

TECHNICAL SPECIFICATIONS AND PARTICULAR CONDITIONS:

Acronyms

BOQ	Bill of Quantities
DAP	Delivered At Place
DI	Ductile Iron
DN	Nominal Diameter
DZ	District Zone
EN	European standards
EPDM	Ethylene-Propylene-Diene Terpolymer
FARA	Fixed Amount Reimbursement Agreement
GIS	Geographic Information System
HDPE	High Density Polyethylene
ISO	International Organization for Standardization
NBR	Nitrile Butadiene Rubber
NRW	Non-Revenue Water
NSF	National Science Foundation
PN	Nominal Pressure
PRV	Pressure Reducing Valve
RPM	Revolution Per Minute
SDR	Standard Dimension Ratio
SS	Stainless Steel

HDPE

1. General

1.1 Ambient Conditions

All pipes, materials and equipment shall be in every respect suitable for storage, installation, use and operation in the conditions of temperature, humidity and The PH and water quality appertaining in Jordan.

Atmospheric temperature in Jordan varies between -10°C and 50 °C.

1.2 Potable Water Certification

All pipes and materials shall be certified for potable water use, and all pipes and materials should be certified as safe for transporting potable water by an independent testing laboratory.

All material in contact with or likely to come into contact with water for public supply shall be introduced with the requirements of BS 6920 (suitability for non metallic products for use in contact with drinking water) or any equivalent standard as well as the Jordanian standard (JS 286/2008) and the World Health Organization standard (WHO), and whenever the regulation is changed it is the supplier responsibility to ensure conformity with any new requirements.

Potable water certificate submitted must be for the same batch delivered to Miyahuna, certificates must be in English

1.3 Toxic Materials

Pipes and pipeline components, including their protective coatings and joint materials, that will or may come into contact with potable water shall not constitute a toxic hazard, shall not support microbial growth, shall not cause taste or odour, cloudiness or discolouration of the water and shall contain no ingredients that may migrate into water in amounts that are considered to be toxic or otherwise dangerous for health .

Non toxicity certificate should be provided.

1.4 Third Party Witness

1.4.1 General

The supplier shall furnish an original certificate from third party inspection agency showing all test results and analysis required by the applicable standard (ISO 4427 /2007) according to which the materials have been manufactured. The third party inspection agency shall under this contract, have witnessed the manufacture and testing operation to verify compliance with the technical specifications and the relevant standard. The third party inspection agency shall verify that all materials used are eligible for the relevant standard productions requirements. All certification should be from a certified and approved third party, and the certificates must be related to the same batch delivered to Miyahuna, all certificates must be valid and written in English.

1.4.2 Pipes

For pipes third Party shall verify that all pipes are produced in compliance with ISO 4427-2/2007, EN12201 or equivalent, all batch release tests shall be witnessed and certified by an approved third party, and No pipe shall be accepted unless all type and batch release tests have been passed. The third party must clearly identify the pipe production date / code marked on the pipes, with each batch test performed.

1.5 Testing after delivery

All materials supplied to the site in Jordan shall be subjected to acceptance tests carried out by the Royal Scientific Society. Or similar accredited authority. The test should confirm that the materials and pipes are manufactured according to ISO 4427, EN12201 or equivalent; all Tests required for polyethylene pipes must be performed according to the above standards. If any of the tests mentioned in the standards cannot be performed by the Royal Scientific Society then the supplier should provide a third party certificate for those tests taking into considerations all the statements mentioned in "third party witness" section.

All testing costs should be borne by the supplier in all cases.

1.6 Pipes Packing and Protection

- All pipes shall be bundled or packaged in such a manner as to provide adequate support and protection for the ends during transportation from the manufacturer to the Purchaser. All special provisions for ocean shipment shall be provided.
- The packaging of pipes by the manufacturer is normally consistent with the requirement to prevent damage and to comply with safety considerations. Usually pipes are delivered strapped into convenient bundles or banded coils. All ends must be closed with caps.

1.7 Identification

The supplier shall be responsible to ensure that each separate item, crate, or package has permanently attached to it, in a conspicuous position, an identification plate of weather - resistant material on which are engraved or stamped;

- **The Manufacturers Name**
- **Contents Description and Quantity**
- **Serial Number or Reference Number Identifiable on the Delivery Note and Cross Referenced to the Purchase Order Item References.**
- **Weight**

The shipment containers shall be marked with the following address;

Jordan Water Co. – MIYAHUNA L.L.C.

1.8 Tender Number – variable

In addition the container shall be marked with the following information;

- **Total gross weight**
- **Total net weight**
- **Packing list reference number**

1.9 Handling

Care shall be taken during loading, transporting, and unloading to prevent damage to the pipes,. Under no circumstances shall pipes or fittings be dropped or rolled against one another. All pipes and fittings shall be examined. Any damaged materials must be rejected by the Purchasers.

1.10Details to be provided at the time of tender

1. Conformity to standard certificate from third party
2. Manuals and technical catalogues
3. Dates of batches or consignment deliveries.
4. The supplier shall state which of the sections of the schedule of requirements he proposes to price and supply.
5. Any alternative standards proposed including demonstration of equivalency or superiority to the standard specified, if allowed.
6. Any alternative materials proposed including demonstration of equivalency or superiority to the standard specified, these alternative materials should be subjected to the clients approval.
7. Where the supplier offers alternative standards, materials to those specified, the supplier shall provide prices for those specified and the alternatives proposed.
8. The supplier shall include in his price for the training elements related to the materials he proposes to supply and shall list the elements of training offered, if needed or requested.
9. The supplier shall provide prices for the equipment applicable to the sections of the schedule of requirements he intends to price.

10. The supplier shall provide full details of his materials tests and procedures.
11. Any alternative proposed specification for combined tracer and marker tape.
12. ISO or EN certification for management and product.
13. CV's of proposed training staff, if necessary.
14. Costs of Trainers expenses, if requested.
15. Training program, if requested.

1.11 Manuals and Technical Specifications

The supplier shall supply full technical specifications for the items to be supplied at the time of tender. In addition he shall provide full instruction manuals, which describe the correct methods and procedures necessary to construct the pipeline system in accordance with best practice. Conformity to standard certificate must be supplied at time of tender where this certificate must be issued from third party and valid up to date.

1.12 Additional Services

The supplier shall provide details of additional services, which he can provide e.g. technical advice and support and, in particular, shall state his capability for supporting the project in the Amman location at the time of tender.

2. Polyethylene pipes

2.1 Technical specifications

The polyethylene pipes shall conform to the requirements of Polyethylene (PE) pipes for water supply under pressure – Specification (ISO 4427-1/2:2007), (EN12201-1, EN12201-2) or equivalent standard in which a supplier must submit a copy of that standard and a proof of equivalency to the above specifications.

Conformity to standard certificate must be supplied at time of tender where this certificate must be issued from third party and valid up to date.

The pipes should have the following properties:

- Pressure class : PN 16 or PN 25 (According to contract documents)
- The Standard Dimension Ratio (SDR) : SDR 11
- Material Designation : PE 100

2.2 Length of Pipes

The following table shows the length of the pipes according to the diameter.

Table 1.1 length of pipe

Diameter of pipe(mm)	Length of pipe (m)
Up to 63	50 or 100
125	(50 or 100 :coils) (upon request), Or (12 m : standard pipes) (for maintenance dept. uses) (upon request)
180 and above	12 or standard pipes

2.3 Markings of Pipes

All PE pipes shall be indelibly marked at maximum intervals of one meter.

The marking shall show at least the following information:

- “MIYAHUNA”
- Manufacture’s name, logo and/or trade mark
- Dimensions (nominal diameter)
- Materials, material class (i.e. PE 100) and pressure class (PN 16)
- Production period (date and code)
- “Water” to indicate that pipes are intended for potable water
- Serial number
- Batch number
- Standard number
- Standard Dimension Ratio (SDR).

For direct purchase procurements order the marking depends on the value of the procurements order

Reference standards

Standard Number	Description
ISO 4427-1 :2007	Plastics piping systems -- Polyethylene (PE) pipes and fittings for water supply Part 1 - General
ISO 4427-2 :2007	Part 2 – pipes
ISO 4427-3 :2004	Part 3 - Fittings
EN12201-1 :2010	Plastic piping System for Water Supply – polyethylene (PE) Part 1-General.
EN12201-2 :2003	Part 2 – pipes
EN12201-3 :2003	Part 3 - Fittings
BS 6920	Testing of non-metallic components with regards to their effect of the quality of water
ISO 14236 :2000	Plastics pipes and fittings – Mechanical joint compression fittings for use with polyethylene pressure pipes in water supply system
ISO 11413: 1996	Plastics pipes and fittings – preparation of test piece assemblies between a polyethylene (PE) pipe and electro fusion fittings
ISO 13954: 1997	Plastics pipes and fittings – peel decohesion test for polyethylene (PE)electro fusion assemblies of nominal outside diameter greater than or equal to 90 mm
ISO 13955	Plastics pipes and fittings – Crushing decohesion for polyethylene (PE) electro fusion assemblies
ISO 3458: 1976	Assembled joints between fittings and polyethylene (PE) pressure pipes –Test of leakproofness under internal pressure
ISO 3459: 1976	Polyethylene (PE) pressure pipes – Joints assembled with mechanical fittings – Internal under pressure test method and requirements.
ISO 3501 : 1976	Assembled joints between fittings and polyethylene (PE) pressure pipes –Test of resistance to pull out

ISO 3503 :1976	Assembled joints between fittings and polyethylene (PE) pressure pipes – Test of leakproofness under internal pressure when subjected to bending.
ISO 3506	Mechanical properties of corrosion-resistant stainless steel fasteners - Part 1: Bolts, screws and studs
EN 681-1	Elastomeric seals - Material requirements for pipe joint seals used in water and drainage applications - Part 1: Vulcanized rubber
EN 681-2	Elastomeric seals - Material requirements for pipe joint seals used in water and drainage applications - Part 2: Thermoplastic elastomers
EN 601	Aluminium and aluminium alloys - Castings - Chemical composition of castings for use in contact with foodstuff
ISO 12176	Plastics pipes and fittings -- Equipment for fusion jointing polyethylene systems -- Part 1: Butt fusion
ISO 13953	Determination of the tensile strength and failure mode of test pieces from a butt-fused joint
ISO 11414	Preparation of polyethylene (PE) pipe/pipe or pipe/fitting test piece assemblies by butt fusion

3. Polyethylene Fittings

3.1 fittings used for existing networks

Fittings used for polyethylene pipes must be manufactured and tested according to the standards shown in the following tables. As shown, table 2.1 is standards for fittings for Miyahuna uses, such as maintenance purposes and storing in warehouses.

3.2 fittings used for new installations

For the new projects, Miyahuna recommends that all fittings should be installed using electro-fusion technology, table 3.2 shows the standards for the fittings used in the new projects.

3.3 Connection Type

Table 2.3 Connection Type

Diameter of pipe(mm)	Connection Type	Standard
25-125	Mechanical or Electro-fusion	According to tables: 3.1.a , 3.1.b and 3.2
125 and above	Butt welding or	Machine : ISO 12176
	Electro-fusion	ISO 13953, ISO 11414

The Butt welding machine must be fully automatic

3.4 Design Requirements:

- The design of fittings must ensure that the wires which coiled around the inner part of electro fusion fittings are built in the body of fittings not separated from it.
- The cutter of PE EF Tapping shall be certified for potable water use.

Table 2.1 Polyethylene fittings on Polyethylene pipes:

No.	Description	Installation /Type	Standard No	Testing method
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1.	PE Connector (25mm,32 mm, 63 mm)	Compression	ISO 14236:2000	ISO 3501,ISO 3503, ISO 3458,ISO 3459
2.	PE EF Collar (125mm , 180 mm,250 mm,25 mm,32 mm, 63 mm)	Electro Fusion	ISO 4427:2004 or Equivalent: EN 12201-3 :2003	ISO 13955,ISO 13954, ISO 11413
3.	PE Reducer (32mmX25mm , 63mmX25mm,63X32)	Compression	ISO 14236:2000	ISO 3501,ISO 3503, ISO 3458,ISO 3459
4.	PE Adaptor (2" (63mm) Male, 1" (32mm) Male, 3/4" (25mm) Male) ^a	Compression		
5.	PE Flange Adaptor (125mm , 180 mm, 250 mm)	Electro Fusion	ISO 4427:2004 or Equivalent: EN 12201-3 : 2003	ISO 13955, ISO 13954, ISO 11413
6.	PE Tee (63X63X63mm, 32X32X32mm, 25X25X25mm, 63X63X32 ,63X63X25,32X32X25) ^b	Compression	ISO 14236:2000	ISO 3501,ISO 3503, ISO 3458,ISO 3459
7.	PE EF Tee 180X125(socket)	Electro Fusion	ISO 4427:2004 or Equivalent: EN 12201-3 : 2003	ISO 13955, ISO 13954, ISO 11413
8.	PE End Cap (63mm, 32 mm, 25 mm,.....)	Compression	ISO 14236:2000	ISO 3501,ISO 3503, ISO 3458,ISO 3459
9.	PE Elbow 63mm, 32mm ,25 mm	Compression		
10.	PE EF Elbow 90 ⁰ (180(socket), 125 mm, 250 mm ,)	Electro Fusion	ISO 4427:2004 or Equivalent: EN 12201-3 : 2003	ISO 13955, ISO 13954, ISO 11413
11.	Electro fusion end cap (125 mm , 180 mm)	Electro Fusion		
12.	PE EF Tapping (125*25 , 180*25 , 125*63 , 125*32,63*32 ,63*25,)	Electro Fusion		
13.	PE EF Elbow 45 ⁰ (180, 125 mm, 250 mm ,)	Electro Fusion	ISO 4427:2004 or Equivalent: EN 12201-3 : 2003	ISO 13955, ISO 13954, ISO 11413

Table 2.2: Fittings for new installation Tenders

No.	Description	Installation/ Type	Standard No	Testing method
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1.	PE Connector (25mm,32 mm, 63 mm)	Electro Fusion	ISO 4427:2004 or Equivalent: EN 12201-3: 2003	ISO 13955, ISO 13954, ISO 11413
2.	PE EF Collar (125mm , 180 mm,250mm,25 mm,32mm, 63mm)	Electro Fusion		
3.	PE Reducer	Electro Fusion		
4.	PE Adaptor (2" (63mm), 1" (32mm), 3/4" (25mm))	Electro Fusion		
5.	PE Flange Adaptor (125mm , 180 mm, 250 mm)	Electro Fusion		
6.	PE Tee ^b PE Tee (63X63X63mm, 32X32X32mm, 25X25X25mm, 63X63X32 ,63X63X25,32X32X25) ^b	Electro Fusion		
7.	PE EF Tee (socket) or saddle branch (line to line) (180X125, 180X180,.....)	Electro Fusion		
8.	PE End Cap (63mm, 32 mm, 25 mm,)	Electro Fusion		
9.	PE Elbow 63mm	Electro Fusion		
10.	PE EF Elbow (socket) (180 mm, 125 mm,250mm)	Electro Fusion		
11.	Electro fusion end cap (125 mm , 180 mm)	Electro Fusion		
12.	PE EF Tapping (125*25 , 180*25 , 125*63 , 125*32,63*32 ,63*25,)	Electro Fusion		
13.	Connector (25 mm, 32 mm) ^c	Compression	ISO 14236:2000	ISO 3501,ISO 3503, ISO 3458,ISO 3459

^a Adapter is used to connect Polyethylene pipes to pipe made from another material, and it should be compression from one side and male threaded from the other side

^b It is not allowed to use the weldable outlet Kit

^c when the installation is near to the customer cabinet ,whether the connection was straight connection or using elbow , compression fittings should be used

Reference standards

Standard Number	Description
ISO 4427-1 :2007	Plastics piping systems -- Polyethylene (PE) pipes and fittings for water supply Part 1 - General
ISO 4427-2 :2007	Part 2 – pipes
ISO 4427-3 :2004	Part 3 - Fittings
EN12201-1 :2010	Plastic piping System for Water Supply – polyethylene (PE) Part 1-General.
EN12201-2 :2003	Part 2 – pipes
EN12201-3 :2003	Part 3 - Fittings
BS 6920	Testing of non-metallic components with regards to their effect of the quality of water
EN 15664	influence of metallic materials on water intended for human consumption
ISO 14236 :2000	Plastics pipes and fittings – Mechanical joint compression fittings for use with polyethylene pressure pipes in water supply system
ISO 11413: 1996	Plastics pipes and fittings – preparation of test piece assemblies between a polyethylene (PE) pipe and electro fusion fittings
ISO 13954: 1997	Plastics pipes and fittings – peel decohesion test for polyethylene (PE)electro fusion assemblies of nominal outside diameter greater than or equal to 90 mm
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ISO 3506	Mechanical properties of corrosion-resistant stainless steel fasteners - Part 1: Bolts, screws and studs
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ISO 12176	Plastics pipes and fittings -- Equipment for fusion jointing polyethylene systems -- Part 1: Butt fusion
ISO 13953	Determination of the tensile strength and failure mode of test pieces from a butt-fused joint
ISO 11414	Preparation of polyethylene (PE) pipe/pipe or pipe/fitting test piece assemblies by butt fusion

4. Repair Clamps

4.1 Scope

This Specification specifies the requirements for the design, materials and in-service performance of mechanical stainless-steel repair clamps for waterworks purposes.

