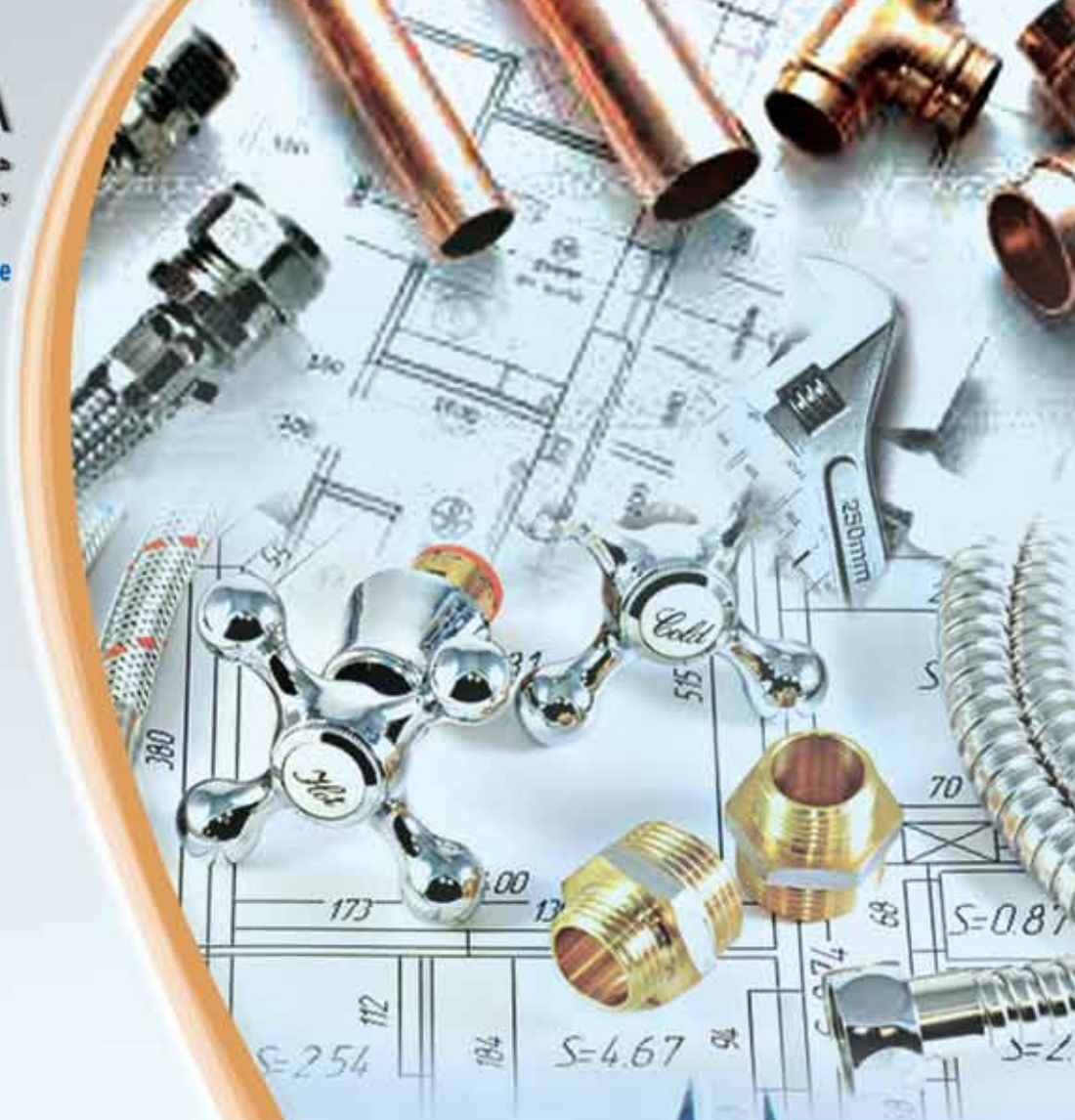




EWA
هيئة الكهرباء والماء
Electricity & Water Authority

Electricity & Water Conservation Directorate



Technical Guidelines for Internal Water Plumbing System

Tel: 80008002 - 17991485 - 36053099 - 36053191

Fax: 17006427

P.O. Box: 2

Email: water.conservation@ewa.bh


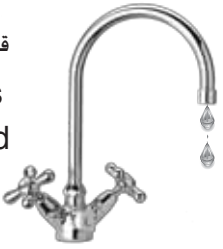





2030
البحرين
BAHRAIN



نقصد لتدوم
SAVE TO SUSTAIN



إحتساب المياه المفقودة جراء تسريبات المياه الصغيرة
COUNT OF FLUID LOST DUE TO SMALL LEAKAGE

| | | | |
|---|---|---|--|
| قطرة في الثانية One Drop Per Second |  | 1 Minute Loss = 1 Hour Loss = 1 Day Loss = 1 Week Loss = 1 Month Loss = | 0.29 Centilitre 17.74 Centilitres 4.26 Litres 30.28 Litres 128.69 Litres |
| قطرتان في الثانية Two Drops Per Second |  | 1 Minute Loss = 1 Hour Loss = 1 Day Loss = 1 Week Loss = 1 Month Loss = | 0.89 Centilitre 59.14 Centilitres 13.88 Litres 98.41 Litres 378.5 Litres |
| قطرات متقطعة Drops Breaking To Stream |  | 1 Minute Loss = 1 Hour Loss = 1 Day Loss = 1 Week Loss = 1 Month Loss = | 5.91 Centilitres 3.79 Litres 90.84 Litres 662.38 Litres 2,649.50 Litres |
| تدفق قطرات المياه بحجم $1/16$ " (1.6 mm) Stream |  | 1 Minute Loss = 1 Hour Loss = 1 Day Loss = 1 Week Loss = 1 Month Loss = | 22.17 Centilitres 13.25 Litres 317.94 Litres 2,176.38 Litres 9,462.5 Litres |
| تدفق قطرات المياه بحجم $1/8$ " (3.2 mm) Stream |  | 1 Minute Loss = 1 Hour Loss = 1 Day Loss = 1 Week Loss = 1 Month Loss = | 68.01 Centilitres 41.64 Litres 984.10 Litres 6,813.00 Litres 29523.00 Litres |
| تدفق قطرات المياه بحجم $3/16$ " (4.8 mm) Stream |  | 1 Minute Loss = 1 Hour Loss = 1 Day Loss = 1 Week Loss = 1 Month Loss = | 1.15 Litres 68.13 Litres 1,608.62 Litres 11,355.60 Litres 48,258.75 Litres |
| تدفق قطرات المياه بحجم $1/4$ " (6.4 mm) Stream |  | 1 Minute Loss = 1 Hour Loss = 1 Day Loss = 1 Week Loss = 1 Month Loss = | 2.45 Litres 147.62 Litres 3,501.13 Litres 24,602.50 Litres 105,033.75 Litres |



