TOTAL CARRIED TO PAGE F-6					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSH	Scts
33	Temporary Works clause 1.63					
34	Patent Rights clause 1.64					
35	Mobilization and Demobilization Clause 1.65					
36	Extended Preliminaries Clause 1.66(see appendix on page C- 24)					
37	Supervision by Engineer and Site Meetings Clause 1.67	1	Item		350,000	00
38	Allow for profit and Attendance for the above					
39	Amendment to Scope of Sub-contract Works Clause 1.68					
40	Contractor Obligation and Employers Obligation clause 1.69(see appendix page C- 24)					
41	Any other preliminaries;					
	Subtotal above					
	Subtotal brought forward from page F-4					
	Subtotal brought forward from page F-5					
	TOTAL FOR BILL NO. 1- PRELIMINARIEGS CARRIED FORWARD TO PRICE MAIN SUMMARY					

SANITARY FITTINGS					
Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	2,500 SQM WAREHOUSE Supply, deliver, install, test and commission the following sanitary appliances complete with all the accessories including all connections to the services, waste, jointing to water supply overflows, supports and all plugging and screwing to walls and floors. (i) All sanitary fittings shall be in approved colour. (ii) The Model and Ref No. indicated is only a guide to the type and quality of fittings. Water Closet (WC) bowl Floor standing WC bowl ('S' or 'P'-trap) in approved colour complete with horizontal outlet to BS 3402 with heavy plastic				
A	seat and cover with metal top fixed (chrome plated) hinges. All to be as <i>'Ideal Standard' Tempo Ref. T3314</i> or approved equivalent.	No.	1		
B	Flush valves 32mm diameter exposed Chrome Plated Manually Operated Closet Water Saver Flush Valve with the Oscillating Non-Hold-Open Handle, Water Saving 3.5 Gallon Per Flush Diaphragm type Flushometer also features a 1" IPS Bak-Check Screwdriver Stop, Control Stop Plug and Has no External Water Adjustment to Ensure Water Conservation. The Flush Valve be as <i>Docol</i> or approved equivalent.	No.	1		
C	Close coupled Water Closet (WC) Floor standing Close-coupled WC suite in approved colour complete with horizontal outlet to BS 3402 with water saving 4.5 litre valveless ceramic cistern and fittings including siphon, 15mm diameter side inlet ball valve, 20mm diameter side overflow, plastic flush bend, inlet connection, chrome-plated dual push lever and heavy duty soft close plastic (thin) seat and cover with stainless steel hinges. As <i>Ideal standards - Tempo Model. T3314</i> or approved equivalent.	No	13		
D	Wash hand basin (WHB) - Counter Top Countertop wash hand basin size 600 x 480mm with one tap hole, 32mm diameter chrome plated chain waste, chain stay hole, chrome plated non-concussive time delay press action tap as <i>'Vado' Ref. PRO 167</i> or approved equivalent and heavy duty plastic bottle trap (32mm 'P' trap) with 75mm seal. To be as <i>'Ideal Standard' Space Ref. G046001</i> or approved equivalent.	No	16		
E	Wash hand basin (WHB) - Pedestal Wash hand basin size 550 x 450mm with one tap holes and chain stay hole, pedestal, 32mm diameter chrome plated pop up chain waste, concealed wall brackets, chrome plated non-concussive time delay press action pillar tap as <i>'Vado' Ref. PRO 167</i> or approved equivalent, and plastic bottle trap (32mm 'P' trap) with 75mm seal. The wash hand basin to be as <i>'Ideal Standard' Space Ref. V154001</i> or approved equivalent.	No.	2		
	Total carried to collection page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	Urinals bowls				
A	Ceramic urinal bowl complete with 40mm heavy duty plastic bottle trap and 40mm diameter chrome plated outlet with grating, top inlet and firmly fixed on the wall with chrome plated screws. The fittings shall be as <i>'Ideal Standard' Simplicity Ref. E897701</i> or approved equivalent.	No	6		
	Urinal Bowl Divisions				
B	Ceramic urinal bowl divisions separating the above described urinal bowls fixed firmly on the wall. The fittings shall be as <i>'Ideal Standard' Ref. S612001</i> or approved equivalent	No	6		
	Urinal Bowl Flush Valves				
C	25mm urinal bowl flush valve for the above urinal bowls complete with, back entry with integral vacuum breaker, non-hold-open features and non-return valve, inlet control stop and wall plate comprising flush valve, bent chrome plated flush pipe and rubber pipe connector. The flush valve to be push button type. The fittings shall be as <i>Docol</i> or approved equivalent.	No	6		
