DIVISION P17 PROCUREMENT AND INSTALLATION FOR WATER METERS

P17.1 SCOPE OF WORK

The Contractor shall procure and install total 153,899 units of bulk water meters and domestic water meters for the existing independent houses and apartment houses under the Project.

The domestic water meters for cold water are provided for the existing independent houses. The bulk water meters for cold water and the domestic water meters for cold water and for hot water are provided for the existing apartment houses.

The Table-1 shows the breakdown of the bulk water meters and domestic water meters to be provided under the Project.

Table-1

Breakdown of Bulk Water Meters and Domestic Water Meters

	Bulk Water Meter	Domestic Water Meter			Grand Total
	For Cold Water	For Cold Water	For Hot Water	Total	
1. Independent House	None	19,149	None	19,149	19,149
2. Apartment House	1,882	66,434	66,434	132,868	134,750
3. Public Building and Facilities	None	None	None	None	None
Total	1,882	85,583	66,434	152,017	153,899

In principle, the bulk water meters are located in the basement of the apartment houses and the domestic water meters are located in the room where the water stand pipes are laid down in the household.

The Contractor shall procure and install the associated materials such as pipes, fittings, valves, strainers, gaskets, sealing materials, pipe supports, but not limited to, to install the water meters.

The Contractor shall carry out transportation and/or custom clearance of all materials to be procured inside and outside Kazakhstan in timely manner.

The Contractor shall provide construction equipment, vehicles, tools and consumables, but not limited to, to be required for the installation work.

The Contractor shall provide the warehouse to store the water meters and the associated materials before installation.

The Contractor shall perform pre-commissioning and commissioning work after completion of the

installation work.

The Contractor shall complete the procurement and installation work for water meters within forty months after contract award of the Project.

P17.2 PROCUREMENT FOR WATER METERS

P17.2.1 SPECIFICATION FOR WATER METERS

The bulk water meters and domestic water meters shall comply with ISO 4064.

The type of bulk water meters shall be of single-jet or of multi-jet and it of domestic water meters for cold water and for hot water shall be of single-jet. The meter has a robust body with antimagnetic shield to avoid magnetic fraud. Its register shall be dry type.

The direction of flow will be clearly marked on the casing of the meter. The meter shall be vandal proof. All materials of water meter, which are in contact with the water flowing, shall be non-toxic and non-tainting. The water meter shall be constructed throughout of materials which are resistant to normal internal and external corrosion. The water meter shall be able to work continuously during six years for cold water and four years for hot water without verification test.

The technical particulars for each meter are attached at the end of this section (Refer to P17 Attachment 1,2 & 3).

The Contractor shall provide the water meters which are authorized by GosStandard and included in state register of the Republic of Kazakhstan.

Water consumption, normal flow rate, connection size, type and quantities for each meter are shown in Table-2, 3 & 4, respectively.

Table-2

Bulk Water Meters for Cold Water

Bulk Water Consumption, (m^3/month)	Normal Flow Rate (m^3/hr)	Connection Size (mm)	Type of Meter	Quantities to be installed (unit)
0-500	1.5	15	Single-jet	30
500-700	2.5	20	Single-jet	64
700-1000	3.5	25	Multi-jet	374
1000-1400	6	32	Multi-jet	366
1400-2300	10	40	Multi-jet	986
2300-4800	16	50	Multi-jet	62
Total				1882

Table-3

Domestic Water Meters for Cold Water

Domestic Water Consumption, (m^3/month)	Normal Flow Rate (m^3/hr)	Connection Size (mm)	Type of Meter	Quantities to be installed (unit)
0-500	1.5	15	Single-jet	85,583

Table-4

Domestic Water Meters for Hot Water

Domestic Water Consumption, (m^3/month)	Normal Flow Rate (m^3/hr)	Connection Size (mm)	Type of Meter	Quantities to be installed (unit)
0-500	1.5	15	Single-jet	66,434

The Contractor shall submit the specifications and drawings for each meter for approval to the Employer and shall not commence production of any meter before getting his approval for them.