Technical guidelines for internal water plumbing system

Introduction:

Electricity & Water Authority (EWA) is investing huge amount of money to provide potable water to all domestic, commercial & industrial customers in the Kingdom of Bahrain. EWA is also very keen to preserve the country's natural water resources by following all means and ways to change erroneous behavior through continuous conservation and educational programs, campaigns and issuing water regulations that will contribute to preserve water resources and avoid water wastage, its contamination and misuse.

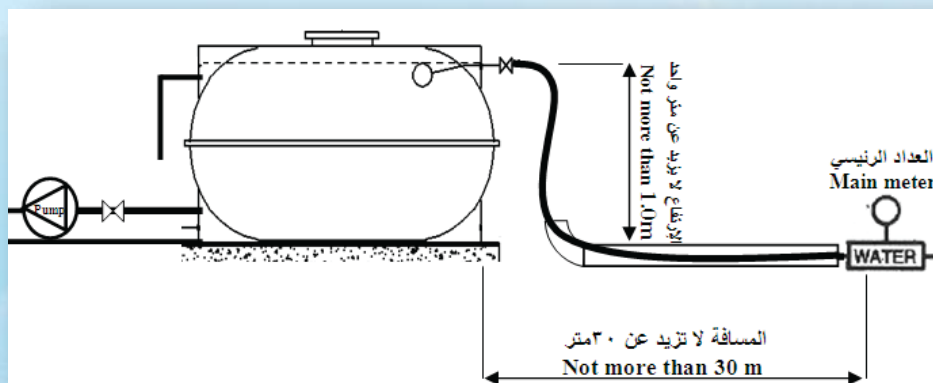
In view of the above, EWA is issuing this comprehensive Technical Guidelines for Internal Plumbing System, which contains the most important clauses in the Ministerial Decree No.(1) /2004 for Water Regulation System. The implementation of these guidelines is expected to have a positive impact on water saving and bill reduction. The Guidelines comprises the followings:

● Responsibility of Electricity & Water Authority (EWA):

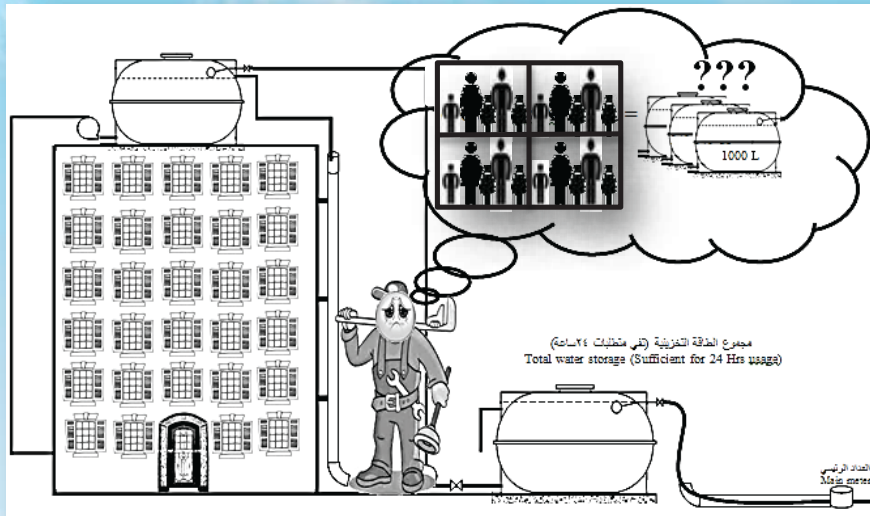
The Authority will provide suitable sizes of water connection for domestic, industrial & commercial customers based on their requirements.

● Storage:

- The main domestic storage tank must be provided on the ground level. The inlet connection to the main storage tank must not exceed one meter height. The ground storage tank should not be located far away from the water meter for continuous flow even during the restricted hours.



- Total storage capacity of ground and roof tanks should not be less than three-days consumption of the premises.



- Guidance may be found in the table below to work out the daily requirements of the premises.

| No | Type | Litres/day | Remarks |
|----|-------------------------------|------------|---|
| 1 | Villas | 1050 | Per Bed Room |
| 2 | Flats | 750 | Per Bed Room |
| 3 | Working staff | 35 | Per Staff (6 to 8 hours working offices) |
| 4 | Visitors for Offices | 5 | Per visitor (if visitors are spending 1-2 hours) |
| 5 | Students of Schools | 15 | Per Student |
| 6 | Students of Technical Schools | 20 | Per Student |
| 7 | Hostel | 180 | Per Student |
| 8 | Hospital | 455 | Per bed (including working staff & other usage in the hospital) |
| 9 | Visitors for Health Centers | 10 | Per visitor (if visitors are spending more than 2 hours) |
| 10 | Labour Camp | 180 | Per worker |
| 11 | Hotel | 275 | Per bed (including Kitchen usage & cleaning) |
| 12 | Car Wash | 100 | Per Car |
| 13 | Laundry for washing | 10 | Per kilogram (Cloth) |
| 14 | Cattle-Livestock | 50 | Per Head |

● **Storage Capacity:**

The storage capacity based on the data elaborated in the below tables, which includes ground and roof storage tanks.