This Specification designated for applications involving rigid pipes, typically ductile iron (DI), grey cast iron (CI), and steel (S). Also, for applications involving flexible pipes, typically un-plasticized polyvinylchloried (PVC-U) and high-density polyethylene (HDPE).

All materials and equipment shall be in every respect suitable for storage, installation, use and operation in the conditions of temperature, humidity and The PH and water quality appertaining in Jordan.

Atmospheric temperature in Jordan varies between -10°C and 50 °C.

4.2 Application

Stainless steel repair clamps complying with this specification are intended for use in repair of water supply pipelines of the size designated in Table 8-1, with a maximum service temperature of 50°C and up to an allowable operating pressure of 16 bars for ranges diameter up to 250 mm. Repair clamps have limited ability to accommodate axial deflection and are, therefore, not generally intended for use as couplings to join two pipes together. However, they are commonly utilized for repair situations at full pipe break, where the pipe ends are considered stable. In addition, repair clamps complying with this specification are intended to provide a permanent means of preventing loss from or contamination of pipelines that have been affected by corrosion or mechanical damage in both above-ground and buried applications.

Materials

The material of Clamps shall be in accordance with the following standards or any other equivalent standards.

Bands: Stainless Steel Grade AISI 304(A2) to BS1449:1991: part 2 or Grade AISI 316(A4) stainless steel to BS 1449:1991: part 2, for corrosion resistance.

Bolts shall be Stainless Steel A2, Teflon coated, or mild steel. Nuts & washers shall be Stainless Steel A2, or mild steel class 4.6 to BS EN20898: Part 1. Receiver bars shall be TIG- welded to shell to form strong fusion, and fully passivated after welding,

Gasket shall have a gridded pattern for positive sealing, and to be made of specially compounded NBR rubber specially formulated for water service or EPDM. Compound Grade E to BS2494:1990

Design

The Clamps shall be used for permanent repair of cracks, holes, or complete breakages of steel, ductile Iron, PVC and HDPE pipes.

The Clamps shall be suitable for potable water for Temperature range (-10 to 50) C. Potable water certificate must be submitted.

Repair Clamps shall be standard full circle single band for diameter 150mm or less. And full circle double band for diameter more than 150mm, length and number of bolts not less than the values in Table 8-1 for each diameter.

Gasket shall provide a 360o sealing surface and of such size and shape to provide an adequate compressive force against the pipe after assembling to affect a positive seal under all combinations of joint and gasket tolerances. And heavy gauge Type 304 stainless Steel bridge plate shall be attached into the gasket end to span the lug area and to make installation quick and easy.

Bolt retainer assembly or lugs shall be of a type 304 stainless steel, and shall be MIG welded to receiver bar and fully passivated after welding. Lugs may be cast, forged or cold formed of type 304 stainless steel, and may include a high impact polycarbonate plastic, non corrosive retainer. Lug design shall be such that the band fully compresses the gasket to the complete working width of the repair clamp without deformation of the band.

Table Error! No text of specified style in document.-2: Repair clamps sizes

Bands	Nominal Pipe Size (Inch)	Clamps O.D Rang				Length (mm)	No. bolts
		Inches		Millimetres			
		Min	Max	Min	Max		
Single Band	2	2.32	2.64	59	67	150	2
	3	3.39	3.66	86	93	150	2
	4	3.94	4.33	100	110	150	2
	5	4.88	5.28	124	134	150	2
	6	6.06	6.38	154	162	200	3
	6(PE)	6.93	7.32	176	186	200	3
Double Bands	8	8.268	9.06	210	230	300	3*
	10	10.63	11.22	270	285	300	3*
	12	12.40	13.189	315	335	500	5*
	16	16.34	17.32	415	440	600	6*
	24	24.41	25.59	620	650	600	6*
	32	32.28	33.46	820	850	800	8*
	36	36.61	37.8	930	960	1000	10*

* Number of bolts for each band side.

** Clamps O.D Range could be acceptable within ($\pm 4\%$) for the minimum and maximum dimensions.

Installation of pipes and fittings

General

The installation of pipes and fittings including: excavation, laying and backfilling, reinstatement, etc. shall be according to the specifications of Miyahuna attached in annex 1.

Disinfection of Pipelines

General

All pipes, fittings, valves and appearances shall be disinfected according to the specification of Miyahuna listed below.

DISINFECTION OF PIPELINES

After the completed pipeline is tested, approved and backfilled, disinfections shall be performed in the following manner: after flushing the pipes, the system shall be drained completely, all valves shall be closed carefully and the system filled with a chlorine solution.

All pipes, fittings, valves and appurtenances shall be disinfected by the Contractor as specified herein unless otherwise directed by the Engineer's Representative. The Contractor is also responsible for conducting bacteriological test for all pipe laying through a laboratory. The cost of disinfection and the bacteriological test shall be borne by the Contractor.

The contractor should use potable water to execute the bacteriological test, and has three options to fulfil the specs:

- Using Miyahuna water direct from the network by installing a bypass connection and as instructed by the concerned people in Miyahuna. The costs for the mentioned connection as well as required material, labour, etc. will be borne by the contractor.
- Using Miyahuna tankers
- By using private tankers the water should be tested first by Miyahuna to ensure that the delivered water is potable water before executing any bacteriological tests. The costs to ensure the water quality will be borne by the contractor.

The attention of the Contractor is directed to the requirements of the Contract whereby he is responsible for preventing the entry of foreign material of any kind from entering the pipe. The Contractor shall take extreme care to keep the interior of the pipelines free of dirt and other foreign material. If in the opinion of the Engineer's or the Employer, dirt or other foreign material entered a pipe which cannot be removed by flushing, then the Contractor shall clean and swab the interior of the pipe with a five percent hypo-chlorite disinfecting solution to the satisfaction of the Engineer's Representative.

The Contractor shall, during the initial filling of the pipeline, concurrently introduce feed of chlorine at the same point where the pipeline is being filled. The rate of filling and the feed rate of the chlorine shall be proportioned so that the initial concentration of the chlorine in the water in the pipeline is between 50 and 100 milligrams per litre. To assure that this concentration is maintained, the chlorine residual shall be measured at blow-off, combination air valves, or other locations during the filling operation.

The following is the amount of chlorine required, if either liquid chlorine (gas at atmospheric pressure) or a one percent chlorine solution is used, to produce a 100 milligram per litre concentration in 100 meters of pipe for the various diameters of pipe to be disinfected under this Contract.

Table Error! No text of specified style in document.-3: Liquid Chlorine Required for Disinfecting 100 Meters of Pipes

Nominal Pipe Diameter (mm)	100% Liquid Chlorine (kg)	1% Chlorine Solution (Litres)
800	3.60	360
600	2.97	297
400	1.30	130
300	0.75	75

250	0.51	51
200	0.33	33
150	0.18	18
100	0.08	8
80	0.05	5
50	0.02	2

The use of liquid chlorine shall only be permitted when suitable equipment consisting of a solution feed chlorinator together with a booster pump of injecting the chlorine gas-water mixture into the pipeline to be disinfected is used. Introduction of chlorine gas directly from the supply cylinder shall not be allowed.

After completion of the disinfections operation for one pipeline section the Contractor may reuse this chlorinated water to disinfect adjacent sections of the pipeline by adding additional chlorine as required to produce the specified concentration of chlorine.

The Contractor shall submit a detailed description of the procedure he proposes to use to disinfect the pipeline including a description of all equipment to be used for the Engineer's Representative approval prior to starting the disinfections operations.

Payment for all labour, material, and equipment, including the cost of all water and chlorine required to disinfect the pipeline and appurtenances shall be included in the costs for meter run of the pipe.

The chlorinated water shall remain in each section of the pipeline for at least 24 hours and during this period all valves and blow-off shall be operated in order to disinfect these appurtenances. At the end of the 24-hour period, the water in the pipeline shall contain no less than 25 milligrams chlorine per litre throughout the length of the pipeline. Shall the pipeline fail to have the specified chlorine concentration at the end of the 24-hour period, the Contractor shall repeat the operation as necessary to provide complete disinfections.

FLUSHING OF THE PIPELINE

All pipelines shall be flushed by the Contractor after all hydrostatic pressure tests and disinfections operations have been performed and accepted by the Engineer's Representative.

Water for flushing the pipes shall be provided by the contractor as indicated under section – Disinfection of Pipelines.

After draining the chlorine solution the pipe system shall be flushed with potable water until the free chlorine content is between 2 to 4 milligrams per litre.

Valves and Accessories

General

Valves and accessories must conform to current EN standards, ISO standards or equivalent with respect to nomenclature, classification, symbols, and conditions of manufacturing, properties and tolerances, conditions for the preparation of specimen, test rules, identification labels and acceptance clauses.

Moulded pieces must have perfect outer surfaces without chips and must be finished by means of debarring or filing.

Connecting surfaces of all flanges have to be machined. Flanges must also have one or several circular grooves in order to facilitate grip. All surfaces which are subject to friction must be machined; bore holes in covers, blind flanges, and flanges which connect pipes have to be produced by means of drills. Manual precision grinding of valve seats and surfaces of sluice valves is required for purposes of stability and accuracy of shut-off elements.

Operating stems must be made of stainless steel. They must be machined complete with straight edges and show no defects or scarcity of material. Toric ring seals must be used for sealing.

Seal bush must be replaceable under pressure.

Manufacturer's marks, flow diameter and an arrow indicating flow direction must be visible on the device's outer surface.

Punched or forged special elements will have this information stamped upon them.

Before materials are accepted or used the Contractor may be required to supply the Supervisor with a sample piece of every hydraulic equipment, fitting, valve and accessory, etc.... that he wishes to install.

All shut-off devices shut in a clockwise sense. This will be indicated by 'O' (open) and 'C' (closed) with arrows either on the hand wheel or the head of a piece. Operation of shut-off devices must be easy both for opening and closing. All valves will be flanged.

The following nominal pressures are stipulated:

Table Error! No text of specified style in document.-4: Nominal Pressure

Nominal Pressure	Pressure Tes6t Body	Seat (Sealing)
10 bar	16 bar	10 bar
16 bar	25 bar	16 bar
25 bar	37.5 bar	25 bar
40 bar	60 bar	40 bar

Third Party Witness

The supplier shall furnish an original accredited certificate of conformity from the third party inspection agency showing all test results and analysis required by the applicable standard (EN 12266-1/2), where test certificates is required. The third party inspection agency shall under this contract, have witnessed the manufacture and testing operation to verify compliance with the technical specifications and the relevant standard. The third party inspection agency shall verify that all materials used are eligible for the relevant standard productions requirements. All certification should be from a certified and approved third party, and the certificates must be related to the same batch delivered to Miyahuna, all certificates must be valid and written in English.

Testing after delivery

All valves supplied to the site in Jordan shall be subjected to acceptance tests carried out by the Royal Scientific Society. Or similar accredited authority. Final inspection tests must be done in accordance with the test requirements of EN 12266-1/2. If any of the tests mentioned in the standards cannot be performed by the Royal Scientific Society then the supplier should provide a third party certificate for those tests taking into considerations all the statements mentioned in "third party witness" section.

All testing costs should be borne by the supplier in all cases.

Valves Packing and Protection

All valves must be packed in such a way to allow instant use on site without additional cleaning.

All valves shall be securely packed in crates and boxes to prevent damage during delivery. The cost of packing shall be deemed to be included in the Contract Rates and crates will not be returned.

Valves are normally supplied in separate cartons together with any associated small items, such as bolts and gaskets.

Identification

The supplier shall be responsible to ensure that each separate item, crate, or package has permanently attached to it, in a conspicuous position, an identification plate of weather - resistant material on which are engraved or stamped;

The Manufacturers Name.

Contents Description and Quantity.

Serial Number or Reference Number Identifiable on the Delivery Note and Cross Referenced to the Purchase Order Item References.

Weight.

The shipment containers shall be marked with the following address;

Jordan Water Co. – MIYAHUNA L.L.C.

Tender Number – Variable

In addition the container shall be marked with the following information;

Total gross weight.

Total net weight.

Packing list reference number.

Transport and Deliveries

The Contractor shall send to the Engineer, one-week advance notice of all consignments of materials. Every consignment shall be accompanied by a detailed delivery note.

The Contractor shall deliver to and off load the materials onto the storage area as directed by the Engineer. All materials delivered will be examined and inspected by the Engineer and taken over by him.

The Contractor shall provide necessary details to the shipping line on precautions to be taken during loading/unloading, handling & transport of the pipes & fittings and other components. Contractor shall provide to the Engineer a set of recommendations of manufacturer for handling, loading, unloading, transporting and storing of polyethylene pipes and fittings

The Contractor shall arrange reception and storage areas only. aslo shall be responsible for off-loading all materials.

The Contractor shall also be responsible for all handling and transport activities up to and from Miyahuna store-yard, Amman.(Materials provided by Miyahuna)

The (DDP) price shall include all costs relating to above-mentioned requirements.

Handling

Care shall be taken during loading, transporting, and unloading. Under no circumstances shall valves be dropped or rolled against one another. All valves shall be examined. Any damaged materials must be rejected by the Purchasers.

Details to be provided at the time of tender

1. Conformity to standard certificate from a certified third party.
2. Manuals and technical catalogues.
3. Dates of batches or consignment deliveries.
4. The supplier shall state which of the sections of the schedule of requirements he proposes to price and supply.
5. Any alternative standards proposed including demonstration of equivalency or superiority to the standard specified, if allowed.
6. Any alternative materials proposed including demonstration of equivalency or superiority to the standard specified, these alternative materials should be subjected to the clients approval.
7. Where the supplier offers alternative standards, materials to those specified, the supplier shall provide prices for those specified and the alternatives proposed.
8. The supplier shall include in his price for the training elements related to the materials he proposes to supply and shall list the elements of training offered, if needed or requested.

9. The supplier shall provide prices for the equipment applicable to the sections of the schedule of requirements he intends to price.
10. The supplier shall provide full details of his materials tests and procedures.
11. Any alternative proposed specification for combined tracer and marker tape.
12. ISO or EN certification for management and product.
13. CV's of proposed training staff, if necessary.
14. Costs of Trainers expenses, if requested.
15. Training program, if requested.

Manuals and Technical Specifications.

The supplier shall supply full technical specifications for the items to be supplied at the time of tender. In addition he shall provide full instruction manuals, which describe the correct methods and procedures necessary to construct the pipeline system in accordance with best practice. Conformity to standard certificate must be supplied at time of tender where this certificate must be issued from a certified third party and valid up to date.

Additional Services

The supplier shall provide details of additional services, which he can provide e.g. technical advice and support and, in particular, shall state his capability for supporting the project in the Amman location at the time of tender.

Ball Valves

Technical specifications Ball Valve specifications

1. General

1.1 Ambient Conditions

All valves and their accessories shall be in every respect suitable for storage, installation, use and operation in the conditions of temperature, humidity and The PH and water quality appertaining in Jordan.

Where the valve must withstand the following conditions:

- Liquid : Chlorinated , 3-5 ppm, potable water
- Working Temperature: Reaches up to 40° C

Atmospheric temperature in Jordan varies between -10°C and 50 °C.

1.2 Potable Water Certification

All valves shall be certified for potable water use, and all valves and their accessories should be certified as safe for being use for potable water by an independent testing laboratory.

All material in contact with or likely to come into contact with water for public supply shall be introduced with the requirements of BS 6920 (suitability for nonmetallic products for use in contact with drinking water) or any equivalent standard and the requirements of EN 15664 (influence of metallic materials on water intended for human consumption) or any equivalent standard as well as the Jordanian standard (JS 286/2008) and the World Health Organization standard (WHO), and whenever the regulation is changed it is the supplier responsibility to ensure conformity with any new requirements.

Potable water certificate submitted must be submitted at time of tender. Certificates must be in English. Offers without potable water certificates will be rejected.

1.3 Toxic Materials

Valves, their protective coatings and accessories, that will or may come into contact with potable water shall not constitute a toxic hazard, shall not support microbial growth, shall not cause taste or odour, cloudiness or discolouration of the water and shall contain no ingredients that may migrate into water in amounts that are considered to be toxic or otherwise dangerous for health .

Non toxicity certificate should be provided.

1.4 Third Party Witness

The supplier shall furnish an original certificate from third party inspection agency showing all test results and analysis required by the applicable standard (EN 12266-1/2), where test certificates is required. The third party inspection agency shall under this contract, have witnessed the manufacture and testing operation to verify compliance with the technical specifications and the relevant standard. The third party inspection agency shall verify that all materials used are eligible for the relevant standard productions requirements. All certification should be from a certified and approved third party, and the certificates must be related to the same batch delivered to Miyahuna, all certificates must be valid and written in English.

The supplier must submit at least 3 different international third party companies where Miyahuna will choose one of them.

1.5 Testing after delivery

All valves supplied to the site in Jordan shall be subjected to acceptance tests carried out by the Royal Scientific Society. Or similar accredited authority. Final inspection tests must be done in accordance with the test requirements of EN 12266-1/2. If any of the tests mentioned in the standards cannot be performed by the Royal Scientific Society then the supplier should

provide a third party certificate for those tests taking into considerations all the statements mentioned in “third party witness” section.

All testing costs should be borne by the supplier in all cases.