P17.2.2 WATER METER MANUFACTURERS

The water meter manufacturers shall have the state license issued by the Construction Affaires Committee of the Ministry of Industry & Trade of the Republic of Kazakhstan.

Currently the following five companies are used as the water meter manufacturers by the Employer;

(1) ZENNER (Germany)

(2) Allmess (Germany)

(3) SchulmBerger (France & Italy)

(4) PKF " Betar" (Chistopal, Russia)

(5) ABB (Germany)

Therefore, the Contractor shall be proposed to select the water meter manufacturer from the above five companies taking easier maintenance work into consideration.

When the Contractor selects the water meter manufacturer, the Contractor shall take their service system for maintenance and repair work at Astana in Kazakhstan into consideration.

P17.2.3 PROCUREMENT PLAN

The Contractor shall prepare the appropriate procurement schedule so as to complete the procurement and installation work for water meters within forty months from the contract award of the Project;

First the Contractor shall hold a meeting with the Employer and discuss and clarify the followings;

(1) the location of the independent houses and apartment houses in which water meters shall be installed.

(2) the order of priority for the independent houses and apartment houses to install water meters

(3) how many times of placing the purchase order to the water manufacturer and how many unit of water meters for each purchase order

The Contractor shall prepare the inquiry document for the water meters and submit it to the Employer for review.

The Contractor shall make inquiries for water meters, evaluates quotations and places an order with the successful water meter manufacturer.

After placing an order for water meters, the Contractor shall submit a copy of the unpriced purchase order to the Employer for record.

The Contractor shall get the specifications and the drawings for each water meters, review them carefully, and submit them to the Employer for approval.

After getting approval for the specifications and drawings from the Employer, the water meter manufacturer shall commence the production of water meters.

The Contractor shall get the production schedule of the water meters from the water meters manufacturer and submit it to the Employer for record.

The Contractor shall monitor production progress of the water meters so as for the water meter

manufacturer to deliver them as per the schedule.

At the same time with the production schedule, the Contractor shall get the quality control plan for water meter production from the water meter manufacturer and submit it to the Employer for record.

The Contractor is responsible for monitoring quality control activities to be implemented by the water meter manufacturer.

The Contractor is responsible for monitoring the shop inspection to be implemented by the water meter manufacturer and for reviewing its result.

The Contractor is responsible for transportation and custom clearance for the water meters to deliver them at site without any damage in timely manner.

P17.2.4 SHOP INSPECTION

In principle, the shop inspection for the water meters to be implemented by the water meter manufacturer shall comply with ISO 4063-3.

Before starting a shop inspection, the Contractor shall prepare the test program, which includes, for example, a description of the tests for the determination of measurement error, pressure loss and wear resistance. The test program shall also define the necessary levels of acceptability and stipulate how the test results shall be interpreted.

The test program shall be submitted to the Employer for approval. The Contractor shall start the shop inspection after getting approval of the test program from the Employer.

Also the Contractor shall describe the inspection items to be witnessed by the Employer in the test program. The Contractor shall notify the Employer of the date of witness inspection one month in advance of the inspection date.

The Contractor shall submit the test results for the water meters to the Employer for record after the shop inspection.

P17.2.5 PACKING, TRANSPORTATION, CUSTOM CLEARANCE AND CUSTODY

The Contractor shall pack the water meters into the robust packing cases or the containers and take necessary measures to prevent the water meters from being damaged due to moisture.

The Contractor shall make an appropriate arrangement for transportation and custom clearance to deliver the water meters at site without giving any impact for the water meter installation schedule.

The Contractor shall get any permit required for transportation and custom clearance to transport the water meters.

The Contractor shall store the water meters in the warehouse at the good conditions and take custody of them until its installation.

P17.3 INSTALLATION

P17.3.1 LOCATION OF WATER METER INSTALLATION

In principle, the bulk water meters are located in the basement of the apartment houses and the domestic water meters are located in the rooms like the toilets where the water stand pipes are laid down in the household.