	Disabled Persons Water Closet and Wash Hand Basin Facility				
	Wheel chair accessible W.C facility Comprising of the following:-				
	i) Close coupled W.C with 7.5 litre cistern with bottom inlet and overflow. The bowl shall be of size 375x560x420mm high. The bowl and cistern shall be manufactured from vitreous china complying with B.S 3402. The unit shall be complete with valveless cistern fittings including syphon, 1 /2" side inlet ballvalve, 3 /4" side overflow, plastics flushbend, inlet connector and reversible metallic chrome plated cistern lever. There shall also be a heavy duty seat(25mmhigh) and cover with chrome plated metal hinges, toilet roll holder, 610 x 610 x 6mm thick mirror and robe hook.				
	ii) Semi pedestal wall mounted W.H.B of size 600x500x545mm high with flexible connectors to waste and taps. The basin shall be manufactured from vitreous china complying with B.S 3402. It shall have one L/H tap hole with 1/2" chrome plated lever action pillar tap, chrome plated waste with height adjustable trap, pedestal and wall fixing bolts.				
D	iii) Hinged support rail with toilet roll holder 770mm long manufactured in nylon coated stainless steel and mounted on a wall fixing plate plate size 230x100 mm, 4No 600mm grab rails with covered wall plates. The set shall be as <i>'Ideal Standards'</i> wheelchair accessible W.C. facility or approved equivalent.	Set	2		
	Toilet Roll Holder				
E	Wall mounted, chrome plated toilet roll holder with protector plate as <i>Vado life</i> or equal and approved.	No	16		
	Toilet Brush and Holder				
F	Toilet brush and holder as <i>Vado life</i> or equal and approved.	No	16		
	Total carried to collection page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
A	Robe Hook Chrome plated double robe hook mounted with concealed screws. To be as <i>Vado life</i> or approved equivalent.	No	16		
B	Kitchen Sink Single bowl, double drainer stainless steel kitchen sink of size 1500 x 600mm as manufactured by ASL . The bowl size to be 430 x 420 x 200mm deep complete with chrome plated 40mm waste fittings, plugs, chain stays, overflow, 1No. 15mm diameter wall mounted chrome plated sink mixer with over-arm swivel spout as ' <i>Ideal Standard</i> ' Ref.B2218/AA with carina handles, heavy duty plastic bottle trap with 75mm deep seal and chain waste fitting.	No.	2		
C	Undersink Heater 10 litres capacity undersink instantaneous water heater complete with 3.0kw electric heating element, externally adjustable capillary type thermostat, polyurethane form thermal insulation, corrosion-proof moulding outer casing, mountings, water and electrical connections. The heater shall be as <i>Ariston</i> or approved equivalent with power supply 3.0kw, 240/50Hz.	No	2		
D	Cleaner's Sink Heavy duty stainless steel sink of size 675 x 485 x 300mm deep in 16 SWG with one tap hole, chrome plated time delay press action pillar tap as <i>Vado</i> and heavy duty plastic bottle trap (32mm 'P' trap) with 75mm seal. as manufactured by <i>ASL 131</i> or approved equivalent	No.	2		
E	Mirror 6mm thick polished plate glass silver backed mirror with bevelled edges, size 610 x 610mm, Plugged and screwed to wall with 4No. chrome plated dome capped screws. The mirror shall rest against a layer of 5mm thick foam.	No.	17		
F	Soap Dispenser Wall mounted soap dispenser with a capacity of about one litre having a press action soap release mechanism complete with fixing screws. Allow for initial soap supply. To be as <i>Mediclinics</i> or approved equivalent.	No.	6		
G	Hand Driers Automatic "hands in" dual flow hand drier in white colour, operating on double infra-red automatic sensing system on both covers with heating element safety cut-out complete with a 30 seconds safety timer, plastic rawl plugs and fixing screws. The hand drier to have a heating capacity of 1.5kw and performance flow rate of 165m ³ /hr and air velocity of upto 410km/hr and to be of size 665x320x228mm deep It shall have a noise level below 72 dBA at 2m. It shall be as <i>Mediclinics model M14A</i> or approved equivalent.	No.	4		
Total carried to collection page					