1.6 Valves Packing and Protection

- All valves must be packed in such a way to allow instant use on site without additional cleaning.
- All valves shall be securely packed in crates and boxes to prevent damage during delivery. The cost of packing shall be deemed to be included in the Contract Rates and crates will not be returned.
- Valves are normally supplied in separate cartons together with any associated small items, such as bolts and gaskets.

1.7 Identification

The supplier shall be responsible to ensure that each separate item, crate, or package has permanently attached to it, in a conspicuous position, an identification plate of weather - resistant material on which are engraved or stamped;

- **The Manufacturers Name**
- **Contents Description and Quantity**
- **Serial Number or Reference Number Identifiable on the Delivery Note and Cross Referenced to the Purchase Order Item References.**
- **Weight**

The shipment containers shall be marked with the following address;

Jordan Water Co. – MIYAHUNA L.L.C.

Tender Number – variable

In addition the container shall be marked with the following information;

- **Total gross weight**
- **Total net weight**
- **Packing list reference number**

1.8 Transport and Deliveries

- The supplier shall send to the Purchasers, one-week advance notice of all consignments of materials. Every consignment shall be accompanied by a detailed delivery note.
- The supplier shall deliver to and off load the materials onto the storage area as directed by the Purchasers. All materials delivered will be examined and inspected by the Purchaser and taken over by him.
- The supplier shall provide necessary details to the shipping line on precautions to be taken during loading/unloading, handling & transport of the valves and other components. Supplier shall provide to the purchaser a set of recommendations of manufacturer for handling, loading, unloading, transporting and storing of valves.
- The Purchaser shall arrange reception and storage areas only. The supplier shall be responsible for off-loading all materials.
- The materials shall be delivered to the Purchaser at **Miyahuna stores**, Amman or any other place chosen by the Purchaser.
- The supplier shall also be responsible for all handling and transport activities up to Miyahuna store-yard, Amman
- **The (DDP) price shall include all costs relating to above-mentioned requirements.**

1.9 Handling

Care shall be taken during loading, transporting, and unloading. Under no circumstances shall valves be dropped or rolled against one another. All valves shall be examined. Any damaged materials must be rejected by the Purchasers.

1.10 Details to be provided at the time of tender

- Conformity to standard certificate from third party
- Manuals and technical catalogues
- Dates of batches or consignment deliveries.
- The supplier shall state which of the sections of the schedule of requirements he proposes to price and supply.
- Any alternative standards proposed including demonstration of equivalency or superiority to the standard specified, if allowed.
- Any alternative materials proposed including demonstration of equivalency or superiority to the standard specified, these alternative materials should be subjected to the clients approval.
- Where the supplier offers alternative standards, materials to those specified, the supplier shall provide prices for those specified and the alternatives proposed.
- The supplier shall include in his price for the training elements related to the materials he proposes to supply and shall list the elements of training offered, if needed or requested.
- The supplier shall provide prices for the equipment applicable to the sections of the schedule of requirements he intends to price.
- The supplier shall provide full details of his materials tests and procedures.
- Any alternative proposed specification for combined tracer and marker tape.
- ISO or EN certification for management and product.
- CV's of proposed training staff, if necessary.
- Costs of Trainers expenses, if requested.
- Training program, if requested.

1.11 Manuals and Technical Specifications

The supplier shall supply full technical specifications for the items to be supplied at the time of tender. In addition he shall provide full instruction manuals, which describe the correct methods and procedures necessary to construct the pipeline system in accordance with best practice. Conformity to standard certificate must be supplied at time of tender where this certificate must be issued from a certified third party and valid up to date.

1.12 Additional Services

The supplier shall provide details of additional services, which he can provide e.g. technical advice and support and, in particular, shall state his capability for supporting the project in the Amman location at the time of tender.

2.1 Technical specifications

- Working pressure: 16 bar or higher
- Nominal Diameter: 1/2" , 3/4" , 1" and 2"
- The design of the ball valve must ensure completely clear of the waterway when valve is full open, in such away permitting a "full flow" throw the valve equal to the nominal pipe diameter.

2.2 Material

The Material of each part of the ball valve is shown in table 2.1 below.

Table 2.1 Materials

NO	PART NAME	MATERIAL
1	BODY	Stainless Steel : EN -10088-3-2 Or

		CW617N according to EN 12165:2011 EN 1982
2	BALL	CW617N according to EN 12165:2011 chromium plated Ball Or Stainless Steel : EN -10088-3-2
3	HANDLE	Steel or Aluminum

2.3 Design of valve

1. Full bore ball valve.
2. Two piece design.
3. Double female threaded in accordance with BS 21.
4. Lever operated.

2.4 Coating

Coating material if applicable must be suitable for potable water uses.

2.5 Marking

Markings shall be in accordance with EN 19 and shall include the following:

- Nominal Size.
- Working pressure.
- name of manufacturer,
- Year of manufacture.
- "Miyahuna".

For direct procurements order the marking is depends on the value of the procurements order.

Reference standards

Standard Number	Description
BS 6920	Testing of non-metallic components with regards to their effect of the quality of water
EN 15664	influence of metallic materials on water intended for human consumption
EN 12266-1	Industrial valves - Testing of metallic valves - Part 1: Pressure tests, test procedures and acceptance criteria - Mandatory requirements
EN 12266-2	Industrial valves - Testing of metallic valves - Part 2: Tests, test procedures and acceptance criteria - Supplementary requirements
EN 12165:2011	Copper and copper alloys. Wrought and unwrought forging stock
EN 10088-2	Stainless steels. Technical delivery conditions for sheet/plate and strip for general purposes

EN 10088-3	Stainless steels. Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes
EN 1982	Copper and copper alloys. Ingots and castings
EN 19	Marking of general purpose industrial valves

Gate Valve Specifications

1. General

1.1 Potable Water Certification

All valves and its coating materials shall be certified for potable water use and shall contain no ingredients that may migrate into water in amounts that are considered to be toxic or otherwise dangerous for health, All material in contact with or likely to come into contact with water for public shall introduced with the requirements of Jordanian standard (JS 286) Whenever regulation changed it is the supplier /contractor responsibility to ensure conformity with any new requirements. Whenever potable water certificate is submitted for the coating material not the valve, the supplier shall furnish a document that relates this certificate with the valve itself.

All valves shall be certified as safe for transporting potable water by an independent testing laboratory.

1.2 Toxic Materials

All valves, coating, sealing and lining material shall be certified for potable water use and shall contain no ingredients that may migrate into water in amounts that are considered to be toxic or otherwise dangerous for health. The Contractor is prohibited to import or to use any of toxic or poisonous materials or sub materials used in piping, kinds of concrete or in soil in any kind of usage.

1.3 Third Party Witness

1.3.1 General

The supplier/contractor shall furnish an original certificate from the third party inspection agency showing all test results and analysis required by the applicable standard according to which the materials have been manufactured. The third party inspection agency shall under this contract, have witnessed the manufacture and testing operation to verify compliance with the technical specifications and the relevant standard. All certification should be from a certified third party from the applied standard (**European Norm**) and approved by Miyahuna, and the certification should be valid up to date and it should be written in English, and it must be shown in the certificate which batch is being tested to make sure that this certificate is for the right batch.

1.3.2 Valves

No valve shall be accepted unless all type and batch release tests have been passed. The contractor also is required to submit **quality assurance certificates, standard compliance and witness test certificate, from third party from the applied standard (European Norm) and approved by Miyahuna**, that the components of the network must not be of any way toxic to the water being conveyed. And can be fully used for the distribution of potable water to a temperature up to 50° C.

Before dispatching the supplies another visual inspection shall be done in respect of proper packing and to certify the Bill of Lading for each shipment.

1.4 Testing at Place of Manufacture

The Contractor shall submit a certificate from the manufacturer certifying that all the items have been mill tested (at the manufactory) and those they have successfully passed the relative tests prescribed by the relative standards specifications.

1.5 Testing after delivery

Valves supplied shall be subjected to acceptance tests carried out by the Royal Scientific where Final inspection test must be done according to EN 12266-1/2

NOTE:

ALL COST TESTS BEFORE AND AFTER THIS ITEM AND WETHER LOCAL OR ABROAD SHALL BE BORNE BY THE CONTRACTOR AND THE COSTS SHALL BE INCLUDED IN THE TENDER UNIT RATES.

1.6 valves packaging

- All valves must be packed in such a way to allow instant use on site without additional cleaning.

- All valves shall be securely packed in crates and boxes to prevent damage during delivery. The cost of packing shall be deemed to be included in the Contract Rates and crates will not be returned.
- Valves are normally supplied in separate cartons together with any associated small items, such as bolts and gaskets.

1.7 Identification

The supplier shall be responsible to ensure that each separate item, crate, or package has permanently attached to it, in a conspicuous position, an identification plate of weather - resistant material on which are engraved or stamped;

- **The Manufacturers Name**
- **Contents Description and Quantity**
- **Serial Number or Reference Number Identifiable on the Delivery Note and Cross Referenced to the Purchase Order Item References.**
- **Weight**

The shipment containers shall be marked with the following address;

Jordan Water Co. – MIYAHUNA L.L.C.

Tender Number – variable

In addition the container shall be marked with the following information;

- **Total gross weight**
- **Total net weight**
- **Packing list reference number**

1.8 Documents to be provided at Time of Tender

1. Conformity to Standard certificate from third party. (EN 1074 / EN 1171)
2. Potable water certificate
3. The CONTRACTOR shall provide detailed repair manuals for the gate valves supplied;
4. Quality assurance certificate (ISO 9001).
5. Upon request, the Contractor has to provide test certificates from the manufacturer's internal quality control.
6. The supplier/ contractor shall supply full technical specifications and catalogues for the items to be supplied at the time of tender.

1.9 Documents to be provided upon delivery

The contractor shall submit at least the following documents:

1. Certificate of origin.
2. Packing list
3. Third Party certificates
4. Any other documents requested by the Engineer and the hand over committee

All above documents must be valid and in English.

1.10 Marking

Markings shall be in accordance with EN 19 and shall include size, working pressure, name of manufacturer, and year of manufacture.

2. Technical Specifications

2.1 General

1. Valves must be according to EN 1074 and EN 1171, conformity to standard certificate must be submitted at time of the tender.
2. All valves shall have flanged ends design. push-on joint submitted upon request.
3. The valve must be submitted with the following accessories :
 - Flanges
 - Gaskets
 - Bolts
 - Surface box
 - Hand wheel GG25

2.2 Material

Part Name		Material
body wedge and bonnet (10-25 bar)		Minimum ductile cast iron EN 1563- EN-JS1030- EN-GJS-400-15 (GGG 40) , or equivalent
		Minimum ductile cast iron- EN 1563- EN-JS1050 -EN-GJS-500-7 (GGG 50) , or equivalent
body wedge and bonnet (40 bar)		same body material as PN 16-25 could be used or "cast steel"
seat	Resilient seat	Wedge full lining with EPDM for water system for pressure less 16 bars. According to EN 1171.
	Metal seated	Non resilient seat (metal seat and wedge ring utilize welded of stainless steel for water system and resistant zinc free bronze for waste water system).
Valve stem(shaft)		<ul style="list-style-type: none"> ▪ shall be stainless steel from the following grades : • SS 420 (x20Cr13) (for potable water) • SS314,SS316,SS317(for raw water) <p>With 13% chromium according to EN10088-3 (ASTM –A352 CAGNM cold rolled thread) .</p> <ul style="list-style-type: none"> ▪ Outside screw stem and stem nut made of hard bronze with double o-ring sealing type for Non –rising stem .
Thread nut		Brass, bronze ,SS304,SS316. (SS-EN1982,SS-EN 12168, EN 10088-3)
Body Bolts		shall be electro-zinc plated steel with hex heads and hex nuts in accordance with, A2 SS-EN 10088-3

2.3 Design

1. Face to face dimension for the pressure range basic series 14 or 15 for PN 10 and PN 16. And basic series 15 for PN 25, PN 40.
2. Gate valve shall be flanged design on request according to EN 1092-1 for the Steel flanges, and in accordance with EN1092-2 cast carbon steel for pressure range (10-25)bar

3. ROTATION OF OPENING:

All valves shall open by turning to the left or counter clockwise, when viewed from the stem.

2.4 Coating

All internal ferrous metal surfaces shall be fully coated, blue color, holiday free, to a minimum thickness 250 microns epoxy coating. Side coating shall be non-toxic, impart no taste to water, and shall be coated in accordance with EN standards. The color is Blue and the grade code is RAL 5005 or RAL 5015, any other grade must be subjected to Miyahuna approval on time of tender.

Butterfly Valves

1. General

1.1 Potable Water Certification

All valves and its coating materials shall be certified for potable water use and shall contain no ingredients that may migrate into water in amounts that are considered to be toxic or otherwise dangerous for health, All material in contact with or likely to come into contact with water for public shall introduced with the requirements of Jordanian standard (JS 286) Whenever regulation changed it is the supplier /contractor responsibility to ensure conformity with any new requirements. Whenever potable water certificate is submitted for the coating material not the valve, the supplier shall furnish a document that relates this certificate with the valve itself.

All valves shall be certified as safe for transporting potable water by an independent third party.

1.2 Toxic Materials

All valves, coating, sealing and lining material shall be certified for potable water use and shall contain no ingredients that may migrate into water in amounts that are considered to be toxic or otherwise dangerous for health. The Contractor is prohibited to import or to use any of toxic or poisonous materials or sub materials used in piping, kinds of concrete or in soil in any kind of usage.

1.3 Third Party Witness

1.3.1 General

The supplier/contractor shall furnish an original certificate from third party inspection agency showing all test results and analysis required by the applicable standard according to which the materials have been manufactured. The third party inspection agency shall under this contract, have witnessed the manufacture and testing operation to verify compliance with the technical specifications and the relevant standard. All certification should be from a certified third party from the applied standard (**European Norm**) and approved by Miyahuna, and the certification should be valid up to date and it should be written in English, and it must be shown in the certificate which batch is being tested to make sure that this certificate is for the right batch.

1.3.2 Valves

No valve shall be accepted unless all type and batch release tests have been passed. The contractor also is required to submit **quality assurance certificates, standard compliance and witness test certificate, from a certified third party from the applied standard (European Norm) and approved by Miyahuna**, that the components of the network must not be of any way toxic to the water being conveyed. And can be fully used for the distribution of potable water to a temperature up to 50° C.

Before dispatching the supplies another visual inspection shall be done in respect of proper packing and to certify the Bill of Lading for each shipment.

1.4 Testing at Place of Manufacture

The Contractor shall submit a certificate from the manufacturer certifying that all the items have been mill tested (at the manufactory) and those they have successfully passed the relative tests prescribed by the relative standards specifications.

1.5 Testing after delivery

Valves supplied shall be subjected to acceptance tests carried out by the Royal Scientific where Final inspection test must be done according to EN 12266-1/2

NOTE:

ALL COST TESTS BEFORE AND AFTER THIS ITEM AND WETHER LOCAL OR ABROAD SHALL BE BORNE BY THE CONTRACTOR AND THE COSTS SHALL BE INCLUDED IN THE TENDER UNIT RATES.

1.6 valves packaging

- All valves must be packed in such a way to allow instant use on site without additional cleaning.

- All valves shall be securely packed in crates and boxes to prevent damage during delivery. The cost of packing shall be deemed to be included in the Contract Rates and crates will not be returned.
- Valves are normally supplied in separate cartons together with any associated small items, such as bolts and gaskets.

1.7 Identification

The supplier shall be responsible to ensure that each separate item, crate, or package has permanently attached to it, in a conspicuous position, an identification plate of weather - resistant material on which are engraved or stamped;

- **The Manufacturers Name**
- **Contents Description and Quantity**
- **Serial Number or Reference Number Identifiable on the Delivery Note and Cross Referenced to the Purchase Order Item References.**
- **Weight**

The shipment containers shall be marked with the following address;

Jordan Water Co. – MIYAHUNA L.L.C.

Tender Number – variable

In addition the container shall be marked with the following information;

- **Total gross weight**
- **Total net weight**
- **Packing list reference number**

1.8 Documents to be provided at Time of Tender

1. Conformity to Standard certificate from third party. (EN 1074 / EN 593)
2. Potable water certificate
3. The CONTRACTOR shall provide detailed repair manuals for the valves supplied;
4. Quality assurance certificate (ISO 9001).
5. Upon request, the Contractor has to provide test certificates from the manufacturer's internal quality control.
6. The supplier/ contractor shall supply full technical specifications and catalogues for the items to be supplied at the time of tender.

1.9 Documents to be provided upon delivery

The contractor shall submit at least the following documents:

1. Certificate of origin.
2. Packing list
3. Third Party certificates
4. Any other documents requested by the Engineer and the hand over committee

All above documents must be valid and in English.

1.10 Marking

Markings shall be in accordance with EN 19 and shall include size, working pressure, and cast arrow to indicate direction of flow, name of manufacturer, and year of manufacture.