In the basement, the bulk flow meters are installed horizontally in the illuminated rooms, which have the temperature not lower than 15℃ and the relative humidity not more than 80 %, easy to get access.

Basically the domestic water meters are installed horizontally in such illuminated rooms as the toilets, which have the temperature not lower than 15℃ and the relative humidity not more than 80 %, easy to get access.

P17.3.2 WATER METER CONNECTION DIAGRAM

In principle, the requirement on the installation work for water meters shall comply with ISO 4064/2.

The bulk water meters and the associated materials shall be installed horizontally in accordance with Figure-1 Typical Bulk Water Meter Connection Diagram attached at the end of this section (Refer to Attachment 4).

The domestic water meters and the associated materials shall be installed horizontally in accordance with Figure-2 Typical Domestic Water Meter Connection Diagram attached at the end of this section (Refer to Attachment 5). However, in case that a space in the room to be installed horizontally is not enough, the domestic water meters may be installed vertically subject to approval by the Employer in advance.

For the bulk water meter installation, all the materials including the water meter shall have flanged connections or threaded connections taking easier maintenance work into consideration.

On the other hand, for the domestic water meter installation, all the materials including the water meter shall have threaded connections.

The water meter shall be easily accessible for fitting, reading and removing.

The water meters shall not be subjected to undue stresses caused by pipes and fittings. Therefore, for the bulk water meter installation, the bulk water meter and/or the associated materials shall be mounted on plinths or brackets. For the domestic water meter installation, the domestic water meter and/or the associated materials shall be supported by the adequate material, if necessary.

The Contractor shall prepare the typical installation drawings for each water meter and submit them to the Employer for approval.

The Contractor shall start the water meter installation work after getting his approval.

P17.3.3 WATER METER INSTALLATION COMPANY

The water meter installation company shall have the state license issued by the Construction Affaires Committee of the Ministry of Industry & Trade of the Republic of Kazakhstan for water meter installation.

The Contractor shall use the water installation company which has such a state license and the experience of water meter installation work in Astana city. Taking working schedule and quantities of water meters into consideration, the Contractor may use more than one water meter installation company.

As the bulk water meter installation work includes the welding work, the Contractor shall use the water meter installation company which has the qualified welders certified for water pipe by the authority concerned

P17.3.4 PROCUREMENT FOR ASSOCIATED MATERIAL

All the associated materials such as pipe, fittings, valves, strainers, flanges, gaskets bolts, nuts, etc. except for the associated materials supplied by the water meter manufacturer shall be procured by the water meter installation company. The associated materials to be required for connection with the existing pipes shall be procured by the water meter installation company as well.

The specifications for the all the associated materials shall comply with International Standard Code like ISO, BS, GOST etc.

All the associated materials shall be non-toxic and non-tainting.

All the associated materials to be used for the bulk water meter installation and the domestic water meter installation for cold water shall be able to work continuously without any problem under the maximum working pressure of 10 bar and the maximum working temperature of 30℃.

All the associated materials to be used for the domestic water meter installation for hot water shall be able to work continuously without any problem under the maximum working pressure of 10 bar and the maximum working temperature of 90℃.

For the associated materials for the bulk water meter installation, the following materials shall be used;

(1) Pipe, Fitting, Flange, Valve, Strainer, Bolt & Nut --------- Carbon Steel

(2) Gasket ---------- Non-asbestos

For the associated materials for the domestic water meter, the following materials shall be used;

(1) Pipe ---------- Polyethylene Plastic or Carbon Steel for cold water

Polyethylene Plastic reinforced with Metal Sheet or Carbon Steel for hot water

(2) Fitting ---------- Polyethylene Plastic or Carbon Steel or equivalent

(3) Valve ---------- Chromium-plated Carbon Steel or equivalent

(4) Strainer ---------- Bronze or equivalent

(5) Sealing Material -------- Teflon or equivalent

The Contractor shall prepare the specification sheets for all the associated materials to be used for each water meter installation and submit them to the Employer for approval. The Contractor shall procure all the associated materials after getting his approval.