<u>COLLECTION PAGE FOR WAREHOUSE SANITARY FITTINGS</u>		
Item	Description	Amount (Kshs)
1	Total carried forward from page E-7	
2	Total carried forward from page E-8	
3	Total carried forward from page E-9	
	Total for 1No. Warehouse	
		X 2
	Total for Sanitary fittings Carried Forward to Summary Page E-28	

PLUMBING AND DRAINAGE					
Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	2,500 SQM WAREHOUSE INTERNAL PLUMBING PPR PN20 Pipework Supply, deliver and install PPR PN 20 pipes, tubing and fittings as described and shown on the drawings. Rates must allow for all Metal/plastic threaded adaptors where required for the connection of sanitary fixtures, valves, sockets, sliding and fixed joints, support raceways, isolating sheaths, elastic materials, expansion arms and bends, crossovers, couplings, clippings, connectors, joints etc. as required in the running lengths of pipework and also where necessary, for pipe fixing clips, holder bats plugged and screwed for the proper and satisfactory functioning of the system. The pipes will be pressure tested before the plastering of wall commences and as per the manufacturers recommended testing pressures.				
A	20mm diameter pipework	Lm	15		
B	25mm diameter pipework	Lm	30		
C	32mm diameter pipework	Lm	20		
D	40mm diameter pipework	Lm	12		
E	50mm diameter pipework	Lm	16		
	Elbows/bends				
F	20mm diameter bend	No.	18		
G	25mm diameter bend	No.	20		
H	32mm diameter bend	No.	16		
I	40mm diameter bend	No.	8		
J	50mm diameter bend	No.	6		
	Equal tees				
K	25mm equal tee	No.	10		
L	32mm equal tee	No.	14		
M	40mm equal tee	No.	8		
N	50mm equal tee	No.	8		
Total C/F to the Collection page					