The capacity has been calculated according to per capita consumption, which reaches to 350 l/day and average the number of 3 persons per room. The correction to the average done as per the standard capacity of storage tanks available in the market

● **Storage Capacity for Villas:**

| No. of Room | Roof Storage (Liter) | Ground Storage (Liter) | Total Storage (Liter) |
|-------------|----------------------|------------------------|-----------------------|
| 1 | 700 | 350 | 1050 |
| 2 | 1400 | 700 | 2100 |
| 3 | 2100 | 1050 | 3150 |
| 4 | 2800 | 1400 | 4200 |
| 5 | 3500 | 1750 | 5250 |
| 6 | 4200 | 2100 | 6300 |
| 7 | 4900 | 2450 | 7350 |
| 8 | 5600 | 2800 | 8400 |
| 9 | 6300 | 3150 | 9450 |
| 10 | 7000 | 3500 | 10500 |

● **Storage Capacity for Flats:**

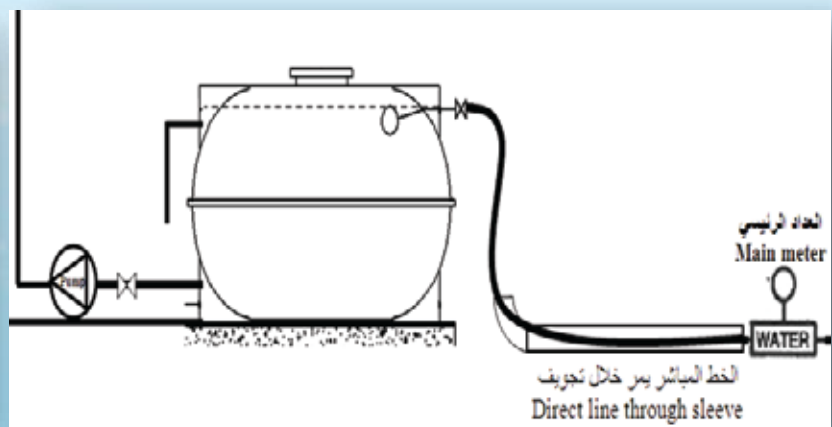
| No. of Room | Roof Storage (Liter) | Ground Storage (Liter) | Total Storage (Liter) |
|-------------|----------------------|------------------------|-----------------------|
| 1 | 500 | 250 | 750 |
| 2 | 750 | 500 | 1250 |
| 3 | 1000 | 500 | 1500 |
| 4 | 1250 | 750 | 2000 |
| 5 | 1500 | 1000 | 2500 |
| 6 | 2000 | 1000 | 3000 |
| 7 | 2250 | 1250 | 3500 |
| 8 | 2500 | 1500 | 4000 |
| 9 | 3000 | 1500 | 4500 |
| 10 | 3250 | 1750 | 5000 |

- All storage tanks should be of white colour & to be kept in shade to avoid direct sun rays.
- If the water requirements for the garden is more than 1 cubic meter a day, it is advisable to install a separate irrigation tank connected directly to the EWA supply line. The inlet pipe should be at higher than the main domestic tank.

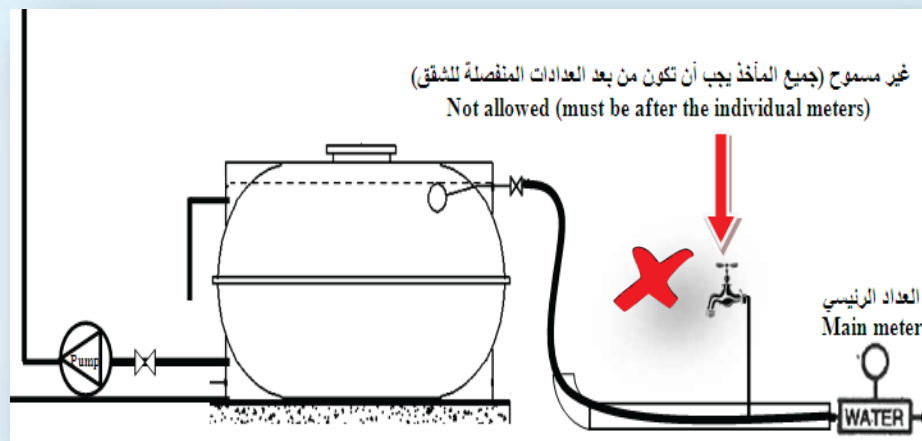
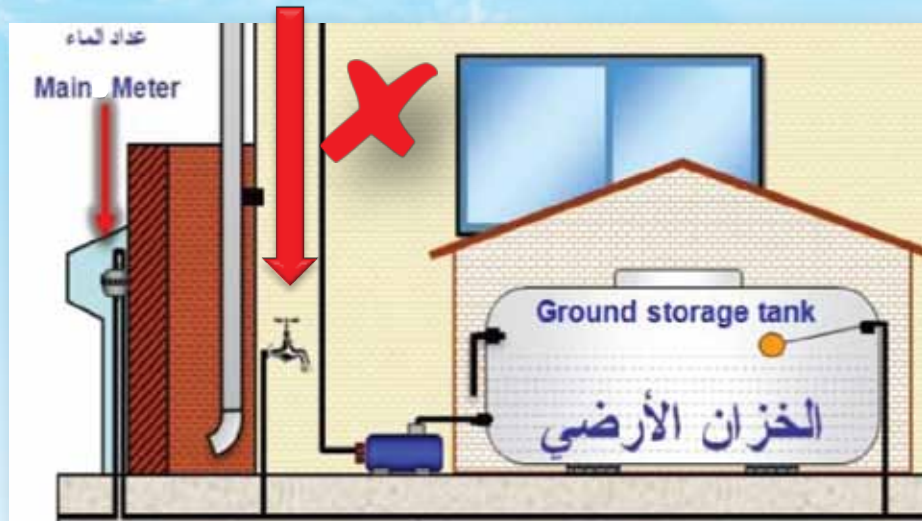


● Plumbing works:

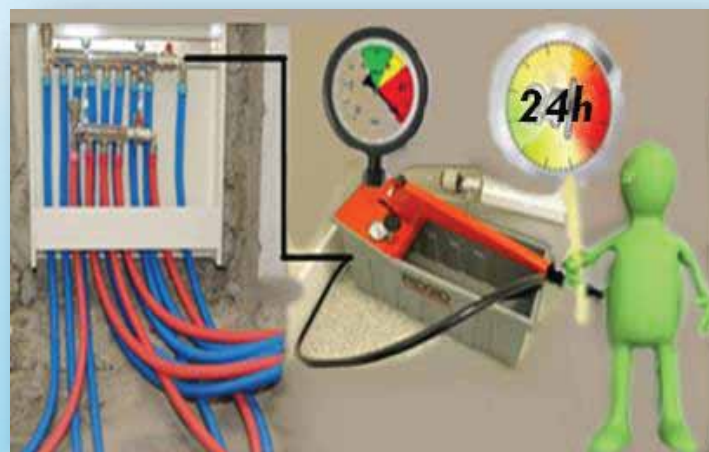
- For new construction or major renovation projects, plumbing materials will comply with B.S. standards or equivalent.
- Copper pipes and fittings are not allowed to be buried/concealed. Rigid pipes of other materials for buried lines must have a guarantee life of 25 years. Also Buried pipes should be easily removable for maintenance and replacement works like pipe-in-pipe system.
- When laying new lines and replacing old ones, invisible lines should be put through sleeves with chambers at junctions, tees, elbows, angles or rising lines etc.