2. Technical Specifications

2.1 General

1. Butterfly valves may be used on water mains 8 inches and larger.
2. butterfly valves shall be of the tight closing, metal seat type with recess-mounted and securely fastened to the valve body or attached to the valve disc. Directions of flow shall be satisfactory for applications involving valve operation after long periods of inactivity.
3. Valve discs shall rotate 90 degrees from the full open position to the tight shut position.
4. **Double eccentric design**

2.2 Material

Part Name	Material
Body and cover	Ductile cast iron EN 1563- EN-JS1030- EN-GJS-400-1
Sealing disk lever	ductile cast iron EN 1563- EN-JS1030- EN-GJS-400-15 (GGG 40)
Shaft	Min X20Cr13(1.4201), SS304,SS316.according to (EN 10088-3)
Thread nut	Brass, bronze, SS304, SS316. (SS-EN1982,SS-EN 12168, EN 10088-3)
Bolts	shall be electro-zinc plated steel with hex heads and hex nuts in accordance with, A2 SS-EN 10088-3

2.3 Design

1. Face to face to EN 558-1, basic series 14.
2. Flanged accordance to EN 1902-2.
3. Flanged connection to DIN 2501.
4. Soft sealing
5. Glands shall be O-ring
6. Valves shall be suitable for installation in either horizontal or vertical position.

2.4 Coating

All internal ferrous metal surfaces shall be fully coated, blue color, holiday free, to a minimum thickness 250 microns with a two part thermosetting epoxy coating. Said coating shall be non-toxic, impart no taste to water, and shall be coated in accordance with EN standards. The color grade is RAL 5005.

Air Valves

Single Air Release Valve

Air Valves shall be single automatic air valves, PN 16, operation pressure PN 0.1 – 6 bars and 1-16 bars, with body/bonnet of special plastics or Ductile Iron according to EN-GJS-400-18 / EN-JS 1030, or equivalent, according to EN 1563 (GGG400 - DIN1693).

Air and Vacuum Valve

The air and vacuum valve shall be able to automatically exhaust large quantities of air during filling of a pipeline. The valve shall automatically close when water fills the valve and remain closed while the system is pressurized but open automatically to admit air during draining or a negative pressure condition. Safe operation even under high-volume, high-speed venting up to sonic speed;

The valve shall be with a venting orifice no smaller than the nominal valve size.

The float ball shall be spherical and made of stainless steel grade 316.

All Internal parts shall be made of stainless steel grade 316.

Shall be of the triple function type with a flanged inlet to EN 1092-2 PN 16 (or 10) (DIN 28605 / DIN 2501/BS 4504) and shall be suitable and approved for the use with potable water at a nominal working pressure from 1 to 16 bar.

Body and cover shall be of ductile iron EN-GJS-400-18 acc. to EN 1563 (GGG 400 - DIN 1693) and shall be inside and outside epoxy powder coated complying in general with DIN 30677 part 2, coating thickness shall be minimum 250µm, freedom from imperfections shall be tested by high-voltage method.

Orifice and float balls shall be of corrosion free material (stainless steel or plastic), all seals shall be of EPDM or NBR suitable and approved for potable water.

Automatic Air Valve, Single-Chamber Type

The Automatic Air Valve shall combine the operating features of both an air and vacuum valve and an air release valve in one house. The air and vacuum valve portion shall automatically exhaust large quantities of air during the filling of the pipeline and automatically allow air to re-enter the pipeline when the internal pressure of the pipeline approaches a negative value due to column separation, draining of the pipeline, or other emergency. The air release valve portion shall automatically release small amounts of air from the pipeline while it is under pressure. Safe operation even under high-volume, high-speed venting up to sonic speed;

The valve shall be with a venting orifice no smaller than the nominal valve size.

The float ball shall be spherical and made of stainless steel grade 316.

All Internal parts shall be made of stainless steel grade 316.

The seat shall be replaceable and made from Buna-N rubber or other suitable elastomer compounds suitable and approved for potable water.

Single-chamber valve directly operated by the medium;

Two-orifices venting system with 3 functions (supply and release of air as well as automatic venting during operation);

Safe operation even under high-volume, high-speed venting up to sonic speed;

With test and purge connection;

Body and cap made of ductile cast iron EN-JS 1030 (GGG-40);

Inner parts made of stainless steel grade 316 (DN 50 float made of plastic);

Seal made of EPDM.

Equipped with inspection valve.

Corrosion Protection:

Inside and outside with epoxy coating to GSK standards for heavy-duty corrosion protection to DIN 30 677-2, coating thickness >250 µm, colour: RAL 5005 blue

Washouts

The types of Washout specified for this Contract, whether in concrete chambers or buried type, are as shown on the drawings. All Washouts shall be constructed as indicated on the drawings or as instructed by the Engineer.

If the flow cannot be discharged by gravity, flooded-manholes can also be constructed opposite the concrete wash-out chambers within the road corridor. Additional excavation and backfilling works shall be included in the unit rates of the washout.

The lengths of washout discharge lines may vary according to the location requirements on site and shall be agreed with the Engineer's Representative prior to installation. Discharge lines shall be paid for as per unit rates of pipelines included in the Bills of Quantities.

At place shown on the drawings or directed by the engineer, wash-outs shall be installed as follows:

- a. For ductile iron main pipeline, the Contractor shall install a suitable flanged tee (T) to install the flanged washout valve. The branch shall be ½ of diameter of the main pipe diameter.
- b. The washout shall have gate valve installed directly at the branch from the main pipe with all fittings and accessories as per drawings.
- c. The wash-out pipes shall be extended to such a length and reach discharge area as is required for every particular site condition as not to flood the trenches or cause any damage to the surrounding area. In case no Wadi is available a flooded-manhole shall be constructed at the nearest road.

The unit rate washout pipe work shall include for the outlet structure and riprap, as shown on the standard drawings, unless noted otherwise.

Pressure Gauges

Pressure gauges shall be installed at all pressure reducing valves upstream and downstream of the valve and at selected strategic points in the distribution system for monitoring pressure fluctuation. They shall be of the bourdon tube type with sensor (for positive and negative pressures). All moving parts shall be of stainless. The dial face diameter shall be 160 mm and the accuracy class 1.6. The gauge must be suitable for a pressure range up to 16 bars.

The installation of the gauge shall be complete and shall include the connecting fittings to the main pipe, the gauge inlet pipe with 3 way cock and screwed joints.

Dismantling Joints

Dismantling joints shall be installed where indicated on the drawings for convenient installation or re-installation of valves or similar items.

For prevention of any movement of the pipe joints adjacent to closed valves, dismantling joints shall be provided in general by restrained dismantling pieces (short version) or flanged adaptors as indicated on drawings or as directed by the Engineer.

Body and glands of steel welded dismantling pieces shall be capable of standing a working pressure of 16, 25 and 40 bars (according to the final design performed by the contractor and approved by the engineer) with bolts and nuts of stainless steel. The surface protection shall be epoxy powder coating. Rubber sealing rings made of Perbunan material, nitrile rubber or equivalent quality shall be used and shall be suitable and approved for the use with potable water.

Spare Flanges, Flange Adaptors, Couplings, Restrainer Clamps

All spare flanges, flange adaptors and couplings shall be made of ductile iron GGG or GG shall comply with DIN equivalent ISO Norm and EN-GJS-400-18 / EN 1563. Flanges shall conform to the dimensions and drillings of the DIN 2501 / EN 1092-2 - PN 16.

All flanges and couplings shall be epoxy powder coated according to ISO14901 or to DIN 30677 Part 2, coating thickness shall be minimum 250µm, freedom from imperfections shall be tested by high-voltage method and shall be suitable and approved for the use with potable water.

Seals shall be made of EPDM or NBR suitable and approved for potable water.

Restrained Flanges shall have a grip ring of steel for DI and ST pipes and a grip ring of Ms 58 (CuZn36Pb3) for uPVC pipes.

Wide range coupling or flange adaptors for Asbestos Cement / DI connections as indicated on the Drawings and in the Bill of Quantities.

Couplings shall be made of Steel, epoxy powder coated, with sealing rubber rings and lock-head bolts.

For connection of the existing to the new pipeline system, flexible couplings shall be installed as indicated on the drawings or as directed by the Engineer.

PRESSURE TESTING

HYDROSTATIC PRESSURE TESTING OF DI PIPES

After completing the installation of a water main, or a section of the line, and before the joints are covered, a hydrostatic test of the line shall be made by the Contractor. A sufficient time for the curing of concrete thrust blocks must be allowed before the test is made. All backfilling and compaction over and around the pipes and thrust blocks must be completed except for the pipe joints to be left open for observation of any leaks, before the test is made.

In accordance with EN 805, pipelines have to undergo an internal pressure test. The definitive criteria for performing this test on water pipelines are EN 805 and the DVGW's worksheet W 400-2.

Test sections

If necessary, longer pipelines should be divided into sections. The test sections should be arranged so that the

- test pressure is reached at the lowest point of every test section;
- at the highest of point of each test section at least 1.1 times the level of the system test pressure is reached;
- the amount of water required for the pressure test can be supplied and drained off; and
- the maximum length to be tested does not exceed 2.5 – 3 km.

The pipeline should be vented as well as possible with 'pigs' and filled from its lowest point with drinking water.

Backfilling and interlocking

If necessary, pipes must be covered with filling material before the pressure test to avoid any changes in length. Backfilling the connections are optional. Pipelines that are not longitudinally force-locked must be anchored at their ends, bends, branches and reducers against the forces produced by the internal pressure. Assessment of the supports needed for this purpose should be done as per specifications.

There is no need for supports on longitudinally force-locked systems, provided that in each case the lengths to be restrained have been installed in compliance with the specifications.

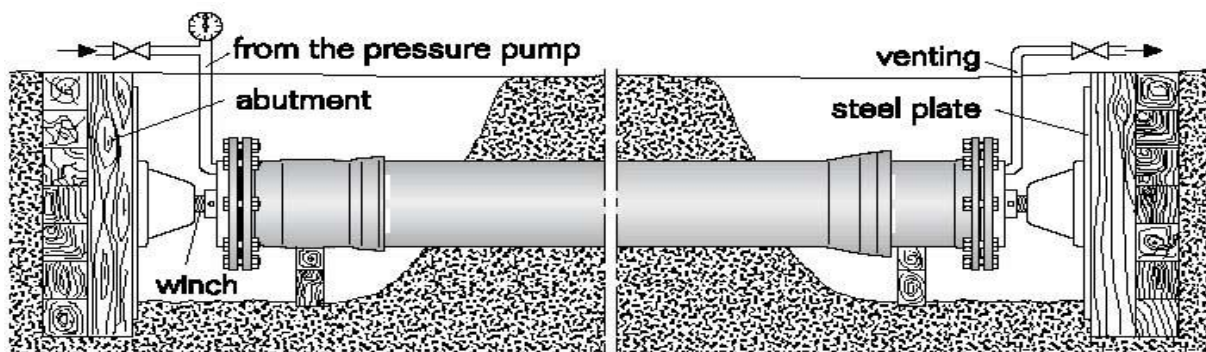
Squeezing against a closed shut-off valve serves no purpose. The temperature on the outer wall of the pipe should be kept as steady as possible and must not exceed 20°C.

Filling of the Pipeline

For drinking water pipes, initial disinfection should be carried out along with the pressure test. This requires a concentration of at least 50 mg of chlorine per litre of water. Depending on how dirty the pipeline is, the level of chlorine can be increased to 150 mg per litre of water. The relationship of the volume of water added to the increase in pressure can give a clue to any leaks or insufficient venting. As the pressure increases, the rate of water consumption should therefore be noted bar by bar.

Where a line has been laid and is vented properly, the amount of water that needs to be pumped per bar of increased pressure is almost constant. Taking into account the compressibility of water and the elastic property of the pipe, it is (theoretically) c. 50 ml/m³ pipeline content/bar. In practice, this figure is around 1.5 to 2 times higher, as trapped air in the fittings and pipe and fitting connections has to be compressed.

The table indicates the amounts of water required in liters per 1 bar of increased pressure for pipeline lengths of 100 up to 1,000 m, assuming a 100% extra allowance for trapped air.



Filling the pipeline

The pipeline should be suitably filled from its lowest point so that the air contained within it can easily escape at the venting points, which should be adequately large in size, on the high parts of the line.

We recommend the following rates of filling in l/s:

DN	100	150	200	250	300	400	500	600	700	800	900	1000
Fill rate	0.3	0.7	1.5	2	3	6	9	14	19	25	32	40

DN	Amount of water in litres for 1 bar of increased pressure, by pipeline length (m)									
	100	200	300	400	500	600	700	800	900	1000
80	0.05	0.09	0.14	0.19	0.24	0.28	0.33	0.38	0.42	0.47
100	0.07	0.13	0.20	0.26	0.33	0.39	0.45	0.52	0.59	0.65
125	0.12	0.24	0.36	0.48	0.60	0.72	0.84	0.96	1.05	1.20
150	0.18	0.35	0.53	0.70	0.87	1.05	1.22	1.40	1.54	1.75
200	0.32	0.64	0.97	1.28	1.60	1.93	2.25	2.55	2.90	3.20
250	0.52	1.04	1.57	2.10	2.60	3.15	3.65	4.20	4.70	5.20
300	0.78	1.56	2.35	3.15	3.90	4.67	5.45	6.25	7.05	7.80
(350)	1.06	2.12	3.20	4.25	5.30	6.38	7.43	8.50	9.55	10.60
400	1.44	2.90	4.30	5.80	7.20	8.65	10.10	11.55	13.00	14.40
500	2.35	4.70	7.05	9.40	11.80	13.10	16.20	18.80	21.10	23.50
600	3.45	7.00	10.50	14.00	17.15	21.00	24.50	28.00	31.50	35.00

Performing a pressure test

The following procedure for carrying out a pressure test on ductile cast iron pipes is described in DVGW 2:

W 400-

- Standard method (for all DN, with and without CM lining)

- Shortened method procedure (up to DN 600, with CM lining)

We describe below the two most frequently used methods: **the standard method and the shortened procedure.**

The level of test pressure in both procedures is as follows:

- For pipelines with allowable operating pressure of up to 10 bar:

1.5 x nominal pressure

- For pipelines with allowable operating pressure of over 10 bar: Nominal pressure + 5 bar.

The standard method for DI pipes

The standard method is carried out in three stages:

- Preliminary test
- Pressure loss test
- Main test

Preliminary Test

The purpose of the preliminary test is to saturate the Cement Mortar (CM) lining and to stretch the pipeline. To do this, the test pressure is kept constant for a period of 24 hours by permanently pumping in more air as and when required. If any leaks are found or any changes in length occur beyond what is allowed, then the pressure must be released from the pipeline and the cause remedied.

Pressure loss test

The purpose of the pressure loss test is to establish freedom of air movement in the pipeline. Air pockets in the pipeline can lead to incorrect measurements and/or cover up small leaks.

A sufficient volume of water (ΔV) is drawn off from the line until a drop in pressure (Δp) of at least 0.5 bar materialises. The volume of water (ΔV) drawn off is then measured. The test pressure is subsequently restored.

The pipeline is deemed to be adequately vented if ΔV is not greater than the allowable change in volume (ΔV_{zul}). If this is not the case, the line must be vented again.

ΔV_{zul} is calculated as follows:

$$\Delta V_{zul} = 1.5 \times a \times \Delta p \times L$$

ΔV_{zul} = allowable change in volume [cm³]

Δp = measured drop in pressure [bar]

L = length of the tested section [m]

a = pressure constants that distinguish the type of pipe [cm³/(bar x m)]

→ see following table

DN	a	DN	a
80	0.314	400	9.632
100	0.492	500	15.614
125	0.792	600	23.178
150	1.163	700	32.340
200	2.147	800	43.243
250	3.482	900	55.679
300	5.172	1000	69.749
(350)	7.147	1200	103.280

Main Test

Following the pressure loss test, the main test is then carried out. The duration of the test is as follows:

Up to DN 400	3 h
DN 500 up to DN 700	12 h
over DN 700	24 h

The test criteria are deemed to have been met if at the end of the test the drop in pressure is not greater than specified below:

Nominal Pressure	Test Pressure	Max. Pressure loss.
10	15 bar	0.1 bar
16	21 bar	0.15 bar
over 16	PN + 5 bar	0.2 bar

Test Report

A test report should be produced. Templates for test reports are included in DVGW worksheet W 400-2. These contain the necessary details such as:

- Description of the line
- Test details
- Description of the test procedure
- Findings during the test
- Check note

The shortened standard method for DI pipes

The advantage of the shortened standard method is largely one of enormous savings in time. The time required is approx. just 1.5 hours

The shortened standard method is carried out in three stages:

- Saturation stage
- Pressure loss test
- Leak test

Saturation level

In order to achieve a high level of saturation, the test pressure is kept constant for half an hour by permanently pumping water. The key factor for saturation is first and foremost the level of test pressure. Unduly low pressure cannot be compensated for by prolonging the saturation level.

Pressure loss test

The purpose of the pressure loss test is to establish freedom of air movement in the pipeline. Air pockets in the pipeline can lead to incorrect measurements and/or cover up small leaks.

At test pressure, a volume of water (ΔV) is drawn off from the pipeline. The resultant drop in pressure (Δp) is measured. In the subsequent leak test this becomes the allowable pressure loss (Δp_{zul}). Following the pressure loss test, the test pressure is restored.