The Contractor shall get material certificates for all the associated materials from the material suppliers and/or material manufacturers.

P17.3.5 INSTALLATION PLAN

The Contractor shall prepare the appropriate installation schedule so as to complete the procurement and installation work for water meters within forty months from the contract award of the Project;

Before preparing the installation schedule, the Contractor shall hold the meeting with Employer to clarify the order of priority for the independent houses and apartment houses to install water meters.

The Contractor shall prepare the affordable installation schedule taking the installation work for the water pipe on service into consideration.

The Contractor shall submit the installation schedule to the Employer for review before start of the installation work.

The Contractor shall have the weekly meeting with the Employer to report the result of the installation work done last week and to discuss the expected installation work to be done this week.

The Contractor shall keep the crews enough for the installation work to maintain the installation schedule.

The Contractor shall use the qualified technicians having ample experience for the water meter installation work and the qualified welders having the required certificates issued by the authority concerned.

As the bulk water meter installation work includes the welding work, the Contractor shall take any safety measure for it sufficiently.

As all the water meter installation works are done on the water pipes on service, the Contractor shall take any measure required before start of the installation works.

The Contractor shall be responsible for the quality control of the water meter installation work.

As soon as the water meter installation work is completed, the Contractor shall carry out the pre-commissioning and commissioning work for the water meter and the associated materials. The Contractor shall clean and disinfect the inside of the water meter and associated material, pass water into the meter and the associated materials, ensure no leakage for them and finally ensure that the water meter is working properly.

After completion of commissioning work for the bulk water meters, the Contractor shall paint the external surface of non-painted carbon steel materials.

P17.3.6 INSPECTION

After completion of the pre-commissioning and commissioning work, the Contractor shall notify the Employer of ready-for-inspection of the water meter in writing immediately. Then the Employer shall witness the inspection of the water meters and, if the inspection is passed, the Employer shall seal and register the water meters.

P17.3.7 ACCEPTANCE

The Contractor shall submit to the Employer the Notice of Acceptance for the water meters sealed and registered by the Employer on monthly basis. The Employer shall give his signature on the Notice of Acceptance.

P17.3.8 GUARANTEE

The Contractor shall guarantee the water meters and the water meter installation works including the associated materials against defects in materials and workmanship for a minimum period of one year from the date of Acceptance in Section P17.3.7.

When any defect occurs during the guarantee period, the Contractor shall remedy any defect immediately at his own cost.

P17 ATTACHMENT-1 DOMESTIC WATER METERS for COLD WATER

Technical Particulars

(a) **General**

1) Type	:	Single-jet
2) Size	:	15 mm

(b) **Process data**

1) Liquid	:	Cold potable water
2) Suspended particles in water	:	Maximum permissible under specifications for cold potable water
3) Maximum temperature	:	30 degree Celsius
4) Maximum pressure	:	10 bar
5) Maximum flow rate	:	As specified in ISO 4064-1
6) Minimum flow rate	:	As specified in ISO 4064-1
7) Normal flow rate	:	As specified in ISO 4064-1
8) Transitional flow rate	:	As specified in ISO 4064-1
9) Head Loss at maximum flow	:	Less than 1 bar

(c) **Construction Features**

1) General	:	All the meters shall be suitable for process data mentioned above. The meters shall conform to ISO 4064-1. Meter shall be protected against any tampering in reading. Meter shall withstand accidental reversal of flow without any deterioration/damage.
2) Registration box	:	Dry type. The register shall be direct straight reading with digit counter. Registration shall be digital for cubic meters.
3) Cap	:	Cap shall be of unbreakable and non corrosive material. It shall be fixed to avoid entry of water and dirt.
4) Seals	:	All meters shall be sealed with approved type of seals and seal wires. The seals and seal wires shall be provided by the supplier.
5) Magnetic drive	:	Required
6) Antimagnetic shield	:	Required
7) Strainer	:	Required