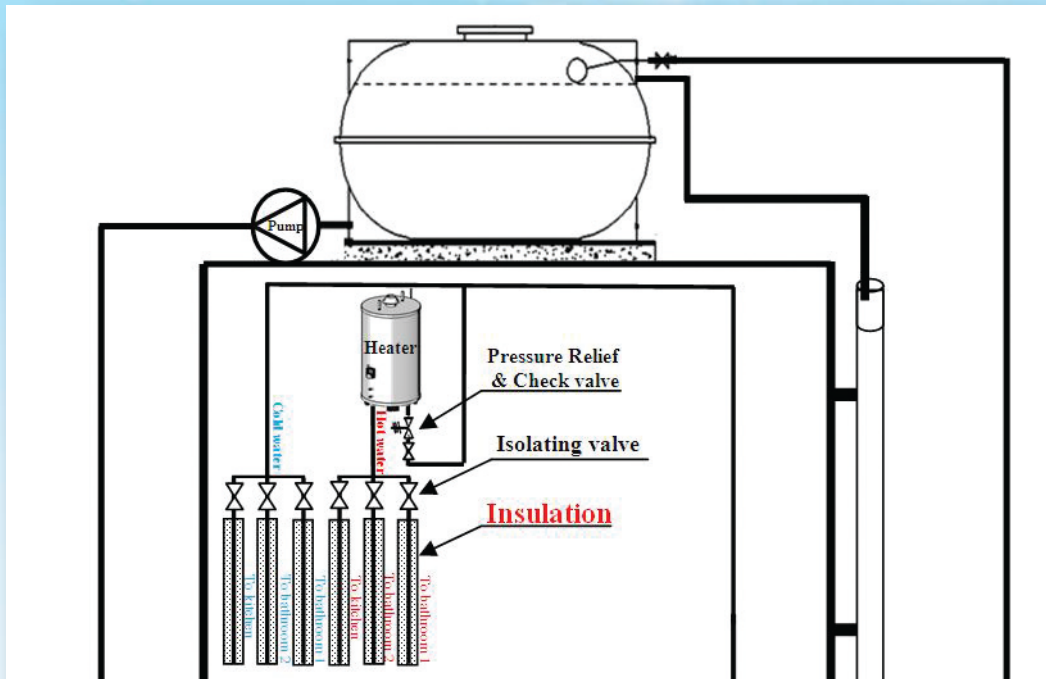
- All water pipe connections should be fed from the tanks and do not tap from direct line.



- The internal piping network has to be hydraulically tested before use in order to locate any water leakages.

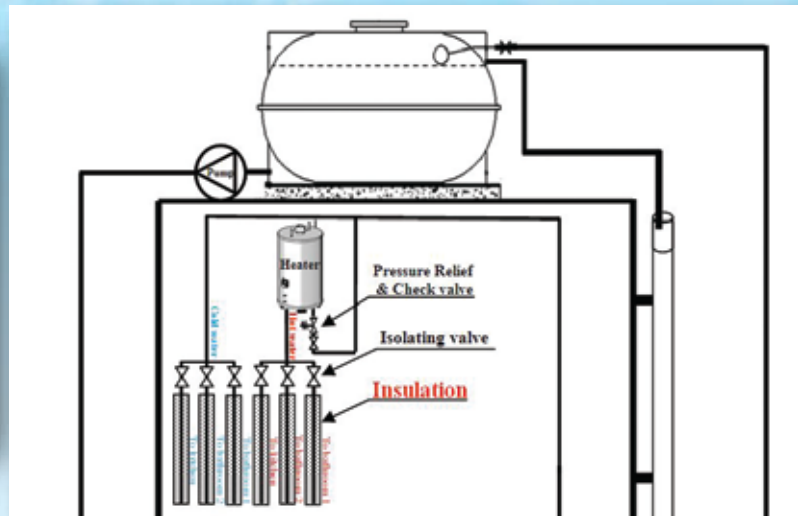


- Provide sleeves, shade, insulations or white paint on external water pipes for protection from direct sunrays.

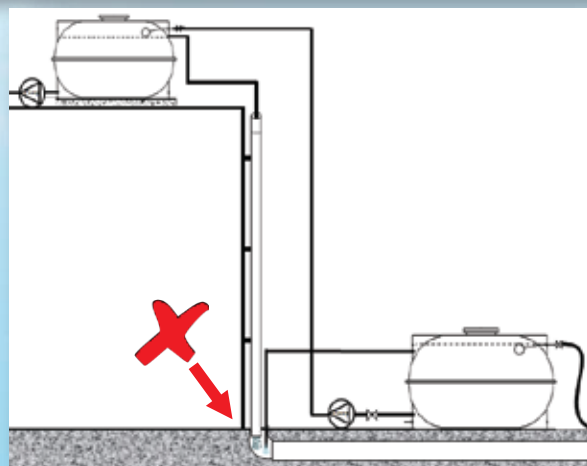
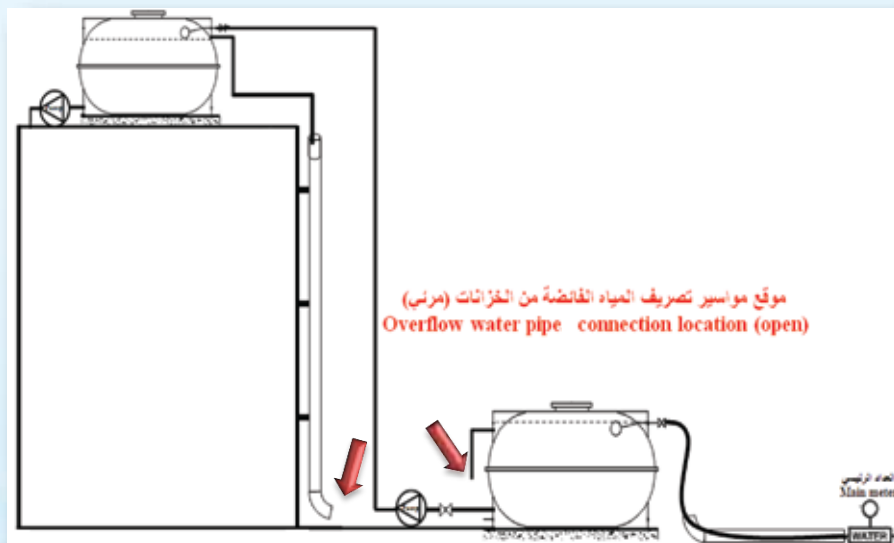