ΔV_{zul} is calculated as follow:

$$\Delta V_{zul} = (DN \times L) / (100 \times k)$$

ΔV_{zul} = allowable change in volume [cm^3]

L = length of the tested section [m]

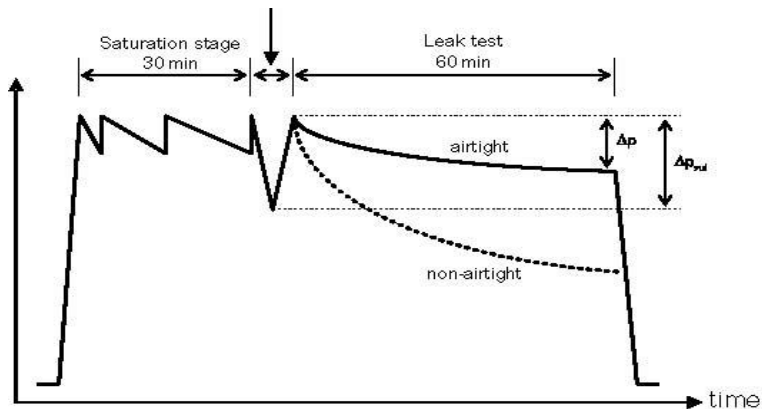
100 x k = proportionality factor, k = 1 m/cm^3

The pipeline is deemed to be adequately vented if when drawing off the volume of water ΔV_{zul} , the drop in pressure is greater than or equal to the minimum levels specified for Δp specified in the table below.

Nominal DN width	Minimum pressure loss Δp [bar]
80	1.4
100	1.2
150	0.8
200	0.6
300	0.4
400	0.3
500	0.2
600	0.1

Leak test

The pipeline is deemed to be air-tight if the fall in pressure (Δp) goes down at a constant rate over equal periods of time and over the duration of the leak test does not exceed the level ascertained (Δp_{zul}) in the pressure loss test. The duration of the test is one hour.



Example of the curve progression of an airtight and a non-airtight pipeline with cement mortar lining

Test Report

A test report should be produced. Templates for test reports are included in DVGW worksheet W 400-2. These contain the necessary details such as:

- Description of the line
- Test details

- Description of the test procedure
- Findings during the test
- Check note

Stop Ends

A simple TEST END (Test facility) consists of a standard FG flanged-spigot pipe made of DI according to standard length for each diameter (about 0.5-1.0m long) onto which a threaded flange with a 2" (DN50) opening for accommodating ingoing water and out coming air.

The TEST END may also include an opening through which the test water may be pumped from the line, if necessary. The test end shall be jointed to the pipe to be tested by means of a standard coupling (e.g. VJ Coupling) or two spare flanges.

The Test End shall be secured with a temporary anchorage to hold it in place against the test pressure.

Air Removal before Test

Before applying the test pressure, all air shall be expelled from the pipe. After all the air has been expelled, all stop cocks shall be closed and the test pressure applied as specified above. The line shall be filled slowly to prevent possible water hammer.

Examination during Test

All exposed pipes, fittings, valves, hydrants and joints shall be carefully examined during the pressure test. All joints showing leaks shall be rejoined until tight, or the pipe material replaced.

Any defective pipes or joints, fittings or valves discovered as a result of this pressure test shall be repaired or removed and replaced by the Contractor at his own expense with sound material and the test shall be repeated until proved satisfactory to the Engineer's Representative.

Cost of Testing

The Contractor shall provide a sufficient quantity of gauges, pumps, stop ends, and connections and all things necessary and suitable for the testing of all pipes as described herein. The Contractor shall also provide all necessary temporary works in connection with test, and shall remove the same on successful completion of the test.

All tests shall be done in the presence of the Engineer's Representative (Resident Engineer) and the results of such tests shall be elaborated in a test report and signed by the Contractor and Resident Engineer and handed over to the Resident Engineer. Payment according to schedule for pipe laying is based on such reports.

All equipment, labour, materials, and water necessary for the carrying out of these tests to the complete satisfaction of the Engineer shall be provided by the Contractor at his own expense. Shall any test fail, the Contractor shall, after repairing and making good any leaks, carry out further tests all as described above until such test meets the requirements contained herein. All such tests and retests shall be at the expense of the Contractor.

PRESSURE TEST OF HDPE PIPES

Pressure inspection in accordance with the contraction method

The test procedure shall be carried out according to EN805:2000 in up to three steps:

- preliminary test;
- pressure drop test;
- main pressure test;

Preliminary test HDPE Pipes

The pipeline shall be divided into practicable test sections, completely filled with water and vented. After that the pressure shall be raised continuously and quickly (in less than 10 minutes) to the system **test pressure (STP) at the lowest point shall be fixed at 16 bars.**

Maintain STP for a period of 30 minutes by pumping continuously or at short intervals. During this time carry out an inspection to identify any obvious leaks.

Allow a further period of 1 h without pumping during which the pipeline may stretch by visco-elastic creep. Measure the remaining pressure at the end of this period.

If the pressure has decreased by more than 30%, interrupt the preliminary phase and depressurize the test section. Check the test conditions e.g. influence of temperature, indication of leakage, and rectify the defaults. Only resume the test procedure after a relaxation period of at least 60 minutes.

Pressure drop test HDPE Pipes

Reduce rapidly the remaining actual pressure measured at the end of the preliminary phase by discharging water from the system to produce a Δp of 10-15% of STP. Measure precisely the removed volume ΔV . Calculate the allowable water loss ΔV_{max} using the following formula and check that the removed volume ΔV does not exceed ΔV_{max} .

$$\Delta V_{max} = 1,2 \times V \times \Delta p \times (1/EW + D/e \times ER)$$

Where

ΔV_{max} is the allowable water loss in litres;

V is the volume of the tested pipeline section in litres;

Δp is the measured pressure loss in kilopascals;

EW is the bulk modulus of water in kilopascals;

D is the internal pipe diameter in metres;

e is the wall thickness of the pipe in metres;

ER is the modulus of elasticity of the pipe wall in the circumferential direction in

kilopascals; 1,2 is an allowance factor (e.g. for air content) during the main test phase;

For the interpretation of the result it is important to use the exact value of ER considering the temperature and the duration of the test. Especially for smaller diameters and shorter test sections Δp and ΔV should be measured as accurately as possible.

If ΔV is more than ΔV_{max} interrupt the test procedure and vent again after the pipeline has been depressurized.

Main test HDPE Pipes

The visco-elastic creep due to the stress caused by STP is interrupted by the integrated pressure drop test. The rapid decrease of the pressure leads to a contraction of the pipeline. Observe for a period of 30 min (main test phase) the increase of pressure resulting from the contraction. The main test phase is considered to be successful if the pressure curve shows an increasing tendency and does not decrease at any time of this 30 min period. If during that period the pressure curve shows a falling tendency, it indicates a leak within the system.

In case of doubt extend the main test phase to 90 min. In that case the pressure loss is limited to 25 kPa from the maximum value occurring within the contraction phase. If the pressure drops by more than 25 kPa the test fails.

Rectify any defect in the installation revealed by the test and repeat the test. The repetition of the main test phase may only be done by carrying out the whole procedure including the relaxation period of 60 min in the preliminary phase.

SURVEY and EARTH WORKS

SURVEYING, PIPE and NODE LOCATING and MARKING

surveying, pipe and node locating and marking includes as follows:

- Surveying,
- Pipe and Node location with electronic equipment, and trial pits
- Marking and recording of the route of the existing and new constructed pipeline, valves, interconnections, etc.

Any surveying works shall be borne by the contractor as per engineer's instructions .

Cleaning and leveling the site -:

The cleaning and leveling work for the mentioned sites includes removing the rubble to the places determined by the competent authorities. The general view after cleaning and leveling should be acceptable to the engineer. The work includes plowing the land, trimming trees, removing weeds and rubble, removing the old fence and columns, and cleaning the site., And Manahlo leveling and supplying red agricultural soil where necessary or supplying selected materials and doing all that is necessary according to the engineer's instructions.

Tile works

The tile work includes the supply and installation of new tiles, after the leveling is done with tamping under the tiles and the work of a concrete span (minimum fracture strength 210 kg / cm² after 28 days) with a thickness of not less than 100 mm provided that it is provided with a metal grille whose bars size is 10 mm every 200 mm In both directions, and that the leveling is sprayed with water before concrete is poured. The work includes the supply and work of a mortar for installation, grouting and glazing of tiles and mechanical smoothing, according to the specifications and instructions of the supervising engineer.

As for the size and type of tiles, they are according to what is mentioned in the table of quantities and according to the instructions of the supervising engineer and specifications.

Painting works :

Painting work for metal surfaces includes cleaning the surface from rust and any other foreign materials manually or automatically, rubbing and checking with putty, then smoothing and coating the surfaces immediately after cleaning with a base paint and after the base coat is painted with a lining layer (Under coats) And the epithelium layer (Finishing Paints) Three faces .Taking into account that the color of the lining layer is consistent with the color of the epithelium layer, and the manufacturer's instructions for applying the epithelium layer are taken into account regarding the recommended lining layer paint .All works are according to the specifications and instructions of the supervising engineer .

The smoothing works include scraping and checking with the putty, then smoothing, and then painting the surfaces that will be painted with a layer of lining .(Under coats) and the epithelium layer (Finishing PaintsThree faces .Taking into account that the color of the lining layer is consistent with the color of the epithelium layer, and the manufacturer's instructions for painting the epithelium layer are taken into account regarding the recommended paint of the lining layer .And all work must be done according to the specifications and instructions of the supervising engineer .

Taking into account the following :

The quality and colors used shall be according to the approval of the Engineer .

During the painting process and until it is completely dry, the contractor must put warning signs made of metal or plastic and written in a clear handwriting and with the approval of the engineer .

Painting works for wooden surfaces include etching and checking with putty on both sides, edging and smoothing each side, and coating the surfaces with a lining layer .(Under coats) and the epithelium layer (Finishing PaintsTwo faces .Taking into account that the color of the lining layer is consistent with the color of the epithelium layer, and the manufacturer's instructions for applying the epithelium layer are taken into account regarding the recommended lining layer paint .All works are according to the specifications and instructions of the supervising engineer .

The new doors must be painted after cleaning and burning the contract with basic paint.

Excavations and earthworks :

1. Leveling excavations and foundations shall be carried out until the solid rock or to the layer that bears the weights distributed on it, according to the engineer's discretion and to the level specified by the engineer .
2. The contractor shall regularly level the excavations for the foundations of the walls and the floor at a horizontal level without any inclination and in a manner commensurate with the shape of the foundations of the walls and floor .
3. The contractor shall take on his own responsibility the support of the sides of the excavations (cutting places) that are prone to collapse by means of wooden supports and pillars that have sufficient strength and durability to prevent collapse, and he does not pay any premium for that. The costs are considered included with the individual prices of the excavation

works and any collapses that occur in The foundations, whatever their cause, the contractor must remove them at his own expense.

4. The contractor must keep the soil for the foundations dry, and if it becomes clear that there is water from any source, such as sewage, torrents, cesspits, underground water, or otherwise, he must secure the pumping of this water and dry its places well, and he does not pay any premium for that. Costs are included with the individual prices for excavation works.
5. The contractor is solely responsible for any impact or damage that affects the neighboring works of buildings, streets or any part, whether permanent or temporary, due to carrying out excavation works or how to dispose of its products. It happens like this and he must take all necessary measures to prevent any damage or slippage at his own responsibility.
6. If, as a result of the experiments on the soil layers during the excavation process, it becomes clear that there is no necessity to make any basic modification to the foundation plans, the contractor must make these modifications without being entitled to ask for any premium or difference in the prices between the schedule of quantities, even if this modification requires an increase in quantities Excavations and concrete foundations.
7. It is never allowed to start pouring concrete with the foundations before they are inspected by the supervising engineer. Therefore, the contractor must inform the engineer sufficient time in advance to be able to attend and conduct an inspection on the foundations and take written approval for the pouring.
8. The contractor shall keep the resulting materials that are necessary and suitable for the backfill works and transfer the surplus directly outside the site, provided that when keeping these materials, it is taken into account not to break roads or obstruct traffic.
9. It is not permissible to backfill around the foundations except after the engineer has inspected them and taken measurements and made sure that they were actually implemented according to the plans and specifications, and then the engineer gives a written approval for the backfilling. The approval of the engineer, even if the parts he filled in was found to have been executed according to the conditions and specifications
10. The contractor shall fill in the collapsed parts or that he is digging in excess of the specified depth with ordinary concrete, the cubic meter of which contains (200) kg of cement.
11. Upon reaching the required foundation levels on the plans, the contractor shall ,at his own expense, verify the bearing capacity of the soil and its suitability for the design work according to the plans. It is included in the bid items prices

Concrete works:

Concrete works include **providing and pouring ready-made concrete .Manual mixing is not allowed on site** with a minimum fracture strength as mentioned in the table of quantities. The price includes making structural joints, shrinkage joints, excavations, restoring conditions, bricks, anchors, supply and installation of teardrops, and the price does not include rebar. Unless it is stated otherwise in the bill of quantities, all work must be done according to the specifications and instructions of the supervising engineer, taking into account the following:

A- Mechanical vibrators must be used when pouring all types of regular or reinforced concrete to obtain concrete free of gaps or nests. The type of vibrators and the duration of shaking shall be determined by the engineer. 5000) shake per minute and the shaker is used according to the specifications.

The bricks should be sturdy to withstand vibrations without causing any defects, and the bricks should be attached to each other so that the cement slurry does not leak from them.

The proportion of water in the mixtures should be in the quantities that give flexible concrete according to the rules and according to the quantities determined by the laboratory during implementation. Soft concrete is not accepted so that the cement slurry does not leak with the excess water quantity.

The period of shaking should not exceed the scheduled time so that the concrete elements do not separate.

Never allow tower blocks or rebar.

The vibrator is used regularly at points that are not far from each other more than the diameter of the circle affected by the shaking.

B- Concrete must be kept wet for a period of no less than (7) days.

C- It is prohibited to start pouring concrete without obtaining the engineer's written approval, and the contractor must submit a written request to obtain approval for pouring before a period of not less than 24 hours.

D- The contractor shall abide by the implementation of what is stipulated in the general technical specifications regarding concrete in hot and cold climates and according to the instructions and approval of the engineer.

E- In order to control the quality of the concrete materials and mixtures, the contractor shall conduct the necessary laboratory tests for the materials in accordance with what is stated in the general technical specifications and to check the concrete mixtures periodically as follows:

For each casting phase, if the casting is in intermittent phases, six cubes are taken and examined, three after a week and the remaining three after 28 days, according to the opinion of the supervising engineer.

f- The contractor shall submit the schedules for the implementation of the rebar plans .Bar - Schedule Binding (indicating the lengths and weights of the reinforcing iron for the representative of the engineer for the purpose of approval before implementation.

G- If the nature of the soil, after verifying its bearing capacity, necessitates an amendment to the levels of the excavations or their dimensions by increasing the depth or width, or both, the contractor must implement this, provided that he bears in mind that he implements these works and has no right to object or request an increase in prices.

H- Digging works: The contractor shall supply silt from outside the site from selected materials approved by the engineer, and the silting shall be done on layers not exceeding a thickness of 20 cm, with water spraying and tamping with mechanical devices until the necessary level is reached.

i- The selected materials used for sloughing shall be of suitable and approved materials, free of residues and impurities, graded to obtain the required degree of compaction, and shall not contain stones or pieces of concrete whose size exceeds (50) mm in any direction and the content of plasticity shall be) Plasticity Index (Less than (10) according to British Standard No. (1377), and the maximum dry density of it is more than (1.6 g / cm³) according to the standard Proctor examination of density. The work of supplying and tamping materials for excavation is considered to be included in the excavation works unless otherwise indicated .

j- The contractor shall not pay the excavation allowance for working distances .Working Space And that its costs are considered included in the individual prices of concrete works, unless otherwise indicated.

K- It is not allowed to pour concrete from a height of more than 1.5 meters, and concrete must be lowered when the height exceeds that with gutters to the places of pouring.

L - Reinforcing steel must be lifted from the brickwork before concrete is poured by 2.5 . concrete molds x 2 cm, provided that it is poured before using it for a period of not less than 20 days, and a wire is fixed in the middle of these molds when casting to connect them with iron. Its prices are included with the individual prices of reinforced concrete works.

Cement - :

The cement used for all concrete and mortar works must be Jordanian Portland or foreign Portland in conformity with the British Standard Specifications for Portland Cement / or Jordanian Portland Pozzolanic Cement in conformity with the Jordanian Standard Specifications No. MQ 1933/214/6 .and the amendments thereto, unless otherwise stated in the bill of quantities.

Gravel and sculptors-:

The gravel and sculptor used in concrete works must be in conformity with the Jordanian Standard Specifications No. M.S.C 6/96/1993 with the modifications that have been made to it and resulting from the crushing of hard, hard limestone free of dust, water-soluble and organic materials or Any other harmful substances that affect the strength of concrete or the organic matter or any other harmful substances that affect the strength of concrete or the reinforcement iron in the future. So that the size is gradual between sieve size (one inch) and sieve number (four), and fine graded is supplied between sieve number (four) and sieve number two hundred, and the contractor, before supplying gravel and sand intended for use in concrete works, must bring samples from them to the engineer The supervisor to approve it or, if necessary, to send it to the materials laboratory for analysis and indication of its suitability for use in concrete and mortar works .The mixing ratios are to be given the greatest strength with an appropriate degree of operation. The mixing ratios must remain constant and

these should be repeated whenever the source of the materials used changes and whenever the engineer deems it necessary.