	8) Process connection		Threaded connection
(d)	**Mark of the Standard followed on Meter**	:	As specified in ISO 4064-1
(e)	**Metrological Characteristics**		
	1) Maximum permissible error	:	As specified in ISO 4064-1
	2) Metrological class	:	Class B (meter at horizontal position) Class A (meter at vertical position)
(f)	**Installation & Commissioning**	:	As per ISO 4064.
(g)	**Performance Test for Meters**		
	1) Initial Verification Tests	:	All the meters shall be subjected to initial verification tests (ISO 4064) by manufacturer and test certificate for the same shall be submitted to the Employer for approval and record.
	2) Pattern Approval Tests	:	As per ISO 4064. Number of sample meters to be selected for pattern tests shall be as per ISO 4064. Test certificates shall be submitted to the Employer for approval and record.
	3) Test bench for carrying out production routine and type tests.	:	The test bench shall be certified by national accredited laboratory. Test certificate for the same shall be submitted to the Employer for review and record.

Notes:

1. The water meters shall be suitable for installations in horizontal and vertical pipelines without loss in accuracy.

2. The pattern approval tests which are carried out on water meters to be supplied will be witnessed by the Employer.

3. Meters designed to resist vandalism will be preferred.

4. The meters shall be guaranteed against defects in materials and workmanship for a minimum period of one year from date of acceptance described in section P17.3.7.

5. The water meters shall be supplied with all the required fittings and gaskets for the meter installation.

6. The water meters shall be supplied with passport documents.

P17 ATTACHMENT-2 DOMESTIC WATER METERS for HOT WATER

Technical Particulars

(a) **General**

1) Type	:	Single-jet
2) Size	:	15 mm

(b) **Process data**

1) Liquid	:	Hot potable water
2) Suspended particles in water	:	Maximum permissible under specifications for hot potable water
3) Maximum temperature	:	90 degree Celsius
4) Maximum pressure	:	10 bar
5) Maximum flow rate	:	As specified in ISO 4064-1
6) Minimum flow rate	:	As specified in ISO 4064-1
7) Normal flow rate	:	As specified in ISO 4064-1
8) Transitional flow rate	:	As specified in ISO 4064-1
9) Head Loss at maximum flow	:	Less than 1 bar

(c) **Construction Features**

1) General	:	All the meters shall be suitable for process data mentioned above. The meters shall conform to ISO 4064-1. Meter shall be protected against any tampering in reading. Meter shall withstand accidental reversal of flow without any deterioration/damage.
2) Registration box	:	Dry type. The register shall be direct straight reading with digit counter. Registration shall be digital for cubic meters.
3) Cap	:	Cap shall be of unbreakable and non corrosive material. It shall be fixed to avoid entry of water and dirt.
4) Seals	:	All meters shall be sealed with approved type of seals and seal wires. The seals and seal wires shall be provided by the supplier.
5) Magnetic drive	:	Required
6) Antimagnetic shield	:	Required
7) Strainer	:	Required

	8) Process connection		Threaded connection
(d)	**Mark of the Standard followed on Meter**	:	As specified in ISO 4064-1
(e)	**Metrological Characteristics**		
	1) Maximum permissible error	:	Measuring range from min. flow rate to transitional flow rate: ±5 % Measuring range from transitional flow rate to max. flow rate: ±3 %
	2) Metrological class	:	Class B (meter at horizontal position) Class A (meter at vertical position)
(f)	**Installation & Commissioning**	:	As per ISO 4064.
(g)	**Performance Test for Meters**		
	1) Initial Verification Tests	:	All the meters shall be subjected to initial verification tests (ISO 4064) by manufacturer and test certificates for the same shall be submitted to the Employer for approval and record.
	2) Pattern Approval Tests	:	As per ISO 4064. Number of sample meters to be selected for pattern approval tests shall be as per ISO 4064. Test certificates shall be submitted to the Employer for approval and record.
	3) Test bench for carrying out production routine and type tests.	:	The test bench shall be certified by national accredited laboratory. Test certificate for the same shall be submitted to the Employer for review and record.