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	Reducers				
A25	x 20mm diameter reducer	No.	12		
B32	x 20mm diameter reducer	No.	8		
C32	x 25mm diameter reducer	No.	10		
D	40 x 25mm diameter reducer	No.	8		
E	40 x 32mm diameter reducer	No.	6		
F	50 x 32mm diameter reducer	No.	6		
G	50 x 40mm diameter reducer	No.	5		
	Female/Male threaded adaptors				
H	20mm female/male threaded adaptor	No.	20		
I	25mm female/male threaded adaptor	No.	20		
J	32mm female/male threaded adaptor	No.	8		
	Unions				
K	25mm diameter union	No.	6		
L	32mm diameter union	No.	4		
M	40mm diameter union	No.	6		
N	50mm diameter union	No.	4		
	Isolating Valves				
O	25mm diameter approved medium pressure screw down full way non-rising stem wedge gate valve to BS 5154 PN 20 for series B rating, with wheel and head joints to steel tubing and complete with round male threaded transition fittings. The gate valve to be as PEGLER or approved equivalent.	No.	6		
P	32mm ditto	No.	4		
Q	40mm ditto	No.	6		
R	50mm ditto	No.	4		
	Total C/F to the Collection page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
A	Non return Valves 50mm diameter approved medium pressure non return valve to BS 5154 PN 20 for series B rating, with wheel and head joints to steel tubing and complete with round male threaded transition fittings. The gate valve to be as PEGLER or approved equivalent.	No.	3		
B	Angle Valves 25mm diameter approved regulating angle valve. The angle valve to be as PEX or approved equivalent.	No.	35		
C	Flexible Connector 15mm diameter x 300mm long flexible connectors complete with chrome plated angle valve including backnut and jointing to gms pipe and sanitary fittings.	No.	35		
	Total C/F to the Collection page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	ROOF PLUMBING				
	<u>PPR PN20 Pipework</u>				
	Supply, deliver and install PPR PN 20 pipes, tubing and fittings as described and shown on the drawings. Rates must allow for all Metal/plastic threaded adaptors where required for the connection of sanitary fixtures, valves, sockets, sliding and fixed joints, support raceways, isolating sheaths, elastic materials, expansion arms and bends, crossovers, couplings, clippings, connectors, joints etc. as required in the running lengths of pipework and also where necessary, for pipe fixing clips, holder bats plugged and screwed for the proper and satisfactory functioning of the system. The pipes will be pressure tested before the plastering of wall commences and as per the manufacturers recommended testing pressures.				
A	32mm diameter pipework	Lm	45		
B	40mm diameter pipework	Lm	40		
C	50mm diameter pipework	Lm	35		
D	63mm diameter pipework	Lm	6		
	Elbows/bends				
E	32mm diameter bend	No.	10		
F	40mm diameter bend	No.	12		
G	50mm diameter bend	No.	10		
H	63mm diameter bend	No.	5		
	Equal tees				
I	40mm equal tee	No.	5		
J	50mm equal tee	No.	5		
K	63mm equal tee	No.	2		
	Reducers				
L	40 x 32mm diameter reducer	No.	5		
M	50 x 32mm diameter reducer	No.	5		
N	50 x 40mm diameter reducer	No.	6		
O	63 x 40mm diameter reducer	No.	2		
P	63 x 50mm diameter reducer	No.	2		
	Total C/F to the Collection page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	Female/Male threaded adaptors				
A	40mm female/male threaded adaptor	No.	4		
B	50mm female/male threaded adaptor	No.	3		
C	63mm female/male threaded adaptor	No.	2		
	Unions				
D	50mm diameter union	No.	5		
E	100mm diameter union	No.	6		
	Isolating Valves				
F	40mm diameter approved medium pressure screw down full way non-rising stem wedge gate valve to BS 5154 PN 20 for series B rating, with wheel and head joints to steel tubing and complete with round male threaded transition fittings. The gate valve to be as PEGLER or approved equivalent.	No.	4		
G	50mm ditto	No.	3		
H	63mm ditto	No.	2		
	Non return Valves				
I	50mm diameter approved medium pressure non return valve to BS 5154 PN 20 for series B rating, with wheel and head joints to steel tubing and complete with round male threaded transition fittings. The gate valve to be as PEGLER or approved equivalent.	No.	2		
	Roof Water Storage Tank				
J	Supply, deliver and install Cylindrical plastic moulded tank of capacity 2,500 litres (1087 gallons) and diameter 1850 x 2050mm high. The tank to be assembled complete with cover and having screwed connections for inlet, outlet, overflow, medium pressure ball valve, drain pipes and any other necessary item for its proper functioning. The tank shall be mounted on a platform and shall be as ROTO Model or approved equivalent.	2	No.		
	Total C/F to the Collection page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	<u>INTERNAL FOUL WATER DRAINAGE</u>				
	Supply, deliver and install the following UPVC, MUPVC, soil and waste systems respectively to B.S 5255 with fittings fixed to Manufactures Printed instructions and manufactured by reputable manufacturers. Tenderers must allow in their pipework prices for all the couplings, clippings, connectors, joints etc. as required in the running lengths of pipework and also where necessary, for pipe fixing clips, holder bats plugged and screwed for the proper and satisfactory functioning of the system.				
	MuPVC and uPVC Waste and Soil pipework				
A	100mm diameter heavy gauge brown mPVC pipe	Lm	30		
B	100mm diameter heavy gauge grey mPVC pipe	Lm	45		
C	75mm diameter waste pipe	Lm	6		
D	50mm diameter waste pipe	Lm	30		
E	40mm diameter waste pipe	Lm	22		
F	32mm diameter waste pipe	Lm	32		
	Bends				
G	100mm diameter long radius bend	No.	6		
H	100mm diameter short radius bend	No.	8		
I	100mm diameter access bend	No.	5		
J	100mm diameter sweep bend	No.	5		
K	50mm diameter sweep bend	No.	12		
L	40mm diameter sweep bend	No.	15		
M	32mm diameter sweep bend	No.	24		
	Tees				
N	100mm diameter sweep tee	No.	12		
O	50mm diameter sweep tee	No.	8		
P	40mm diameter sweep tee	No.	10		
Q	32mm diameter sweep tee	No.	18		
	Total C/F to the Collection page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	Access Caps				
A	100mm diameter access cap	No.	5		
B	50mm diameter access cap	No.	5		
C	40mm diameter access cap	No.	6		
D	32mm diameter access cap	No.	6		
	Reducing Sockets				
E	40 x 32 reducing socket	No.	6		
F	50 x 32 reducing socket	No.	5		
G	50 x 40 reducing socket	No.	8		
	Single Branch				
H	100 diameter single branch	No.	6		
	Boss Adaptors				
I	100 x 75mm diameter boss connector	No.	2		
J	100 x 50mm diameter boss connector	No.	10		
K	100 x 40mm diameter boss connector	No.	2		
	WC Connectors				
L	100mm diameter WC connector	No.	16		
	Traps				
M	100 x 50mm diameter floor trap and grating	No.	8		
	Vent Cowl				
N	100mm diameter weathering slate and vent cowl	No.	4		
	Total C/F to the Collection page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
A	Gulley Trap 100mm “metro” Gulley trap with 300 x 300mm square top and inner grating 50mm back inlet and 100mm outlet surrounded in concrete and with loose perforated mild steel cover grating set flush to rebated edge in raised concrete 100 x 75mm high Kerb finished smooth on exposed surface including all necessary excavations and form work.	No.	4		
B	Grease Trap 1800 x 900 x 600mm deep concrete two chamber grease trap complete with all the fittings including the grease collector basket, interconnecting pipes, gulley traps and 2No. heavy duty manhole covers. It shall be constructed with 125mm thick reinforced concrete and water proofed.	No.	1		
C	Manholes and Inspection Chambers Construct inspection chamber size 600 x 450mm and averaging 750mm deep constructed in 100mm thick concrete base (1:3:6), approved 150mm block sides rendered all around in cement and sand (1:4). It shall have an approved heavy duty cast iron cover and frame as manufactured by E.A Foundry works. Include all necessary excavations, disposal and form work. To be as manhole type 'A'.	No.	6		
D	Excavation Excavate trench in soil/murram for above pipes not exceeding 2000mm deep, part return in, fill, ram and surplus cart away.	No.	120		
E	Testing Allow for the testing of the plumbing and drainage installation work during the progress and on completion of the work and leave in perfect working condition to the satisfaction of the Engineer.	Item			
Total C/F to the Collection page					