Natural sand-:

The texture should be rough and free from organic matter, salts, dust and all materials that affect the durability of concrete and steel reinforcement. Samples should be sent to the laboratory to determine its suitability for use and determine the best mixing ratios to give the greatest strength with an appropriate degree of operation.

Rebar- :

The supply and installation of reinforcing materials to the site with the types, lengths, diameters and degrees of strength required to ensure proper implementation of the reinforcing work and with the least possible connections. It shall be required before commencing with the armament works, knowing that the approval does not absolve the contractor from bearing full responsibility for the armament works. Also, the reinforcing materials must be cleaned of rust and any other materials, and the armaments should be installed and fixed in their correct positions and linked well using binding wires, supports, chairs and spacers. It is forbidden to pour concrete before taking the engineer's written approval, and all work must be done according to the specifications and instructions of the supervising engineer.

Framework-:

The brickwork must exactly match the dimensions and shapes required according to the concrete that will be poured into it, according to the detailed plans. That the slabs of bricks are adjacent to each other, so that the sump does not leak from them.

The contractor is solely responsible for the safety of the block and for every malfunction and damage that may occur as a result of not bearing it. The supervising engineer has the right to inspect the block and request additional supports or ties if he deems it necessary, but this does not absolve the contractor from full responsibility for the safety of the block and the engineer is not responsible for any Malfunction or damage caused.

In all cases, the surface of the block must be flat, free of corrugation and close together so as to prevent the flow of the slurry from it.

The vertical supports must be of sufficient number and sections to bear the loads that fall on them and in the form that the contractor deems fit, provided that the supervising engineer approves them.

The contractor shall ensure the work of sturdy and wide scaffolding and walkways of wood to ensure the progress of work and the carts to transport the concrete during pouring without causing any damage to the rebar or changing its position.

The brickwork must be completely cleaned before starting to pour the concrete, and the necessary arrangement must be made for this in the work of the walls and columns by leaving suitable holes for the cleaning process, and the brickwork must be sprayed with water well before starting to pour the concrete.

The brickwork must be made for reinforced concrete in parts that can be dismantled each part separately without the occurrence of vibration or any damage to the other parts.

Side panels for walls (three days after pouring the last part)

Side panels for columns or bridges (after three days)

Ceiling tiles whose width does not exceed 4 meters after 15 days.

Plastering Works - :

Providing all materials necessary for plastering works, labor, and the price, including metal corners, mesh slats, and all that is completely needed to complete the work according to the specifications and instructions of the supervising engineer.

Inner floor:

The interior plaster works from three aspects as follows:

The first side (nail - splatter) _____ -:

It works with a thickness of not less than 5 mm of cement and sand in a ratio of 1: 2 in order to form a rough surface and spray with water for two days. The second face works two days after the completion of the first face.

The second side (rough - lining):

Prayers are made on the walls in the form of vertical rulers with a width of (0 1) cm extending from the floor to the ceiling, with a spacing of two meters between the rulers.

The thread is used to control the deposits at distances exceeding 5 meters, then fill between the deposits and complete the plastering so that it is taken into account that it is (3-5) mm less than the face of the door rings, and this face is grooved with rulers in width and height to ensure the cohesion of the second face with it .The mortar for this face is made of cement and sand in a ratio of (4:1) and its thickness ranges between 10 and 15 mm .This face is left to dry and watered with water for two days so that it remains wet.

The third side (the smooth - the epithelium), which is the final face of the plaster :

Work with a thickness of (3-5) mm above the second face with a mortar of cement and sand in a ratio of (1:4), provided that fine silica sand is used with this face at a percentage of.(%50)

Polish this face after drying with a trowel and a palm of felt, so long as the plaster is level horizontally and vertically and wipe with the door rings and so that no roughness appears on this face.

-The outer shell:

The external plaster of the walls works with three faces according to the specifications of the internal plaster, but the mortar is in a ratio of 3:1 for the lining layer and 4:1) for the epithelium layer.

The works of Shabriz - :

Shabriz spray works wherever required after the lining as a third face and it is of white or ordinary cement and powder of hard white limestone (quartz) in a ratio of 3:1 and the addition of coloring pigment according to the instructions of the manufacturer and it must conform to British Standard Specifications No .(BS1014)And sprayed with a special machine.

The spray should be consistent with each other in terms of thickness, roughness and appearance, and its thickness should not be less than 3 mm .The colleagues work in places, in the corners and wherever required so that they are of the required width and in straight lines without any zigzags, then the spray is watered for a period of (3) consecutive days continuously.

plastic pipes UPVC -:

Providing and installing rainwater gutters with filters of sieved wire, simplified iron, metal cleats, and all the necessary pieces and all that is completely needed to complete the work according to the specifications and instructions of the supervising engineer .

Pipes must be of medium caliber (Medium Grade) It conforms to British Standard No(BS 3505) As for the delivery parts, they are according to specification No (BS 4346).

These pipes are connected after cleaning the ends, rinsing them and sanding them with sandpaper using special adhesive. Solvent Cement/

Slanting and roof insulation works:

First, a period of inclination to the surface shall be worked for the concrete layer shall not be less than 0 3 mm at the point of the minimum thickness of concrete whose fracture shall not be less than 150 kg / cm² and the cement content shall not be less than 200 kg / m³ and it shall be given sufficient inclination to the direction of the gutters for the water to flow easily and so that its percentage shall not be less than ½% The period must be free of any concavity so that the water does not collect in pools. The edges of the normal concrete work in the periods of inclination when they meet the walls, tilted at least 45 degrees from the horizontal and at a height of not less than 100 mm. It is necessary to complete the work according to the specifications and instructions, And the approval of the supervising engineer.

Metal Works - :

The supply and installation of doors includes a gas cylinder of the finest local types, and oil paint in a blue color with three faces, and all that is needed to complete the work according to the specifications and instructions of the supervising engineer.

the doors:

- *1* They are made of peephole sections, and iron sheets are pressed on these sections, with a thickness of (2) mm on each side. The internal crossbars are used to ensure durability and no lining. The door is fixed by three bolts on each side, so that the bolt section is not less than $(.30) \times (3\text{mm})$ and a length of about (15) cm. With a movable glass space $0.30 \times 0.60\text{NS}$. The price includes one cylinder of the finest local types, three-sided oil paint, and all that is completely needed to complete the work according to the specifications and instructions of the supervising engineer.

- *2* Doors of tubes cut (8×4) cm, the thickness of the iron sheet is (1.5) mm, double-sided, and the price includes the hinges and the installation of cylinders and handles of the best types, and the glass is plain or lined, 6 mm thick for the space, and the installation of protection grilles for silverware from iron Simplified section (8×16) mm and oil paint has three faces except for the foundation and two sides with all that is needed in full to complete the work to the fullest extent and according to the specifications and instructions of the supervising engineer

Manufacture is done by sound technical methods, where the welding must be organized and hidden, all welding lines must be cooled and polished, and no signs of knocking appear, and joints must be tight without leaving gaps, excess or protrusions from the welding material or sawn iron filings. .

- 3 Rolling doors) Rolling Doors(

Such as the doors used for stores and shops ... etc., the doors must be made of metal strips, open and close manually, and the plates used must be galvanized steel and conform to the British Standard Specifications (BS 2989) And (BS 3083) Taking into account that the weight of the galvanizing layer shall not be less than (380) grams / square meter.

- be caliber) Gauge (Galvanized steel plates proportional to the width of the door so that it is not less than #20US Gaug The thickness is 0.812 mm.

- The side ducts for rolling doors shall be made of galvanized steel sheets or steel, with a thickness of not less than (1.5) mm and a depth of not less than (100) mm, and equipped with steel strips to resist friction during the operation of the door.

- Providing doors with terminal clamps Endlocks) made of forged iron (Malleable Iron. (

- The spring used to move the door is of a helical type, the safety of which is not less than 25%, and it is attached to a winding shaft) Shaft (A metal of sufficient thickness to secure the necessary stiffness, so that its deflection does not exceed (1.5) mm for each metrological part. This and the doors shall be provided with two end springs and an additional one for each (2.0) meters" of the door's width.

- Provide the bottom edge of the doors with a tape connected to a tubular section made of vinyl or rubber, in order to prevent the entry of dust, moisture and the like when closing those doors, and it is required that these tapes be easy to replace when damaged.

- The doors should be provided with two locks on both sides of the door of the type that locks more than two cycles and with the approval of the engineer, and the doors must be provided with latches (latches) of the type that suits the purpose and it is allowed to put an external lock inside its hole. The doors are also provided with handles and special openings to lift and close the doors manually.

- Fixing the side ducts to the walls by means of special hook clips, provided that the distance between the clip and the next should not be more than (0.6) m for the ducts buried inside the walls. As for the side ducts installed on the surfaces of the walls, they are fixed by screws, so that the diameter of these screws is not less than (9.5) mm and the distance is not more than

Between the nail and the next for about (0.6) m.

Rolling doors shall be painted with no less than two sides of foundation paint suitable for the purpose, then with no less than two sides of foundation paint suitable for the purpose, and then with no less than two sides of acrylic backing paint and the desired color.

Aluminum works:

Aluminum works include providing and installing aluminum windows with a coating of no less than (18) microns using Y60 sections. x 90mm for the shelf, as well as the provision of a mobile sifter with the use of a fiberglass or aluminum sieve with the installation of 6 mm thick glass, galls, chrome pieces, brushes, skimmers, silicone, and non-rusting metal pellets, one of the best types, with the provision and installation of all that is needed in full To complete the work as per the specifications.

Brick work:

Supply, provision and construction of cement brick walls according to the thickness mentioned in the table of quantities, and the fracture resistance is not less than 35 kg / cm² after 28 days. Reinforcing steel and all that is completely necessary to complete the work according to the specifications and instructions of the supervising engineer .

Taking into account the following:

Brick walls are built using slate and scale over a layer of mortar of uniform thickness .And adjust the straightness of the walls using the thread.

The construction must be continuous at approximately the same height, so that the height of any part of the wall does not exceed the rest of the parts, or the height of any part of two perpendicular walls is more than 400 mm than the rest of the parts, and the height of what is being built per day must not exceed 1.2 meters.

Tiles that fall on the ground during construction should not be reused.

Fill the ends of the vertical walls when they are connected to the ceiling with care, leaving no space unless special details are mentioned on the plans or according to the instructions of the supervising engineer .

When two brick walls meet, the courses must engage offset.

After completing the construction of brick walls, it must be sprayed with water for one day and in the way it deems appropriate.

Electrical works:

-1Introduction

The individual prices for electrical installation works include all materials, connections and works to complete the works according to the rules and to the fullest extent and according to the plans, specifications, instructions and approval of the engineer.

1-1The price of the main distribution panel includes securing the entrance to the power cable according to (the requirements of the electricity company or the electricity authority) and the approval of the engineer, including feeding the panel with electric current from the nearest source. The price also includes all the necessary materials and works.

2-1All main board circuit breakers are cast type).MCCB And according to the approval of the supervising engineer.

3-1A suitable and appropriate duct shall be made under the main panel for the passage of cables.

4-1The main board must have special flaps that can be removed, closed and opened easily, according to the requirements of the supervising engineer and the concerned party, or according to the plans and specifications mentioned below.

- 2The price of the lighting unit, lampposts, bells, etc., includes all pipes, wires, switches, lamps, edgings, cans, as well as drilling, chandeliers, working hands, etc., and all that is needed to complete the work in full. From the plate feeding point to point.

-3All electrical works are carried out in accordance with the general technical specifications issued by the Ministry of Public Works and Housing in 1985, the third volume, with any appendices or amendments issued to date regarding works not mentioned in the specifications for the tender mentioned below.

- 4The contractor must submit catalogs, models and samples for various electrical works to the supervising engineer so that they do not conflict with the works of the bid, in order to obtain approval on them before supplying them to the site and using them.

-5All extensions are hidden unless otherwise stated explicitly in the bid specifications, bill of quantities or drawings

- 6The electrical works should not conflict with other works, and in the event that the electrical installations intersect with the sanitary installations or the central heating extensions, the electrical installations must be above the other extensions and at a distance as per the engineer's directions.

-7Wires and cable lines are assembled and arranged in distribution boards by means of special plastic clips, and their assembly with adhesive tape is prohibited.

- 8The implementation must be excellent with regard to extensions and installations.

-9The work is carried out on the basis of the proper operation of all electrical circuits after the completion of implementation.

- 10The plans, conditions, repairs, specifications and tender documents are considered one and indivisible unit and they must all be taken into consideration.

-11Not to change the implementation contrary to the plans and conditions without the approval of the supervising engineer, and all materials and lighting units are subject to the approval of the supervising engineer.

-12These special specifications are a description of what will be included in the bid if it is found within the plans or the schedule of quantities (and if there is in the drawings and/or the schedule of quantities what is required other than what is here, the drawings shall follow at that time) and with the approval of the engineer.

-13Grounding system -:

- The contractor shall implement a grounding system so that the ground resistance does not exceed 5 ohms, unless otherwise indicated in the drawings or the table of quantities, and the cross-sectional area of the copper wire connected to the main distribution panel is at least equal to the cross-section of one of the wires, the phases of the main panel feeding cable, and not less than 10 mm² The grounding system is connected to the main board and, accordingly, to all electrical points according to the diagrams

- The cross-section of the grounding wires for any electrical device or point (excluding an electrical device ,a lighting unit.....) must not be less than the area of the cross-section of the phase wire feeding this point, and its color should be green or yellow and green together (
- When executing the earthing system from making the necessary pit using wedges, nets or copper plates and from earthing wires from the pit to the building) in accordance with the soil layer in the site, and the written approval of the supervising engineer must be obtained with his testimony to do this and when using materials to improve the conductivity of the ground (salt) For example) these materials must be far from the land network without direct contact with it, and the specifications of public works must be applied in this regard, and what was mentioned above is considered the minimum required
- And the contractor must bring a ground measuring device and check the grounding system to prove its success before and upon receipt

- 20 Interior lighting extensions and ledges - :

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1Lighting distribution panel LDP It has a metal body and a metal cover that is recessed into the wall. It contains a main circuit breaker with electrothermal and magnetic protection, two poles for single-phase panels and three poles for three-phase panels (if the diagram does not indicate the number of poles) of the type)MCCB (and a number of sub- circuit breakers of the same type for lighting circuits, sockets, etc., in number, nominal current, and power of the engineer's instruction section.

-2Wire clips for single-phase Abyss circuits (Phase + N + E) Not less than 4 mm² insulated stranded copper (PVC) Excellent kind.

-3Section of the lighting circuit wires (Phase + N) With ground, if mentioned elsewhere, or on the drawings, not less than (2.5) mm² insulated stranded copper (PVC (of the excellent type and according to the specifications BS 4607.

4Extension inside walls and ceilings shall be inside flexible or rigid plastic pipes (unless otherwise indicated in the drawings) according to the approval of the engineer, and their extension shall be vertical and horizontal in the walls and not diagonally or inclined.

- 5The inner diameter of any extension pipe must not be less than (20) mm, and the number of wires inside any pipe must not exceed (6) wires, and in the case of using pipes with an inner diameter (25) mm, the number of wires must not exceed (5) Provided that the cross-section of any wire does not exceed (6) mm², and in the case of using pipes with an internal diameter of less than (20) mm, the number of wires should not exceed (5) wires in any case with a cross-sectional area of not more than 4 mm² and otherwise, the written consent of the engineer is taken

- 6Every circuit, regardless of its type, must have enough towing boxes for pulling and ramming (and following up on future faults), and their number for each circuit is determined by the engineer according to reality (in writing) if their number is not specified in the plans. In any case, the number must not be less than (2)) for each circuit and implement which one is more.

- 7The drawers in corridors and drawers shall be square or rectangular (not circular) and shall have dimensions of not less than (10 x 10) cm (if not mentioned otherwise) and according to the directions of the engineer and with a metal cover (fixed with screws and wiped with walls after plastering). (.

- 8The drawer boxes inside the rooms can be circular, provided that these boxes are for room service only and not for more than one room, meaning that the circuit enters it from the outside and does not return from it or from the room to another room, otherwise it must be like the previous item (square or rectangular) and have covers fixed with screws and wipe with the walls as well

-9All wires when accessing devices, circuit breakers, switches, etc., and inside the junction boxes, must be loose, of excessive length, and not tight.

- 10The single-phase light switches inside rooms, corridors and staircases shall have a capacity of (10) amps of the original magic type and stamped with this or molded on the same pieces (not a sticker), unless otherwise stated in the specifications or plans.

-11 The monophasic sockets are three-pole (Phase + N + E) (of the same type of switches, and the current of the mains (10-15) amps if it is not mentioned on the drawings.

-12 The lighting circuits are fed by their own independent circuit breakers (MCCB) in the lighting distribution panel (LDP) (with a current capacity of (10) amps and a cutting capacity of (5-10) kV .a . If it is not mentioned in the drawings.

-13 The socket circuits are fed by their own independent circuit breakers (MCCB) in the lighting distribution panel (LDP) (with a current capacity of (10) amps, and a cutting capacity of (10-15) kV .a . If it is not mentioned in the drawings.

-14 It is forbidden to interfere with feeding circuits of sockets, lighting and others, that is, they must not feed the other at all.

