



Low Voltage Electricity & Water
Installations Regulations

WATER

INSTALLATION CODE 2016



His Highness
Sheikh Tameem Bin Hamad Al-Thani
 Emir of the State of Qatar

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Message from KAHRAMAA

Dear Consultants, Contractors and Valuable Customers,

Qatar General Electricity and Water Corporation “KAHRAMAA” is committed as per its mission “To provide our customers with high quality electricity and water services, whilst creating value of our shareholders”, based on customer services Department mission to provide customers with high safe and secure water installation.

The Customer Services Department (CSD) would like to present the book of (Regulation of Internal Water Installations and Connection Works).

As part of the Customer Services Department effort to facilitate communications, the book can be downloaded from KAHRAMAA website <http://www.km.com.qa>.

The book is the only approved reference book approved by KAHRAMAA and from now on all updates and upgrades of the installation regulations book will be available on KAHRAMAA website.

In this case, KAHRAMAA reserves its right to update and upgrade the book of Regulation of Internal Water Installation and Connections Works without prior notice.

Kind Regards,

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1. Regulation Purpose

The regulation presented in this document form part of the requirements for water services connection and installation. The purpose of this regulation is to prevent misuses, waste, undue consumption or erroneous measurement of water and most importantly, to prevent leakage of potable water. These regulations would replace the former Rules and Regulation Guide Plumbing works, the previous additions 2006, 2007 and May 2009.

General Guidelines for Updating KM “Regulations of Internal Water Installations and Connection Works”

1. Review and update the existing regulations in compliance with the up-to-date international standards such as IEC, BS, ASHARE, etc. and the industry best practices.
2. Recommend new regulations where applicable or necessary for high-rise buildings for internal water installations.
3. Develop water connection works (internal installations, risers, internal water networks, etc.) guidelines for large scale developments such as malls, residential buildings, high-rise towers, etc.
4. Revise existing regulations wherever necessary and/or include new clauses in applicable sectors to accommodate conservation of electricity and water.
5. Revise existing regulations to include water quality standards in customer premises, and corrective/preventive measures.
6. Recommend new specifications for remote metering reading, relevant to smart meter technical specifications, operation systems, installations, and/or all other aspects that are related to the concept of remote meter reading and control.
7. Provide recommendations regarding relation of internal water installations works and Qatar Civil Defence requirements based on the latest international / particular standards in this regard.

2. Building Permit

“All Building Permit Applications are Electronically Applied through BP Application System. In order to be reviewed by KM Engineers in accordance to KM regulation and specifications.”

In order to be reviewed by Installation Section Engineers due to KAHRAMAA regulation and specifications.

3. Scope

The scope of KAHRAMAA water Regulation for Consultants, Contractors and Valuable customers.

Qatar General Electricity and Water Corporation “KAHRAMAA” is committed as per its mission “To provide our customers with high quality electricity and water services, whilst creating value of our shareholders”, based on Customer Services Department mission to provide customers with high safe and secure water installation.

Scope for KAHRAMAA Consultant:

- Experiment this regulation with positive vetting with SI standard.
- Benchmarking jurisdiction with British Standards relevant to the State of Qatar or GCC standards avoiding inveterate.
- Cognate jurisdiction with SI standard resemblance, further with the American Standard with GCC particular standard.
- KAHRAMAA particular jurisdiction blossom and consolidate enhancement and expectation via AMR system.
- Objectives are enhancement, accreditation with all relevant expectation to hire proper water service decontamination, conservative, dumping, decreasing water loss via KAHRAMAA target proper continuous water supply.

Contacts:

Qatar General Electricity & Water Corporation (KAHRAMAA).
Customer Services Department, Tel: 44628282 / 44628559
Building Permit Complex - Doha, Tel: 49505050
Website: www.kahramaa.com.qa

4. Application Categories

The Law

Prior to starting any installation activities related to services connection or installation to the following development, the applicant must submit preliminary design drawings attached with the building permit application to **KAHRAMAA**, Customer Services Department for review and subsequent approval.

- Villa, Raw House
- Towers, Residential flats, Offices (High) Buildings
- Any premises betterment.
- Residential Compound
- Malls, Retails & Commercial Centres.
- Individual villa & Industrial sector.
- Commercial sector.

4.1 Document Required for Water Service Connection

Contractor should submit their request online KMSP

- Submit a photo copy of installed service cabinet.
- Submit a photo copy of owning-ship document.
- Submit Photo Copy of Service Site Plan with Proper Coordinates of Meter & Connection Location requiring New Connection, Re-location and Etc.
- Submit a photo copy of the State of Qatar ID card.
- Submit a photo copy of Company Registration Number.
- Submit electricity number.
- Submit building permit approval.
- Submit Valid Holding Certificate and No Objection Certificate from Agricultural Affairs for Water Supply to Farms.

4.2 Document Required for Temporary Water Supply

Contractor should submit their request online KMSP

- Submit building permit approval.
- Submit a photo copy of site plan.
- Complete all installation requirements and coordinate with Customer Services Department Installation Engineer.

4.3 Upgrading of Water Supply:

- Daily Demand.
- Tank Capacity.
- WEMS Report.
- Existing Service Connection Size.