Notes:

1. The water meters shall be suitable for installations in horizontal and vertical pipelines without loss in accuracy.
2. The pattern approval tests which are carried out on water meters to be supplied will be witnessed by the Employer.
3. Meters designed to resist vandalism will be preferred.
4. The meters shall be guaranteed against defects in materials and workmanship for a minimum period of one year from date of acceptance described in section P17.3.7.
5. The water meters shall be supplied with all the required fittings and gaskets for the meter installation.
6. The water meters shall be supplied with passport documents.
7. The results of the tests shall be corrected with the operating temperature, if necessary.

P17 ATTACHMENT-3 BULK WATER METERS

Technical Particulars

(a) **General**

1)	Type	:	Single-jet or Multi-jet
2)	Size	:	15, 20, 25, 32, 40 and 50mm

(b) **Process data**

1)	Liquid	:	Cold potable water
2)	Suspended particles in water	:	Maximum permissible under specifications for cold potable water
3)	Maximum temperature	:	30 degree Celsius
4)	Maximum pressure	:	10 bar
5)	Maximum flow rate	:	As specified in ISO 4064-1
6)	Minimum flow rate	:	As specified in ISO 4064-1
7)	Normal flow rate	:	As specified in ISO 4064-1
8)	Transitional flow rate	:	As specified in ISO 4064-1
9)	Head Loss at maximum flow	:	Less than 1 bar

(c) **Construction Features**

1)	General	:	All the meters shall be suitable for process data mentioned above. The meters shall conform to ISO 4064-1. Meter shall be protected against any tampering in reading. Meter shall withstand accidental reversal of flow without any deterioration/damage.
2)	Registration box	:	Dry type. The register shall be direct straight reading with digit counter. Registration shall be digital for cubic meter.
3)	Cap	:	Cap shall be of unbreakable and non corrosive material. It shall be fixed to avoid entry of water and dirt.
4)	Seals	:	All meters shall be sealed with approved type of seals and seal wires. The seals and seal wires shall be provided by the supplier.
5)	Magnetic drive	:	Required

6)	Antimagnetic cover	:	Required
7)	Strainer	:	Required
8)	Process Connection	:	Threaded Connection or Flanged Connection

(d) **Mark of the Standard followed on Meter** : Required

(e) **Metrological Characteristics**

1)	Maximum permissible error	:	As specified in ISO 4064-1
2)	Metrological class	:	Class B as per ISO 4064-1