- It is advisable that all internal distribution should be by gravity flow with multiple outlets supply system.

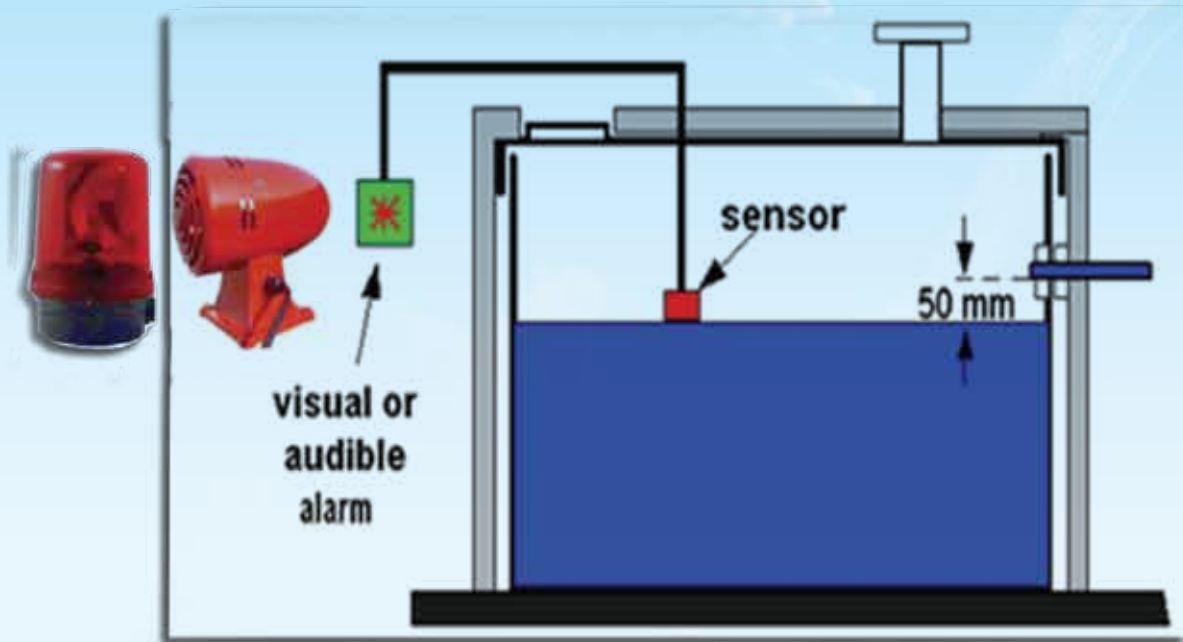
- Minimize to the extent possible length of the pipe from the water heaters to the taps.



- Water Overflow pipes should not be connected to the drainage, it should be in a visible location where the discharge of water can be readily seen or noticed.



- An alarm which is either Audible or Visual SHOULD BE fixed in all underground or ground lever tanks exceeding 10m³ capacity. The alarm should be activated when the water level reaches 50mm below the water tank inlet.



Ground Tank more than (10m³) Capacity



Under Ground Tank

- **Gardening:**

EWA is not responsible for the supply of water for gardening/ irrigation purposes, it recommends the following:

- It is advisable that the size of the garden tap should not exceed 1/2" diameter.
- An effective modern and economic irrigation system with timers should be provided for controlling water consumption and to be set for early morning or late evening.



- It is advisable that lawn area should be restricted in size or best avoided as it consumes plenty of water. A brick pavement with spaces planted with drought tolerant trees is preferable.

- **Water Appliances:**

- Automatic sensor type mixers in public places must be considered.



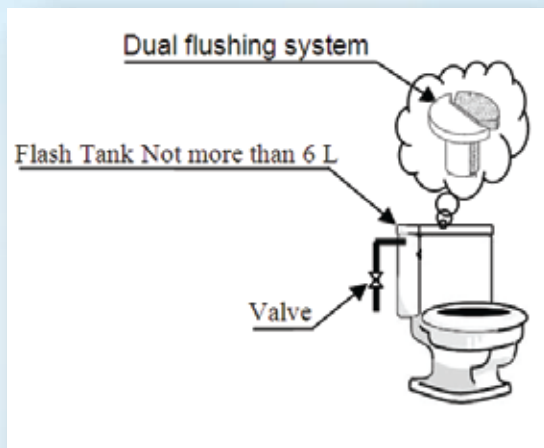
Automatic sensor type mixers

- It is advisable to use "Lever" type mixers in normal domestic places.



"Lever" type mixers

- The volume of flush tanks shall not exceed 6 litres and dual flushing mechanism shall be used.
- It is advisable to use siphon type flush tank rather than flush valve system.



- Urinals should be flushed only after use either manually or by electronic sensor.





Sensor type



Press type



- Flow rates shall not exceed the following values:

| Fitting | Maximum Flow at Outlets (Litres/minutes) |
|--|---|
| Sink Basin / Bib Tap  | 8 |
| Wash Basin Tap  | 6 |
| Bath Tap  | 12 |
| Shower Tap  | 10 |

- **Water Reuse:**

- If the capacity of air conditioning is more than 100 tons, it is preferable to use the condenser drain water for flushing systems or gardening purposes.