-15 All single-phase spigots shall be earthed and connected to the grounding system with an insulated copper grounding wire of no less than (4) mm² or as the wire feeding the brim, whichever is greater .The grounding wire shall be taken from the lighting distribution board, and the color of the grounding wire shall be uniform for all the sockets and different in color (green or green and yellow together) (from the rest of the other colors of the wires for the tie and phases.

-16 The colors of the phase wires are of a special color that is different from the colors of the other wires.

-17 The colors of the tie wires shall be Neutral (Uniform with a special color that differs from the colors of other wires, such as blue, for example.

-18 The height of the fenders of the forces, telephones, bells, etc., shall be at a height of (40-50) cm from the tiles and equally for all the eaves, except for those located directly near the doors, which shall be at a height of (1.5) meters.

-19 Junction boxes and their covers, lighting units, distribution panels and anything to be fixed on walls and ceilings shall be fixed by plastic wedges and iron screws. It is strictly forbidden to use other wedges such as wood or wires.

-20 It is strictly forbidden to lay under floors, and if necessary, after the prior written approval of the supervising engineer, provided that this is done with galvanized metal pipes and for electricity, especially (Banser) and according to specifications .BS4566 Its inner diameter shall not be less than (20) mm, with a number of wires not exceeding (5), and with blunt elbows .Bend A soft item with a large curvature) with the presence of towing boxes directly before and after entering the floor, on the directly opposite walls at the lowest possible point.

- 21 Feed the plate (L.D.P) By means of a cable feeding from the nearest source approved by the supervising engineer ,hidden under the ground and the walls inside a pipe whose inner diameter is not less than two and a half times (2.5) the outer diameter of the cable, and as a minimum, its nominal diameter must not be less than (1.5) inches. Galvanized metal and copper cable. Isolated tab PVC.

-22 All the apparent extensions over the walls shall be galvanized metal, including the boxes and their covers, with a diameter of not less than (3/4") in any case or more according to the modifications and conditions mentioned in this section and it applies to the number of wires What applies to pipes PVC The interior is under the walls for all kinds of extensions, whatever their type, such as lighting, boilers, eaves, other panels etc .The locations of connecting pipes to devices and boxes must be tightly secured with nuts from the inside and outside. Flexible metal pipes can be used (and sometimes must) with the approval of the engineer, especially in the installation of boilers when they enter the engines or devices according to the situation.

-23 The suspended fluorescent lighting units consist of a metal body painted in glossy white color with two lighting tubes (2 x 40) watts or according to the scheme with a reflector on both sides (or according to the scheme) with all its accessories ready for lighting and one hanging from the ceiling by: Either number (2) Strong galvanized tracks with a length of not less than (1) meter for each track or two (2) pipes fixed to the ceiling by means of a simple metal rosette fixed to the ceiling with screws and with the unit by means of a tooth and an internal and external nut and a length of not less than For (1) m, whichever shall be carried out according to the plans or the engineer's directives, and the cable coming down from the ceiling for the unit (2 x 2.5) mm² stranded copper, double insulated, not single, affixed to one of the tracks or the two pipes, according to the drawings.

- 24 The ceiling-mounted fluorescent lighting units are of the same specifications as the units in the previous item, but they are fixed

On the ceiling or wall by means of plastic wedges and (4) sheet metal screws, according to the plans.

-25 Ordinary outdoor incandescent lighting units that are not under a canopy are located inside a rain-tight body protected by a galvanized metal grid fixed to the ceiling or wall by means of plastic wedges and screws or according to the plans and a lamp (100 watt bulb).

-26 The internal incandescent lighting units suspended from the ceiling shall be suspended by a cable (item for 2 x 1.5) mm 2 insulated copper PVC Covered with a cloth fabric with a length of (1) m and installed on the ceiling with a rose (baldakhin), and the pendulum ends with a sukkah and a lamp (bulb 100) watts, according to the plans.

-27 Ordinary indoor incandescent lighting units installed on the wall or ceiling (according to the plans) are a club with a milky or transparent bottle with a diffuser and a base fixed on the wall or ceiling with iron screws and plastic wedges with a lamp (bulb) capacity (100) watts.

-28 All other details mentioned on the drawings must be taken into account.

-29 It must contain a plate) L.D.P (Numbering of all wires entering and leaving the circuit breakers and in accordance with their plans and numbering of the breakers in a way that is fixed on the cover of the panel from the inside to know which direction feeds the required cutter and attach the new scheme numbered according to the implementation number (3) and put it in the panel.

-30 In any case, the above-mentioned extensions must have a vacuum factor for all types of pipes of no less than 40%, meaning that it is possible to add half the number of existing wires without emptying these pipes.

-31 The lighting units for the chlorination rooms shall be as in the plans in terms of capacity and installation, but from a plastic body and a transparent acrylic cover, and the unit is of a type that is water- and dust-proof) IP 55. (

External lighting extensions - :

1 The external lighting circuit(s) is fed from the lighting distribution board .LDP (Omen the operation panel and control the external lighting(CB LO) according to the diagrams.

2 External lighting circuits are three-wire) 1 Ph + N + E (In the case of lighting poles (mercury, for example), whether they are wall mounted on walls or perpendicular to the ground in streets and sidewalks, or in the case of ordinary wall or ceiling external incandescent lighting units with a metal body (according to specifications and text) or metal displays from the contractor It requires the entire grounding wire.

3 The cross-section of each of the power circuits for external lighting shall be (3 x 2.5) mm² at least, insulated stranded copper .PVC wires or cables) and that is also for the column lighting unit or according to the plans.

- 4 The main cable feeding the external lighting panel from the main distribution panel from the switch specified by the engineer in the adjacent main panel. It is a cable or wires (4 x 4) mm² insulated stranded copper .PVC (Unless stated otherwise in the drawings, it shall have priority, with the main panel connected to the external lighting panel with a grounding wire (1 x 4 mm²) insulated .PVC (Also.

- 5 The reinforcing wires of the cables entering the column or the box are tied together after they are entered and connected with the column or the box (if the cable is armed).

- 6 The outdoor lighting units shall be as mentioned in the plans.

- 7 All necessary extensions above walls or surfaces (for photovoltaic cells, for example) shall be inside metal tubes of at least (4/3") diameter, well fixed and well connected at distances not exceeding (1/2) meters, and inspection boxes with metal covers on A distance of no more than (5) meters and at the corners as well

- 8 The method of controlling the external lighting (according to the drawings) and as follows:

1- 8 Ordinary control: by means of a key / ordinary keys (like the rest of the room keys, for example) with one or two directions .Double Direction (and according to the plans.

2- 8 Automatic control: This is by means of a photocell .pc - photo cell) (or as mentioned in the drawings) and connected with the control system for external lighting to the external lighting control box, and all control wires are in a section of (1.5) mm² insulated stranded copper) .PVC The photovoltaic cell is fixed on the roof of the building on a galvanized metal pillar from an angle or section U or I Size 60 mm welded on a square metal base installed) Measuring 200 x 200 x 3 mm on the surface with (4) screws .Rawll Plug. (

3 - 8 control box for external lighting) .Out Door lighting Control Box - OLCB The external lighting control box shall be visible metal (measurement 30 cm high x 5 3 cm width x 15 cm depth) approximately and its location (or its components inside another control panel) according to the drawings with a thickness of (2) mm, painted inside and outside in a color (gray or Blue (and fixed to the wall with screws (RP (or (4) sheet screws, and the box shall have protection .IP 54 And it has a normal manual lock with an external hand without a key and contains the following:

- cut MCCB) Molded Case Circuit Breaker (Electromagnetic mains for external lighting circuits with a capacity of 15 amps, 500 volts, 3 phases similar to the circuit breaker feeding this circuit in the lighting distribution board (according to the diagrams (

Attractive cutter (complementary) Contactor With a nominal thermal current capacity of not less than (15) three-pole amperes .3p 400) volts and two auxiliary contacts(1 NO + 1NC . (

A three-position selector switch on the case cover with an indication panel for these modes:

M -for direct manual operation mode(Manual (without a photocell.

O To put off.

A To put the automatic operation by the photocell according to the schemes.

- Indicator lamp of green, red and orange color according to the plans.

- Numbering and labeling of internal wires - power and control - and installed devices and label plates engraved on plastic screwed to each of the external devices on the lid of the box.

Numbering all lighting units connected to the system on these units by making a blue face plate and white background size (4 x 7 cm) engraved with the column number, for example :A1, A2..... And so for the rest of the columns according to a number for each column, and each panel is fixed to each column longitudinally with a number of screws (2) above and below the panel, and at a height of (180 cm) from the ground.

Scheme (3 copies) showing the system extensions - for power and control - placed inside the box.

Install all the devices inside the box on metal ducts to facilitate their dismantling and installation.

Sanitary works - :

The sanitary works include all water and sewage installations, all bathroom parts, washbasin, nigara, and faucets. The work also includes providing and installing a 1 meter or 2 meter galvanic tank, 1.25 mm thick, etc., and providing all that is completely needed to complete the work. According to the specifications and instructions of the supervising engineer and conduct the necessary tests.

Extension works of external sewage lines must be carried out according to the specifications of the Water Authority for sewage lines. The price includes excavations, settlement, extension, insurance, re-dumping, transferring the surplus of excavations to places determined by the competent authorities, constructing manholes, linking to the main network, and providing all that is needed in full. To complete the work according to the specifications and instructions of the supervising engineer and to conduct the necessary tests, including checking the concrete, checking the water pressure of the lines and all the necessary tests.

Sewer line extension works :

The contractor's work includes, for example, but not limited to :

Excavations in all types of soil as required by the work and linking to the existing lines.

-Supplying and installing pipes and supplying materials for repainting, restoring the conditions to what they were and removing the debris, according to the general plans and specifications of the sewage lines - the Water Authority and according to the instructions of the supervising engineer.

Providing and pouring any concrete works, constructing fountains of all kinds, supplying and installing manhole covers, and salt-resistant cement must be used without any price premium.

Putting warning signs and following the general safety requirements

-The contractor shall take the necessary measures for public safety and reinforce the walls of the excavations with the necessary backfill without any price increase.

-The contractor shall take the necessary measures for the safety of all workers on the site and provide them with all necessary equipment and clothing for this without any increase in prices.

Underground facilities :

The contractor must take into account the clauses in the general specifications that relate to the contractor's responsibility to locate and maintain the buried underground facilities and installations. Damages caused to these facilities and facilities, the contractor must repair them at his own expense in accordance with the relevant clauses in the contract and according to the engineer's instructions.

Fence works - :

-The fence is made of iron poles (I BEAM) (I It is fixed to the ground vertically every three meters, on which a galvanized net is tightened, in addition to the inclined part at the top of the fence columns to install the barbed wire. An iron gate is also made of galvanized pipes with a galvanized mesh strip installed on reinforced concrete poles. All works must be in accordance with specifications, plans and instructions of the engineer and as indicated. Below -:

-Metal grille :

It shall be made of galvanized wire with a diameter of 3 mm and with square holes measuring 5. X 5cm.

-Fence poles :

Fence poles shall be of iron (I BEAM) . 100 gauge X 50mm and in the length indicated on the plan, they are fixed in the ground perpendicularly at distances not exceeding (3) meters and are fixed in the ground in 50-gauge pits X 50 with a depth of 65 cm by means of ordinary concrete with a minimum fracture strength of not less than 150 kg / cm² after 28 days. The corner columns are supported in the three directions according to the plans and instructions of the engineer, as well as the fence is supported every 4 columns in two directions from the inside.

-Tension wires :

Galvanized tension wires with a diameter of 3 mm are installed on the columns and are tightened well and are at the top, middle and bottom of the columns and are fixed on them with a galvanized wire thickness of (2) mm inside the pre-prepared holes on these columns. mm.

4- **Support pipes and gate:**

The pipes shall be galvanized iron, diameter (2), of medium weight, according to British Standards No. 1387 or its equivalent.

-5Barbed wire :

The barbed wire shall be made of two mercury wires twisted together, each with a thickness of at least (2) mm, and shall be provided with barbed-headed pieces at distances not exceeding 15 cm.

The barbed fence is tightened at the top of the fence columns (the inclined part) on three horizontal and two diagonal rows between each two of the fence columns with the holes made for them and connected with a mercury wire with a diameter of 2 mm.

B - Gate:

The gate shall be of the width shown in the table of quantities and consist of two or more doors as shown in the plan or mentioned in the table of quantities. Each leaf shall be made of a structure of galvanized pipes (2") in diameter, on which a wire mesh is installed with 5 square holes. X 5cm made of mercury wire with a diameter of 3 mm, as shown on the diagrams .

The door sills are fixed to the concrete columns by means of at least (3) sturdy hinges for each sash, and each hinge is welded to the movable gate frame in two places, and also fixed in at least two positions on the other sill (in case the gate is more than 2 flanges) or the metal beam (rod). 80 . simplifiedX 8mm) installed on the concrete screed column during casting by welding with steel reinforcement for the column as well as by rails in order to ensure that the doors do not collapse .Also, each flap shall be provided with a ground latch from a rod of at least 20 mm in diameter .A latch is installed on each of the two shutters to secure the gate. It is equipped with a union lock or its equivalent. There must also be an opening with a galvanized sheet frame opposite each lock and sufficient to enter the hand to open the lock from the inside or outside (gauge 15).XAt least 15 cm) with a frame of galvanized sheet thickness of 5 mm and welded with the structure of the gate and all works according to the plans and specifications and according to the instructions of the supervising engineer

Specification for Bill of quantity

Using parts of the project upon completion: -

The business owner has the right if he desires to use or operate any part or parts of the project immediately upon completion of its implementation and does not give him the right to any additional payments due to the loss of time or the inadequacy of the work to which he may be exposed as a result of this work by the employer.

Implementing contractor Staff:

The contractor must commit to appointing the required cadre according to what is shown in the table below, and this is considered the minimum and the number of observers must be increased when the number of working teams increases, and in the event that the contractor does not commit to appointing the required staff, the monthly amounts specified in the table below will be deducted from the contractor's entitlements. The contractor may object to this, bearing in mind that the contractor must increase the number of working teams according to the volume of work and according to the engineer's request. And the contractor must abide by Regulation No. 131 of 2016, the Compulsory Regulation, to employ Jordanian workers from the people of the governorate in the reconstruction projects implemented therein.

No	Position	qualification	Years of Experience	The required number	The deduction amount for each day / for each person absence / JD
1-	Site Engineer	Civil Engineer	7 years (in supervision or implementation of building projects)	1	25
2-	Foreman	Intermediate university college (diploma in civil engineering or surveying)	5 years (in supervision or implementation of building projects)	1	25

Job Description:

- The contractor's actions include the following, for example, and not exclusively:
- The most important work required by this contract is to provide all the materials, numbers and mechanisms to carry out the construction of the following buildings, walls, and check for Al Haidan wells and Madaba water station
- Provided that the work and the supply of the required materials shall be carried out with high specifications and quality and in accordance with the specifications of the public works.

Cleaning and leveling of a site: -

The cleaning and leveling work of the aforementioned sites includes removing rubble to the places specified by the competent authorities. The general view after cleaning and leveling must be acceptable to the engineer, and the work includes plowing the land, pruning trees, removing weeds and rubble, removing old fence and columns, cleaning the site, manholes, and leveling. And the supply of red agricultural soil where necessary, or the supply of selected materials and do all the necessary according to the instructions of the engineer.

Work overlap with services and equipment at the work site: -

The contractor must take into account that his work at the work site must not cause any obstacle and he must take the necessary precautions not to damage any of the cables or equipment and everything that is present on the work site and any damage caused by the contractor during the performance of the contract work he must repair or Replace it as it was (according to the engineer's instructions and approval) and at his own expense.

- The contractor must make the necessary coordination with the supervising engineer in the event that any electrical tools are used with regard to electrical current sources during work.
- The contractor shall be responsible "for preserving and storing the tools, tools and materials related to it which are supplied to the site.
- The contractor must transfer the rubble to the places specified by the competent authorities and dispose of it first, and its costs are included in the bid price.
- The contractor must, before setting its prices, inspect the site to make sure by himself of the nature of the work, take the appropriate and necessary measurements, and take all the information related to this bid.
- The contractor, after completing the works of this contract, must clean the site and remove the debris that resulted from the implementation of the works and remove the equipment, so that he hand over the site in a clean manner acceptable to the engineer and does not pay any sums or bonuses for that, as their costs are considered included in the individual prices for tender work.

The contractor must do what is necessary to coordinate and obtain work permits in all sites and with all the necessary authorities, for example, and not limited to, the Electricity and Communications Company, the Greater Madaba municipality, and public works

Water for business:

- 1 - The contractor is responsible "for securing all his water needs at the work site for the use of his workers, employees, employers and engineers, for work, and storing them in clean containers approved by the engineer in sufficient quantities to ensure the progress of the work and at his own expense."
- 2 - In the event that a water source belonging to the Madaba Water Department is available at or close to the work site, the contractor (after the approval of the employer) can obtain his water needs in exchange for the official approved pricing, provided that he undertakes, at his own expense, the transportation of water by tankers or making the necessary installations to deliver the water. To the work site, to install a water meter approved by the engineer, and to remove these extensions or the meter upon completion of work in this contract.