	<u>COLLECTION PAGE FOR PLUMBING AND DRAINAGE</u>	
Item	Description	Amount (Kshs)
1	Total carried forward from page E-11	
2	Total carried forward from page E-12	
3	Total carried forward from page E-13	
4	Total carried forward from page E-14	
5	Total carried forward from page E-15	
6	Total carried forward from page E-16	
7	Total carried forward from page E-17	
8	Total carried forward from page E-18	
	Total for 1No. Warehouse	
		X2
Total for Plumbing & Drainage Installation Works Carried Forward to Summary Page E-28		

FIRE PROTECTION

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	2500 SQM WAREHOUSE				
	HOSEREEL AND PORTABLE EXTINGUISHERS				
	Supply, deliver and install the following fire fighting equipment in positions indicated on the contract drawings or as shall be instructed by the Engineer.				
	Hose Reel				
A	Swinging type hosereel fitted with 30 metres long, 20mm diameter reinforced non-kink rubber hose with 5/6 mm lever operated shut-off nozzle, mild steel feed pipe, isolation valve, guide and all other accessories as 'Angus Fire Armour' or equal and approved.	No.	6		
	GMS Pipes Class B				
B	25mm diameter pipework	Lm	25		
C	50mm diameter pipework	Lm	150		
	Extra Over Pipework Bends				
D	25mm diameter bends	No.	15		
E	50mm diameter bends	No.	10		
	Tees				
F	50mm diameter equal Tee	No.	6		
	Reducers				
G	50 x 25 mm diameter reducer	No.	6		
	Valves				
H	25mm diameter approved medium pressure screw down full way non-rising stem wedge gate valve to BS 1952, with wheel and head joints to steel tubing. The gate valve to be as PEGLER or approved equivalent.	No.	6		
I	50mm diameter gate valves	No.	4		
J	65mm diameter gate valves	No.	0		
	Unions				
K	25mm diameter pipe union	No.	6		
L	50mm diameter pipe union	No.	4		
	Total carried to collection page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
A	Hosereel Pumpset Hose reel pumpset, one duty, the other standby mounted on a frame with a mild steel base plate. Each pump shall have a duty 5m ³ /hr against 45m head as Grundfos model CM 5 - 6 or approved equivalent. In addition, there shall be a 24 litres diaphragm pressure vessel, pressure switches, a switch to protect dry run, 50mm foot valve and strainer, tank connections, gate valves and non-return valves. Control shall be effected via a pressure switch through a pre-wired control panel which shall give automatic change-over from duty to standby pump within 5 seconds should the duty pump fail to deliver for any reason. The pumpset shall include all non-returns valves, timer, isolating valves and pipe connections.	Set	1		
B	Control Panel Control panel for above pumps with contactors, over voltage and under voltage protection relays, MCBs, phase failure protection, timer, 10 meters long float switch control 4-core cable to the roof tanks, start/stop push buttons and indicator lights. All these shall be housed in a lockable cabinet (with integral isolator) made from SWG 18 mild steel sheet that is oven powder coated. There shall also be an adjustable time delay switch to ensure pumping cycles are controlled to not more than 6 per hour. It should include a change-over switch to enable the pumps to work alternately.	Item	1		
C	Portable Fire Extinguishers Supply, deliver, install, test and commission the following portable fire extinguishers and conforming to BS EN 3 / BS 1449.				
	Water/Carbon Dioxide Gas Fire Extinguisher 9 litres water/carbon dioxide gas portable fire extinguisher complete with pressure gauge, initial charge and mounting brackets.	No	6		
D	Carbon Dioxide Gas Fire Extinguisher 5 Kg carbon dioxide gas portable fire extinguisher complete with pressure gauge, initial charge and mounting brackets.	No	6		
E	Dry Chemical Powder Fire Extinguisher 6kg dry chemical powder portable fire extinguisher complete with pressure gauge, initial charge and mounting brackets.	No	6		
F	Manual Alarm Bell 9" (225mm) manual operated alarm bell (Gong)	No	4		
G	Painting Allow for painting of the hose reel pipework as per particular specifications.	Item	1		
H	Fire Notices Allow for fire signage for the hose reel system, fire exits and fire instructions as directed by the Project Engineer.	No	6		
	Total carried to collection page				