(f) **Installation & Commissioning** : As per ISO 4064

(g) **Performance Test for Meters**

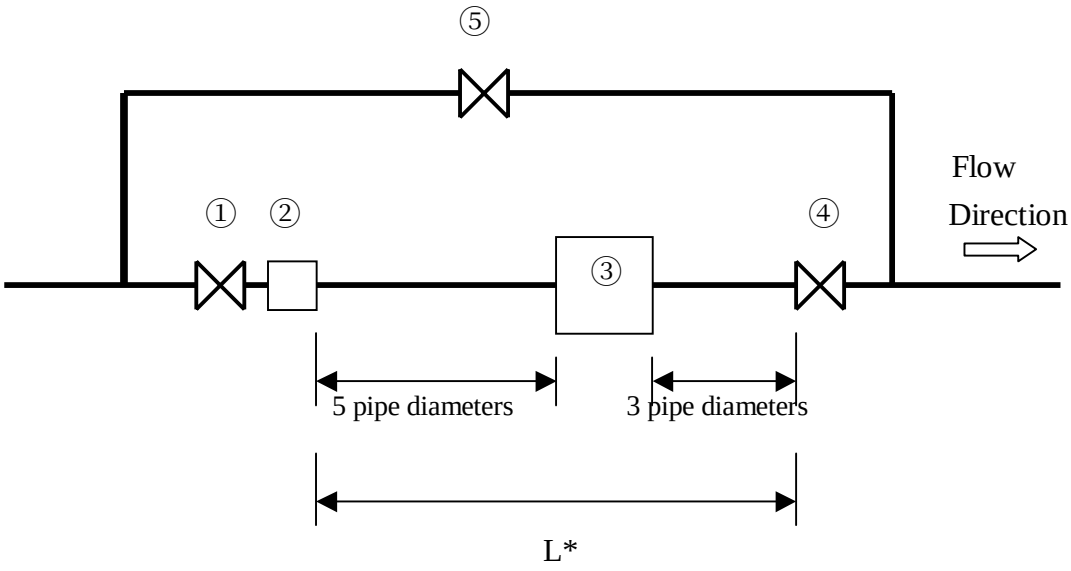
1)	Initial Verification Tests	:	All the meters shall be subjected to initial verification tests (ISO 4064) by manufacturer and test certificates for the same shall be submitted to the Employer for approval and record.
2)	Pattern Approval Tests	:	As per ISO 4064. Number of sample meters to be selected for pattern approval tests shall be as per ISO 4064. Test certificates shall be submitted to the Employer for approval and record.
3)	Test bench for carrying out production routine and type tests	:	The test bench shall be certified by national accredited laboratory. Test certificate for the same shall be submitted to Purchaser for review and record.

Notes:

1. The water meters shall be suitable for installations in horizontal pipeline without loss in accuracy.
2. The water meters shall be supplied with all the required fittings and gaskets for the meter installation.
3. The pattern approval tests which are carried out on water meters to be supplied will be witnessed by the Employer.
4. Meters designed to resist vandalism will be preferred.
5. The meters shall be guaranteed against defects in materials and workmanship for a minimum period of one year from date of acceptance described in section P17.3.7.
6. The meters of single jet type shall be used for the size of 15 and 20 mm.
7. The water meters shall be supplied with passport documents.

P17 ATTACHMENT-4

Figure-1 Bulk Water Meter Connection Diagram

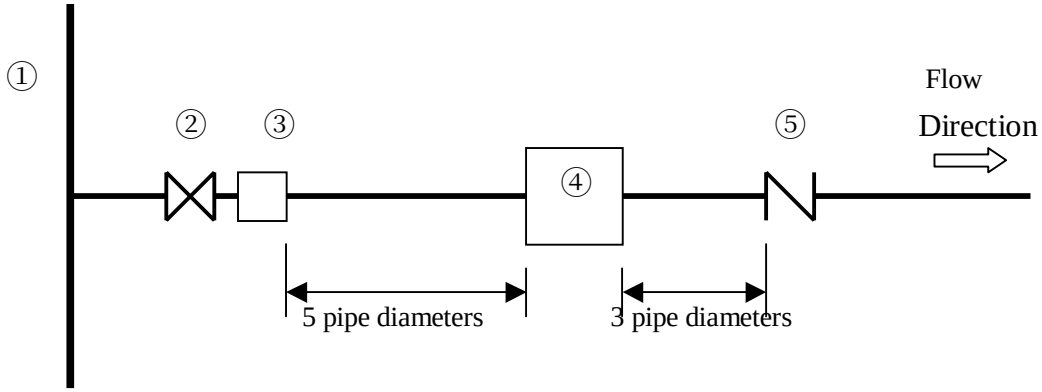


① Isolation Valve
② Strainer
③ Water Meter with Antimagnetic Shield
④ Isolation Valve
⑤ Bypass Line Isolation Valve

Note: *The section "L" should be positioned horizontally and be straight without cross sections, laterals and joints.

P17 ATTACHMENT-5

Figure-2 Typical Domestic Water Meter Connection Diagram



① Water Supply Stand Pipe
② Isolation Valve
③ Strainer
④ Water Meter with Antimagnetic Shield
⑤ Check Valve