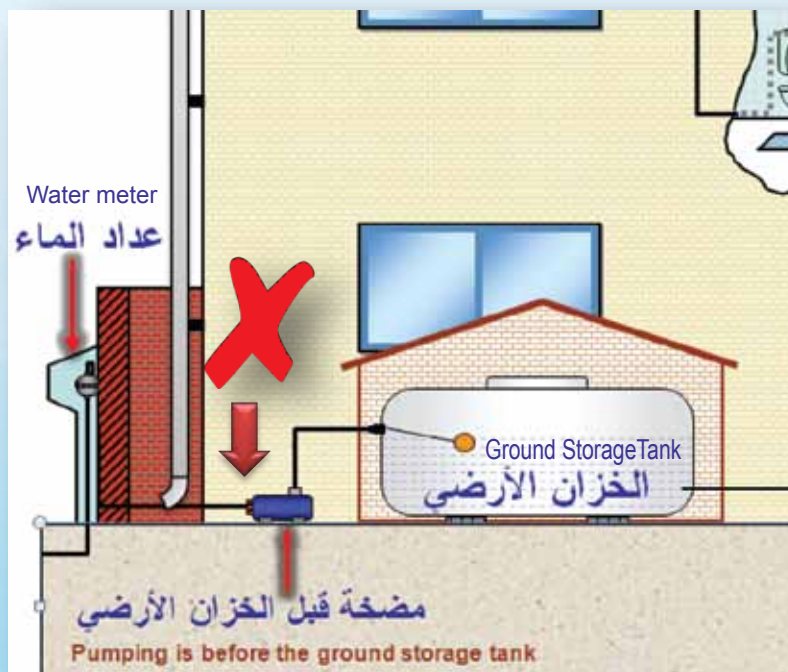
- It is advisable to re-use the water in industrial premises such as laundries, car washing services, garment factories etc. after suitable treatment.

- In major projects, grey water is to be treated and reused for gardening & flushing purposes. For these purposes, there should be two separate water supply and two drainage systems with standby fresh water supply in case of gray water supply outage.
- It is advisable to use Reject Water from the R.O. plants by diverting it to a separate ground tank and to be used for flushing, cleaning or gardening etc.

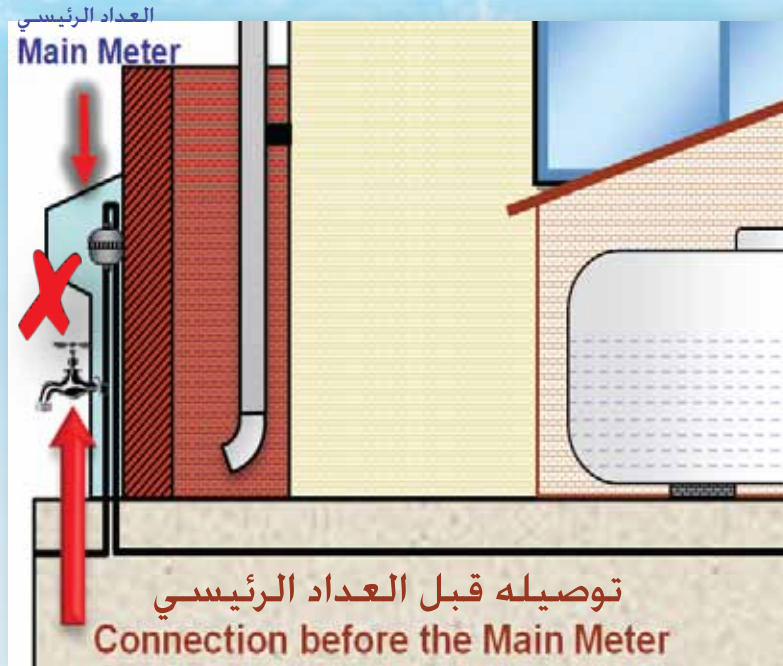


● **Violations:**

- Direct pumping from the meter can cause water pollution and create water shortage to the neighboring premises.

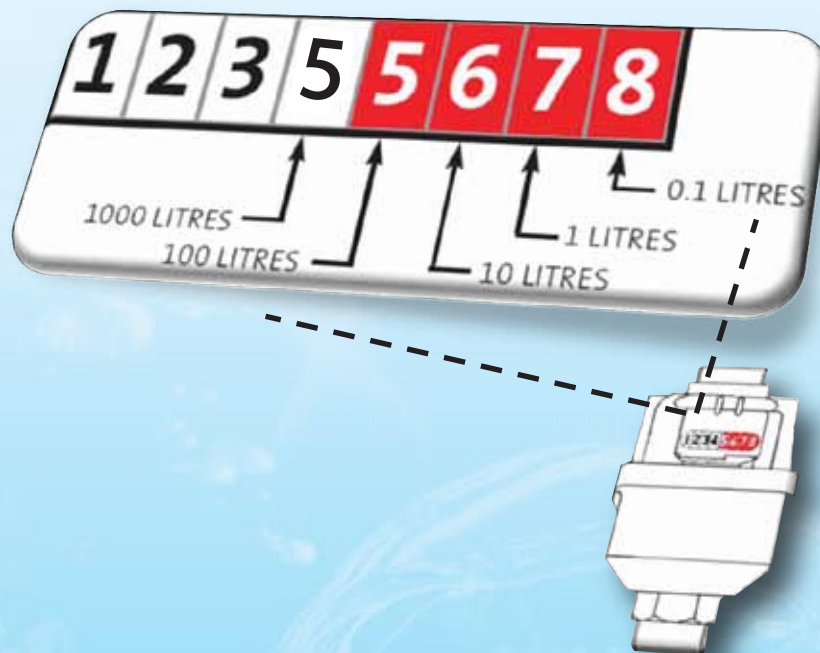


- Intentionally removal of water meters or damage or breaking.
- Using water before water meter.