<u>COLLECTION PAGE FOR FIRE PROTECTION</u>		
Item	Description	Amount (Kshs)
1	Total carried forward from page E-20	
2	Total carried forward from page E-21	
	Total for 1No. Warehouse	
		X2
Total for fire protection Carried Forward to Summary Page E-28		

WATER RETICULATION

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	CLEAN WATER RETICULATION				
	Supply and fix High Density Polyethylene (HDPE) pipes, tubing and fittings as described and shown on the drawings. Tenderers must allow in their pipework prices for all flanges couplings, unions, connector joints, reducers, etc. as required in the running lengths of pipe, all fixing clips, and holderbats, plugged and screwed.				
	Excavations				
A	Excavate trench in red soil/murram for small pipe not exceeding 1000mm deep and average 750mm deep, Part return in, fill and surplus cart away.	LM	200		
B	Allow for keeping the excavated trenches free of water either by bailing or by pumping.	Sum	1		
	HDPE Pipework				
C	110 mm dia. HDPE Pipe	LM	50		
D	75 mm dia. HDPE Pipe	LM	90		
E	63 mm ditto	LM	120		
F	50mm ditto	LM	100		
G	40mm ditto	LM	75		
H	32mm ditto	LM	35		
I	25mm ditto	LM	25		
	<u>Extra over HDPE pressure Pipework for the following:</u>				
	Coupling				
J	110 mm diameter coupling	No	5		
K	75 mm diameter coupling	No	6		
L	63 mm diameter coupling	No	6		
M	50 mm diameter coupling	No	4		
N	40 mm diameter coupling	No	4		
O	32 mm diameter coupling	No	3		
	Adaptors				
P	110 mm diameter adaptor	No	4		
Q	75 mm diameter adaptor	No	5		
R	63 mm diameter adaptor	No	4		
S	50 mm diameter adaptor	No	3		
T	40 mm diameter adaptor	No	4		
U	32 mm diameter adaptor	No	4		
	Total carried to Collection Page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	Bends				
A	110 mm diameter bends/elbows	No	15		
B	75 mm ditto	No	11		
C	63 mm ditto	No	8		
D	50mm ditto	No	13		
E	40mm ditto	No	8		
F	32mm ditto	No	8		
G	25mm ditto	No	6		
	Tees				
H	110 mm diameter equal tee	No	4		
I	75 mm ditto	No	5		
J	63 mm ditto	No	4		
K	50mm ditto	No	6		
L	40mm ditto	No	8		
M	32mm ditto	No	6		
	Reducers				
N	110 x75mm diameter	No	4		
O	75 x65mm diameter	No	5		
P	65 x50mm ditto	No	3		
Q	50 x40mm ditto	No	4		
R	50 x32mm ditto	No	5		
S	50 x25mm ditto	No	5		
T	40 x32mm ditto	No	4		
U	40 x25mm ditto	No	4		
V	32 x25mm ditto	No	6		
	Valves				
W	100 mm diameter high pressure approved pattern brass rising stem fullway gate valve with wheel head and jointing to tubing as "Pegler" or approved equivalent.	No	2		
X	75mm diameter ditto	No	5		
Y	63 mm diameter ditto	No	5		
Z	50mm diameter ditto	No	4		
A1	40mm diameter ditto	No	5		
B1	32mm diameter ditto	No	4		
	Total carried to Collection Page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	Unions				
A	110 mm diameter union	No	3		
B	75mm ditto	No	5		
C	63mm ditto	No	5		
D	50mm ditto	No	6		
E	40mm ditto	No	5		
F	32mm ditto	No	5		
	Valve Chamber				
G	Valve chamber size 750 x 750 x 600mm deep with 100mm concrete (1: 3: 6) base 100mm block sides rendered all round in cement and sand (1:4) and with approved hinged and flanged cast iron cover and frame including all necessary excavation, disposal and form work.	No	10		
	Stand Pipes				
H	20mm diameter GMS Stand pipes	No	10		
	Testing and Commissioning				
I	Allow for pressure testing and commissioning of the reticulation installation to the satisfaction of the Engineer.	Sum	1		
	Project managers stationery and Expense				
J	Ream white photocopying paper A/4 80g/m2	Ream	15		
K	Letter head quality paper, size A4, 80g/cm ³ , Green, 500 sheets	Ream	5		
L	Letter head quality paper, Blue, 500 Sheets as Classic or Conqueror or approved equivalent.	Ream	5		
M	HP Leserjet Print Cartridge serial 5A No. CE505A	No.	5		
N	Rotating High back chair with gas lifting mechanism, adjustable headrest, armrest and lumbar support. The chair to be made of high density sponge Seat covered in durable fabric and high quality mesh backrest. The base to be made of strong Chrome.	No.	2		
O	Laptop Computer Intel corei 7 sixth generation processor /2.7GHz Quad-core/8GB System RAM/1TB SSD/ win10/HD15.6" Screen/carry case and preinstalled with MS Office 16 and an antivirus as 'Hp Envy Ultrabook'.	No.	2		
	Total carried to Collection Page				