Tables:**Matching tables: Technical Catalog & Compliance Tables**

The contractor must submit the technical bulletins for all the materials that go into the work of the project and submit the original technical bulletin of the presented material completely "specific to it or technically included in it" with an indication of the material - its type - in the attached technical bulletins in addition to the obligation to provide a detailed comparison table therein. The name of the offered material, its model and the requested (and its model that was mentioned in the bid) and the full technical specifications of the offer compared to what was requested in the tender, a statement of difference and conformity between them and any note on that, and the standard specifications manufactured on which the required

material and presented must be presented to prove the differences or technical matches. On the contrary, it will be rejected.

Third Party Control:-

1. **SGS – Societe General De Servwillance .**
2. **Tuboscope Verco International.**
3. **OMIC – Overseas Merchandise Inspection Company LTD .**
4. **LYTD Control Baltic4-**
5. **Inspecturate (suisse) S. A.**
6. **Control Union International.**
7. **Socotec International Inspection.**

Material Inspection Laboratory: -

The contractor shall designate a laboratory for testing the materials qualified, licensed and approved by the competent authorities and submit its papers and experiences for approval in order to conduct and perform the required tests of various kinds according to the conditions and specifications of the bid, as well as the examinations requested by the engineer.

- The contractor must send and bring the samples to and from the laboratory (or bring the laboratory equipment to the work site, according to the nature and type of examination), and bring the reports (3 copies of each report) and all that is necessary to carry out these works.

- The costs of conducting and repeating the tests and the costs of laboratory work and preparing reports are included in the bid prices.

Their use before implementation and any materials used without written approval will be subject to rejection, and non-payment of the price or cost of the rejected works.

Description of BoQ items

The following chapter describing the main BOQ items referring to the attached BoQ, including the main tasks for the mentioned items and the contractor shall also refer to the drawings, technical specifications and conditions of contract.

HDPE pipes

INSTALLATION of HDPE PIPES, PE100, PN16,

The item for INSTALLATION of HDPE PIPES, PE100, PN16, ISO63 and above, in classic trench excavation includes the following:

- installation of a linear meter of HDPE pipeline according to the Technical Specifications,
- Include supply and install all electro-fusion fittings, connectors and bends,
- Marking of pipe trench location,
- Cutting of road surface (asphalt) and removal of asphalt,
- Careful removal and storage of side walk tiles or plastering stones,
- Excavation in any type of soil of trench to the depth of bottom of pipe plus sand bedding according to diameter as specified in the Technical Specifications,
- Trench protection by timbering,
- Transport and disposal of excavated material,
- Supply of appropriate sand, sand bedding below, aside and above according to Technical Specifications and detailed drawings,
- Including all required thrust blocks and encasement whenever required in accordance with the technical specifications and drawings,
- Including all connection and disconnection points shown on the drawings.
- Supply and Installation of HDPE pipes, inclusive cutting and chamfering of ends,
- Backfilling of trench with imported material, compaction in layers of 20cm according to Specifications of the authority owning the road,
- Supply and Installation of a warning and tracing tape for pipes according to the technical specifications,
- Reinstatement of surfaces as specified in the detailed standard drawings and to the specifications of the authority owning the road,
- Cleaning and flushing the interior of the pipes after installation,
- Pressure testing of pipeline according EN 805, including the filling of the line with water for the entire pipeline section including bends and T-Pieces, Valves, AV, and also with all pipe saddles installed as part of the main pipe, as indicated in the technical specifications,
- Including provision of the testing equipment, water shall be supplied and paid by the contractor,
- Test according EN 805 with Test certificate and procedure,
- Flushing of the pipeline,
- Chlorine, disinfection of the pipeline,
- Final flushing and tests,
- Survey of the new pipeline and elaboration of as-built drawings,
- Including disconnection, reconnection / immigrate of all connections and costumers, whether allocated inside or outside the project area which are connected to the existing pipe network lines.

HDPE Pipe installation with HDD Trenchless Technology

The HDD trenchless technology shall be used if necessary and only after getting the approval of **the Engineer and the Client and** where the contractor will not get an excavation permit, only but not entirely, especially not necessarily for low traffic road, narrow roads in residential areas or interconnections with sewer lines and septic tanks. This technology shall be executed to avoid traffic hazards and problems with road excavation permits required from the Municipality. **With the same unit price for open trench pipe installation.**

SUPPLY & INSTALLATION of house connection for a single and multiple customers water meters (if Required)

See Technical Specifications and drawings.

The item for SUPPLY and INSTALLATION of HOUSE CONNECTION for a single and multiple customer water meters includes the following:

- Supply of Material and Installation of SINGLE House Connection HDPE Pipes PE100, PN16, , according to the Technical Specifications and drawings,
- Supply and installation of house connection includes an average of length 8 m of HDPE pipeline,
- Supply and installation of pipe saddle for DI pipes or electro-fusion pipe saddles for HDPE pipes at tapping points, according to the technical specifications and drawings,
- Supply and installation of a linear meter of HDPE pipeline
- Includes all electro-fusion connector and bends,
- Marking of pipe trench location,
- Cutting of road surface (asphalt) and removal of asphalt,
- Careful removal and storage of side walk tiles or plastering stones,
- Excavation in any kind of soil of trench to the depth of bottom of pipe plus sand bedding according to diameter as specified in the Particular Technical Specifications,
- Trench protection by timbering,
- Transport and disposal of excavated material,
- Supply of appropriate sand, sand bedding below, aside and above according to Technical Specifications and detailed drawings,
- Supply and Installation of HDPE pipes, inclusive cutting and chamfering of ends,
- Inclusive Backfilling of trench with imported material, compaction in layers of 20cm according to Specifications of the Municipality of Greater Amman,
- Supply and Installation of a warning and tracing tape for pipes according to the technical specifications,
- Reinstatement of surface on the payment with tiles or plastering stones,
- Reinstatement of road surfaces as specified in the detailed standard drawings and according to the specifications of the authority owning the road,
- Cleaning and flushing the interior of the pipes after installation,
- Pressure testing of pipeline according EN 805, including the filling of the line with water for the entire pipeline section including bends and T-Pieces, Valves, AV, and also with all pipe saddles installed as part of the main pipe, as indicated in the technical specifications,
- Including provision of the testing equipment, water shall be supplied and paid by the contractor,

- Test according EN 805 with Test certificate and procedure,
- Flushing of the pipeline,
- Chlorine, disinfection of the pipeline,
- Final flushing and tests,
- Survey of the new pipeline and elaboration of as-built drawings,
- Including supply and installation of material according to the General- and Particular Technical Specifications,
- Including the galvanized milled steel pipes (GMS) of approx. 10m, including all fittings,
- Including all necessary bends for connections through walls and floors inside of Customers Property,
- Works includes break off of bricks and walls,
- Including all necessary wall clamps, or any material needed to work be done as per engineer's Instructions
- Including excavation in any type of soil and backfilling works, if necessary,
- Including reinstatement works for inside house connections as shown on drawings and technical requirements,
- Task includes all works and material for the connection after the water meters until the place of the existing connection.
- Including disconnection, reconnection / immigrate of all connections and costumers, whether allocated inside or outside the project area which are connected to the existing pipe network lines.

SUPPLY & INSTALLATION of VALVES District Meters

See Technical Specifications and drawings.

SUPPLY & INSTALLATION of Isolation Valves

The item for supply and installation of isolation Valves includes as follows:

- Including supply and installation of material according to the Technical Specifications,
- Cutting of road surface (asphalt) and removal of asphalt,
- Careful removal and storage of side walk tiles or plastering stones,
- Inclusive Excavation in any type of soil of trench to the depth of bottom of connecting pipe plus sand bedding according to the Technical Specifications,
- Including supply and install of all concrete and civil works required in the technical specifications and drawings,
- Inclusive all mounting parts and manhole cover according to the Technical Specifications,
- Securing and protection of the trench/pit,
- disposal of excavated material,
- Inclusive supply and installation of extension spindles whenever required based on the technical specifications and drawings,
- Inclusive Backfilling of trench with imported material, compaction in layers of 20cm according to Specifications of the authority owning the road,
- Reinstatement of surfaces as specified in the detailed standard drawings and according to the specifications of the authority owning the road,
- Inclusive supply and installation of surface boxes, after backfilling and reinstatement of surface whenever required in accordance with the technical specifications and drawings,

- Installation either into existing or new installation in new system.

SUPPLY & INSTALLATION of Combination Air Valves

The item for supply and installation of Combination Air Valves includes the following:

- Including supply and installation of material according to the Technical Specifications and drawings,
- Cutting of road surface (asphalt) and removal of asphalt,
- Careful removal and storage of side walk tiles or plastering stones,
- Inclusive Excavation in any type of soil of the trench to the depth of bottom of connecting pipe plus sand bedding according to the Technical Specifications and drawings,
- Securing and protection of the trench/pit,
- disposal of excavated material,
- Supply and installation of combination Air Valve and all required material in accordance with the technical specifications and drawings,
- Inclusive all construction, civil and concrete material and works for the Air Valve Chamber, according to the Technical Specifications and drawings,
- Inclusive all mounting parts and manhole cover according to the Technical Specifications and drawings,
- Inclusive Backfilling of trench with imported material, compaction in layers of 20cm according to Specifications of the authority owning the road,
- Reinstatement of surfaces as specified in the detailed standard drawings and according to the specifications of the authority owning the road,
- Installation either into existing or new installation in new system.

SUPPLY & INSTALLATION of Wash-Outs

The item for supply and installation of a Wash-Out includes the following:

- Including supply and installation of material including pipes, valves, fittings, accessories ... etc., according to the Technical Specifications and drawings,
- Cutting of road surface (asphalt) and removal of asphalt,
- Careful removal and storage of side walk tiles or plastering stones,
- Inclusive Excavation in any type of soil of the trench to the depth of bottom of connecting pipe plus sand bedding according to the Technical Specifications,
- Securing and protection of the trench/pit,
- disposal of excavated material,
- Wash-out pipe HDPE ISO125, shall be extended to such a length to reach the discharge area as is required for every particular site condition,
- Inclusive all construction, civil and concrete material and works for the Wash-out chamber, according to the Technical Specifications and drawings,
- Inclusive all mounting parts for fixing the pipe,
- Inclusive Backfilling of trench with imported material, compaction in layers of 20cm according to Specifications of the Municipality of Greater Amman,

- Inclusive reinstatement of surfaces as specified in the detailed standard drawings and according to the Specifications of the authority owning the road,
- Installation either into existing or new installation in new system.
- Inclusive flood manholes in case there isn't any location to drain the pipe.

SUPPLY & INSTALLATION Electrically Actuated Isolation Valves

The item for supply and installation of electrically actuated isolation Valves includes the following:

- Supply and installation of material according to the Technical Specifications,
- Cutting of road surface (asphalt) and removal of asphalt,
- Careful removal and storage of side walk tiles or plastering stones,
- Excavation in any type of soil of trench to the depth of bottom of connecting pipe plus sand bedding according to the Technical Specifications,
- Supply and install of all concrete and civil works for Valve chamber required in the technical specifications and drawings,
- Inclusive all mounting parts and manhole cover according to the Technical Specifications,
- Securing and protection of the trench/pit,
- disposal of excavated material,
- Backfilling of trench with imported material, compaction in layers of 20cm according to Specifications of the authority owning the road,
- Installation either into existing chamber or new installation.
- For diameters 200 mm and above the isolation valve shall be butterfly.
- For diameters less than 200 mm the isolation valve shall be resilient seated gate valve.

Electromagnetic district Water Flow meters

The item for supply and installation of Electromagnetic District meters includes the following:

- Supply and installation of material according to the Technical Specifications,
- Cutting of road surface (asphalt) and removal of asphalt,
- Careful removal and storage of side walk tiles or plastering stones,
- Excavation in any type of soil of trench to the depth of bottom of connecting pipe plus sand bedding according to the Technical Specifications,
- Supply and install of all concrete and civil works for Valve chamber required in the technical specifications and drawings,
- Inclusive all mounting parts and manhole cover according to the Technical Specifications,
- Securing and protection of the trench/pit,
- disposal of excavated material,
- Backfilling of trench with imported material, compaction in layers of 20cm according to Specifications of the authority owning the road,
- Installation either into existing or new installation in new system.

Installation in Chambers

Installation in new chambers

The item includes the following:

- Including supply and installation of all required material such as (strainers, valves, fittings, accessories, ... etc)to complete the task according to the Technical Specifications, site requirements and drawings,
- Supply and Install the chamber's steps according to the typical drawings.
- Cutting of road surface (asphalt) and removal of asphalt,
- Careful removal and storage of side walk tiles or plastering stones,
- Inclusive Excavation in any type of soil of trench to the depth of bottom of connecting pipe plus sand bedding according to the Technical Specifications,
- Including supply and install of all concrete and civil and mechanical works required such as chambers, encasements, installation of fittings ... etc. as in the technical specifications and drawings,
- Inclusive all mounting parts and manhole cover according to the Technical Specifications,
- Inclusive supply and installation of all required material, valves, fittings and accessories as indicated in the detail drawings
- Securing and protection of the trench/pit,
- disposal of excavated material,
- Inclusive Backfilling of trench with imported material, compaction in layers of 20cm according to Specifications of the authority owning the road,
- Reinstatement of surfaces as specified in the detailed standard drawings and according to the specifications of the authority owning the road,
- Pressure reducing valves and district meters data sheets are attached to the BOQ.
- Installation either into existing chamber or new installation.

Installation in Existing chambers

The item includes the following:

- Including supply and installation of all required material such as (strainers, valves, fittings, accessories,... etc.) to complete the task according to the Technical Specifications, site requirements and drawings.
- Supply and Install the chamber's steps according to the typical drawings if required.
- Cutting of road surface (asphalt) and removal of asphalt,
- Careful removal and storage of side walk tiles or plastering stones,
- Including supply and install of all concrete and civil and mechanical works required such as (encasements, installing of fittings, removing un needed fittings, cleaning, calibration for the fittings plastering, installing steps replacing of manhole cover by a heavy-duty sealed one ... etc). as in the technical specifications and drawings,
- Inclusive all mounting parts and manhole cover according to the Technical Specifications,
- Inclusive supply and installation of all required material, valves, fittings and accessories as indicated in the detail drawings
- Securing and protection of the trench/pit,
- disposal of excavated material,

- Inclusive Backfilling of trench with imported material, compaction in layers of 20cm according to Specifications of the authority owning the road,
- Reinstatement of surfaces as specified in the detailed standard drawings and according to the specifications of the authority owning the road,
- Pressure reducing valves and district meters data sheets are attached to the BOQ.
- Installation either into existing chamber or new installation.

PRELIMINARIES

Mobilisation & Site Installation

Site installation is in accordance with the special Conditions, the technical specifications including all facilities required for the construction and installation works on site of the project.

The item for Mobilisation & Site installation includes the following:

- Supply, transport and installation of machinery, equipment and plant,
- Storage of material and equipment,
- Safe guarding of the site installations,
- Elaboration of the site installation plan(s),
- Earthwork (cleaning, profiling, levelling, excavations etc.) necessary for the site installation,

Important Notes:

- 1- The lengths & quantity in the schedule of quantities are subject to increase or decrease, and the contractor is not entitled to claim a price difference, any malfunction, damage, or any other compensation of any kind as a result of an increase or decrease in the value of any item over the 20% of the same item or the effect of that on 1% Of the total value of the bid
- 2- The contractor must submit the technical offer for the materials that will be imported and installed with the country of origin with catalogs from the manufacturing company to the supervising engineer after the assignment to be approved according to the specifications of the bid. Otherwise, implementation will not take place.
- 3- A- If the contractor breaks a water or sewage line, the contractor will be fined the price of water according to the model approved for Miyahuna, and water tanks will be sent to the citizens in the event that citizens are affected by the breakage of the line and at the contractor's expense. Supported forms
- 4- **The contractor must do the following:**(Fixing the boundaries of the Roads before starting the implementation by a licensed surveyor)
- 5- 1- The quantities of work mentioned in the bill of quantities are estimated quantities and are mentioned to fix the individual prices, which are expected to be implemented during the contract period, and they are subject to increase and decrease in unspecified rates. The entire quantities mentioned in the items of the bill of quantities are not binding on the Madaba Water Management Company
- 6- 1- Any work performed by the contractor that is not required in the contract and not by a written order from the engineer will not be included in the calculation process.
- 7- Supplies and equipment required to be provided by the contractor
- 8- Provide the following safety requirements for each mechanism
 - An ambulance fund
 - Fire extinguisher
 - Flasher (Loahat)
 - reflective
 - Scout and lighting suitable

9- Providing the following safety equipment and personal protective clothing for each worker: -

- a. safety shoe
- b. A helmet to protect the head
- c. paws
- d. Hearing protectors when working on cambrichat
- e. Reflective jacket
- f. A sufficient number of plastic cones
- g. Guidance and warning signs
- h. Reflective tape
- i. Protection barriers
- j. Never leave the workplace in an unsafe manner
- k. Not to use equipment that hinders the movement of cars and harms them, such as barrels
- l. The contractor is responsible for the workers 'compliance with the rules of public safety and for the risks and damages that may befall the citizens
- m. Providing or training a trained and qualified person to carry out occupational safety and health duties by the contractor
- n. The contractor shall bear any loss resulting from his failure to apply public safety conditions
- o. The responsibility of following up and implementing the above points shall be with the executing contractor for the work by the supervision engineer responsible for the follow-up of the project.

In the event of non-compliance with the general safety, a fine of 100 JD will be applied for each working day that the contractor did not abide by