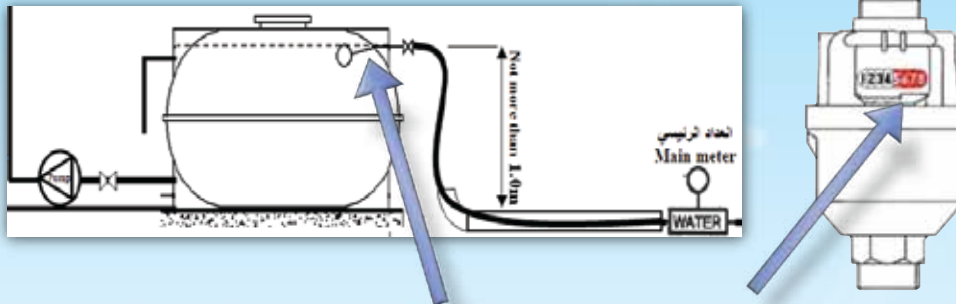
● How to know your water consumption

- Take reading on 1st day (1235,5678).
- Next day take reading at same time (1235,7678).
- Then subtract the readings, you will get your consumption (2000 Litres/day).
- Compare with the table in (page 2) to check if your consumption is in the range.



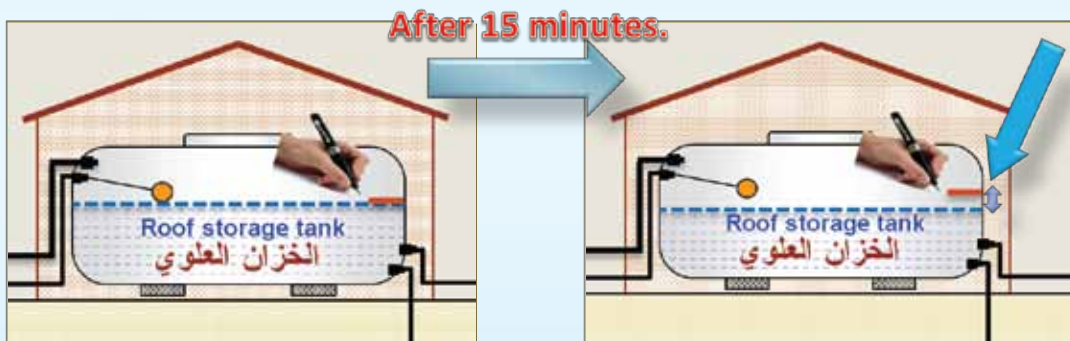
● METHODS OF LEAK DETECTION

- 1) Close all outlets (Taps) and ensure there is no water supply into the tanks.
- 2) Take water meter reading. After 15 minutes, take another reading. If there is a difference, then there is a leak between the meter and the tank or direct line.



**No water supply into the tanks,
Meter must STOP.**

- 3) Mark the water level in the roof tanks.
- 4) Wait 15 minutes.
- 5) Check the water level in the tank. If there is a drop in the water level, then, there is a leak after the tank.



- 6) To check the internal water lines, close all the taps and then attach a ribbon or piece of cloth to the end of a rod. Place the rod into the water tank and let the ribbon or cloth hang near to the outlet pipes of the tank. If the cloth is sucked into one of the pipe, it is clear that there is a leak in that particular line.



● CAUSES OF WATER SHORTAGE

Water shortage may be due to the following:

- **No ground storage tank when the building is more than two stories in height.**
- **Not having enough water storage capacity.**
- **Excessive garden watering.**
- **Visible or invisible water leaks.**
- **Wasteful way of using water.**
- **Improper internal plumbing systems**

For an appointment to check the implementation of internal water regulations, the engineering office will call water conservation section after the completion of plumbing works on the following numbers