<u>COLLECTION PAGE FOR WATER RETICULATION</u>		
Item	Description	Amount (Kshs)
1	Total carried forward from page E-23	
2	Total carried forward from page E-24	
3	Total carried forward from page E-25	
Total Carried Forward to Summary Page E-28		

RAIN WATER DRAINAGE					
Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	2,500 SQM WAREHOUSE Supply and fix uPVC pipes to BS 4660 and BS 4515 and MuPVC pipes to BS 5255 with screwed and socketed joints to BS 21. Solvent welded joints shall be as per the system's manufacturer's written instructions. Tenderers must allow in their pipework prices for all the couplings, clippings, connectors, joints etc. as required in the running lengths of pipework and also where necessary, for pipe fixing clips, holder bats plugged and screwed for the proper and satisfactory functioning of the system.				
A	150mm diameter heavy gauge grey mUPVC down pipes	100	Lm		
B	150mm diameter heavy gauge golden brown UPVC down pipes	25	Lm		
C	150mm diameter sweep bend	25	No.		
D	150mm diameter rain water shoe	15	No.		
E	Excavate trench in soil/murram for above pipes not exceeding 2000mm deep, part return in, fill, ram and surplus cart away.	25	LM		
	Total for 1No. Warehouse				
					X2
	Total for Rain water drainage Carried Forward to Main Summary Page E-28				

SUMMARY PAGE

Item	Description		Total Cost (Kshs)
1	Total for Sub-contract Preliminaries and General Items.....Page E -6	
2	Total carried forward from Summary Page for Sanitary Fittings.....Page E-10	
3	Total carried forward from Summary for Plumbing and drainage.....Page E-19	
4	Total carried forward from Summary Page for Fire protection.....Page E-22	
5	Total carried forward from Summary Page for Water reticulation.....Page E-26	
6	Total carried forward from Summary Page for Rain water drainage.....Page E-27	
7	Contingency Sum to be used at the discretion of the Engineer	1,000,000.00
Total Cost for Plumbing, drainage and fire protection Carried Forward to Grand Summary			

SECTION G:

TECHNICAL SCHEDULE OF ITEMS TO BE SUPPLIED

CONTENTS

<u>CLAUSE No.</u>	<u>PAGE</u>
1. GENERAL NOTES TO THE TENDERER.....	(i)
2. TECHNICAL SCHEDULE.....	G-1-G-2

TECHNICAL SCHEDULE

1. General Notes to the Tenderer

- 1.1 The tenderer shall submit technical schedules for all materials and equipment upon which he has based his tender sum.
- 1.2 The tenderer shall also submit separate comprehensive descriptive and performance details for all plant apparatus and fittings described in the technical schedules. Manufacturer's literature shall be accepted. Failure to comply with this may have his tender disqualified.
- 1.3 Completion of the technical schedule shall not relieve the Contractor from complying with the requirements of the specifications except as may be approved by the Engineer.

TECHNICAL SCHEDULE

The tenderer must complete in full the technical schedule. Apart from the information required in the technical schedule, the tenderer **MUST SUBMIT** comprehensive manufacturer's technical brochures and performance details for all items listed in this schedule (fill forms attached).

ITEM	DESCRIPTION	MANUFACTURER	COUNTRY OF ORIGIN	REMARKS (Catalogue No. etc.)
A	Water closet			
B	Wash hand basin			
C	Urinal flush valve			
D	Gate Valves			
E	Pipes PPR			
F	Booster pump			
G	Presses steel plates			
H	Hosereel			
I	Water/co2 extinguisher			
J	Hydrant			

Catalogue must be attached for all the items in the schedule of material above

SECTION H:

DRAWING SCHEDULE

CONTENTS

CLAUSE No.

PAGE

1.DRAWING SCHEDULE.....

H-1

DRAWING SCHEDULE:

As shall be provided during project implementation.

SECTION I:

STANDARD FORMS

STANDARD FORMS

CONTENTS

<u>FORM</u>	<u>PAGE</u>
1.KEY PERSONNEL.....	I-1
2. CONTRACTS COMPLETED IN THE LAST FIVE (5) YEARS....	I-2
3. SCHEDULE OF ON-GOING PROJECTS.....	I-3
4. DETAILS OF LITIGATIONS OR ARBITRATION PROCEEDINGS	I-4
5. SCHEDULE OF MAJOR ITEMS OF CONTRACTOR’S EQUIPMENT PROPOSED FOR CARRYING OUT THE WORKS.....	I-5

**NOTE: ALL FORMS IN THIS SECTION MUST BE FILLED AS THEY SHALL BE
PART OF THE EVALUATION CRITERIA**

KEY PERSONNEL

Qualifications and experience of key personnel proposed for administration and execution of the Contract.

POSITION	NAME	YEARS OF EXPERIENCE (GENERAL)	YEARS OF EXPERIENCE IN PROPOSED POSITION
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

I certify that the above information is correct.

.....
Title

.....
Signature

.....
Date

CONTRACTS COMPLETED IN THE LAST FIVE (5) YEARS

Work performed on works of a similar nature and volume over the last five years.

<u>PROJECT NAME</u>	<u>NAME OF CLIENT</u>	TYPE OF WORK AND YEAR OF COMPLETION	VALUE OF CONTRACT (Kshs.)

I certify that the above works were successfully carried out and completed by ourselves.

.....
Title

.....
Signature

.....
Date

SCHEDULE OF ON-GOING PROJECTS

Details of on-going or committed projects, including expected completion date.

PROJECT NAME	NAME OF CLIENT	CONTRACT SUM	% COMPLETE	COMPLETI ON DATE

I certify that the above works are currently being carried out by ourselves.

.....
Title

.....
Signature

.....
Date

DETAILS OF LITIGATIONS OR ARBITRATION PROCEEDINGS IN WHICH THE
TENDERER IS INVOLVED AS ONE OF THE PARTIES

- 1. . _____ .
- 2. . _____ .
- 3. . _____ .
- 4. . _____ .
- 5. . _____ .
- 6. . _____ .
- 7. . _____ .
- 8. . _____ .
- 9. . _____ .
- 10 . _____ .

**SCHEDULE OF MAJOR ITEMS OF CONTRACTOR'S EQUIPMENT PROPOSED FOR
CARRYING OUT THE WORKS**

ITEM OF EQUIPMENT	DESCRIPTION, MAKE AND AGE (Years)	CONDITION (New, good, poor) and number available	OWNED, LEASED (From whom?), or to be purchased (From whom?)