Tel: 80008002 - 17991485 - 36053099 - 36053191

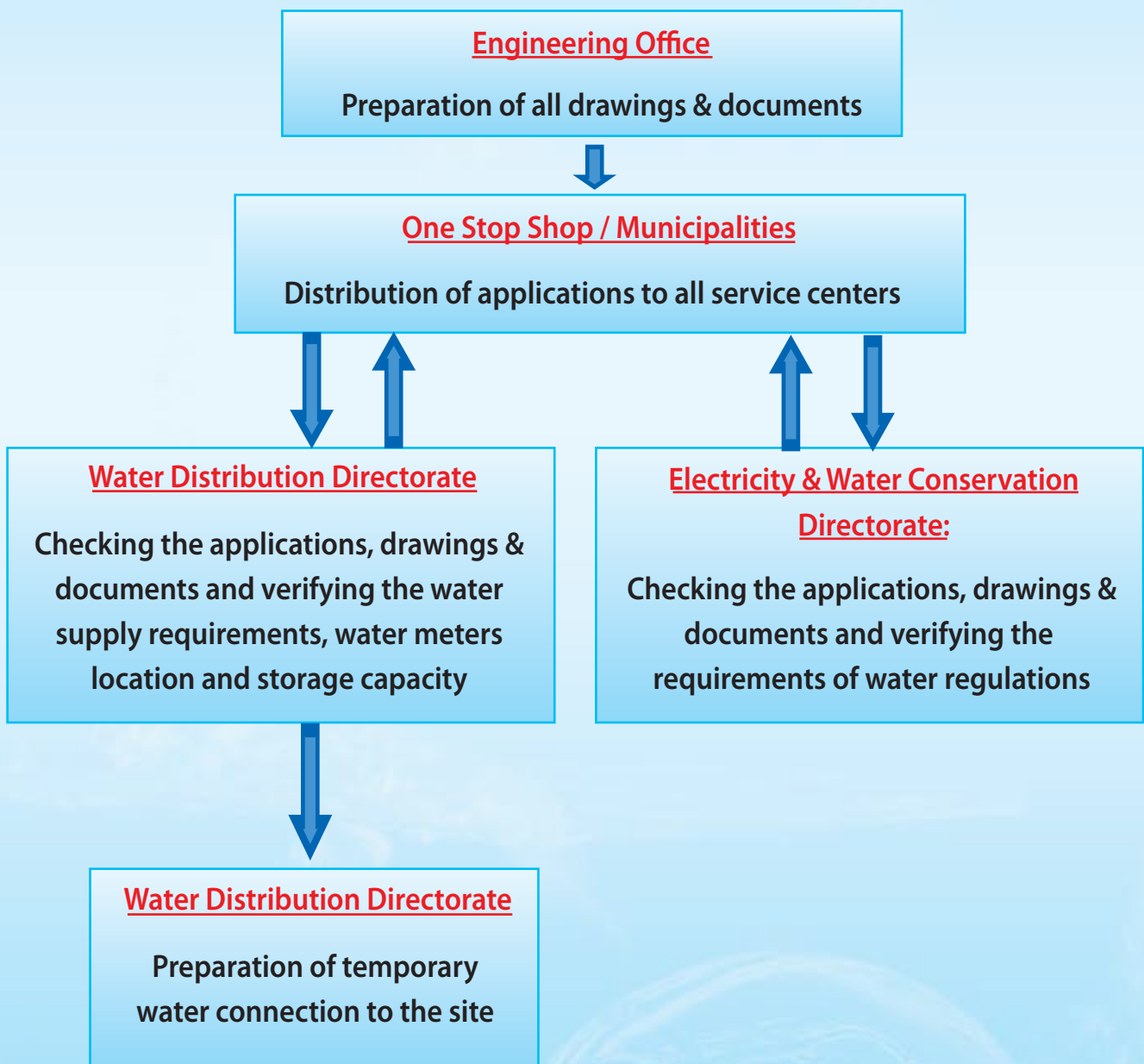
Fax: 17006427

P.O. Box: 2

Email: water.conservation@ewa.bh

11. Mechanism to receive and check requests received electronically from the Municipal One Stop Shop

Mechanism of application process - Planning Stage



Mechanism of application process: **Implementation Stage**

Engineering Office

“WATER REGULATIONS SYSTEM IMPLEMENTATION FORM”

To be sent to Electricity & Water Conservation Directorate
for inspection and approval

2

1

Water Distribution Directorate

Checking the final approval of
Electricity & Water Conservation
Directorate, water meters location,
storage capacity and then the final
water supply connection will be given

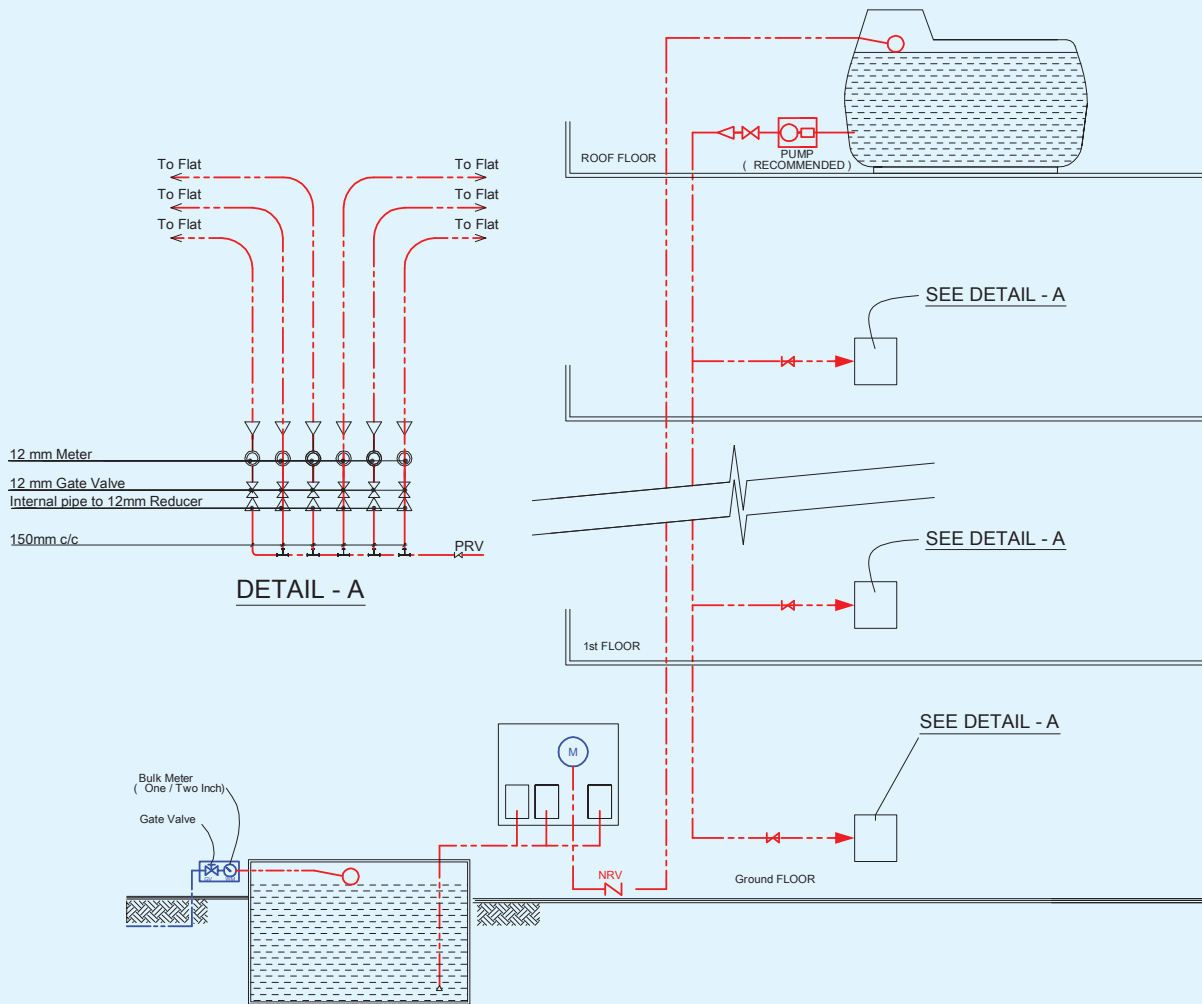
**Electricity & Water Conservation
Directorate**

Conducting a site visit for inspection
and verifying the implementation of
water regulations system, and
approval of the form.

**Electricity & Water
Conservation Directorate**

Preparation to issue
“No Objection Certificate”

**TYPICAL INTERNAL PLUMBING SYSTEM TO
MULTI STOREY RESIDENTIAL PREMISES DIRECT PUMPING SUPPLY.
TYPE-1**



To check the locations of the individual meters, please contact “Water Service Coordination Groups” at Water Distribution Directorate (Tel: 17997660)

To get detailed drawings for water meter locations, please visit EWA website www.mew.gov.bh