5. Definitions

In this by laws booklet, the following words and expressions shall have the meanings defined as follows:

Applicant: A person who is of a communal service.

Approval or Approved: Approval in writing or stamp by **KAHRAMAA**.

AMI: Advance Meter Infrastructure for the AMR.

AMR: Automatic Meter Reading system for remote reading.

Back Flow: The flow in a direction contrary to the intended normal direction of flow.

Branch meters: All sub meters that supply different apartments in the residential buildings, villa compounds, retails, shops inside malls or commercial centres.

Bulk Customer: The customer who has demand exceeding 600m³ per day.

Customer: Any person, persons or corporate body supplied with, or applying to be supplied with water by **KAHRAMAA**. Reference to "Customer" in these by laws shall include applicant as previously defined.

Customer Premises: Property land which the owner has a deed for such as villa, house, building, etc.

Corrosion Resisting Material: Any material which is highly resistant to any corrosive action to which it is likely to be subjected in the circumstances in which it is to be used.

Cylinder: Cylindrical closed vessel capable of containing water under pressure greater than atmospheric pressure.

Capacity in relation to Storage Water Tank or Tank: The capacity of the Water Tank or tank measured to the highest level that water can reach when the float valve or other approved device for controlling the inflow of water is fitted.

Charge: Any charge for water, any deposit or fees payable to the **KAHRAMAA**, the actual cost or other works carried out by the **KAHRAMAA**, and any other charge including any surcharge which is payable under these by laws.

Water Tank: A fixed container for holding water at atmospheric pressure such as tanks, sectional panel GRP tank or concrete tank.

Closed Loop: Any system of pipes and water fittings through which water circulates in the internal network (in Residential Complex) and from which water is drawn for use, that feeds or supplies water to the Water Tank.

Distributing Pipe: Any pipe (other than an overflow or a flushing pipe) conveying water from a storage Water Tank or from a hot water apparatus supplied from a feed Water Tank, or under pressure from that Water Tank.

Distributing Main: A pipeline that conveys water to the premises by means of service connection.

Domestic Water System: The water system which includes the distributing pipe and all associated apparatus within premises, up to the point where water is drawn for use.

Fire Service: The pipes, tanks, pumps, fittings and apparatus in any premises installed for the purpose of firefighting.

Flot Valve: A valve for controlling the flow of water into a Water Tank, the valve being operated by the vertical movement of a float riding on the surface of the water.

Flushing Water Tank: A Water Tank provided with its discharging apparatus for discharging the stored water rapidly into a water closet pan, urinal, drain or sewer.

Header: The pipe conveying water from the downstream tank or roof tank in building through OTS (Open To Sky) supplying the corresponding floor.

Inside Service: The pipes and fittings in premises after the ground storage tank and any pipes and fittings between the storage tanks and the termination of the water network service connection, which shall normally be at the meter.

Insulating tubes: All roof plumbing tubes / pipes and fittings should be heat insulated using materials which are poor conductors of heat (Fibrous material or Cellular material) with Aluminium cladding that protects thermal block tubes from direct sun radiation.

ISO: The International Organization for Standardization.

Internal Network: A pipeline that conveys water from the main Water Tank to the individual villa or buildings and other utilities inside the residential complex by the set of water pumps.

Meter: Any appliance or device owned and maintained by **KAHRAMAA** for the purpose of measuring consumption.

Main Meter: A meter where the water is conveyed from the distribution network to the premises through it to the adjacent ground tanks.

Meter Cabinet: The Meter Cabinet will be as per **KAHRAMA** Standards and Specifications.

Meter Chamber: The manhole underground in which the electronic sensor will be installed and connected to the GRP bulk meter cabinet by 2 inches conducted to the sensor cord to the EDU (Electronic Display Unit).

Over Flow Level: The lowest level at which water can flow in to the overflow pipe of a Water Tank or tank.

Potable Water: Water supplied by **KAHRAMAA** which is suitable for drinking and culinary purposes.

Premises: Any land, house, building, possessed or reverted to the owner. A house, building, apartment or part of a house and the cartilage thereof in respect of which water is supplied or applied for.

PRV: Pressure Reducing Valve that regulates the flow of the appropriate pressure.

NRV: Non Return Valve to avoid backflow from pressurized source.

FCV: Flow Control Valve to regulate the flow and pressure the pipe system/customer.

Riser: The pipe that conveys water from downstream of a booster pump up to the roof tanks on the roof floor of the building.

Registered Plumbing Contractor: A person authorized by the **KAHRAMAA**, to carry out plumbing work of the grade indicated.

Sub Main: Water meters inside the compound (complex), through which water is conveyed to the buildings from the internal network inside the complex, in case of complex composed of villa and buildings.

Sub Meters: Individual meters downstream of the main meter or sub main through which water is conveyed to flats or villas in a building or complex.

Service Pipe: Any pipe / arrangement of pipes for supplying water from a distribution main to any premises as it is subject to water pressure from that main and ends at the water meter at the customer's boundary provided that only one pipe can be connected to the water meter.

Service Connection: The part of pipes and fittings between the distribution mains up to and including the water meter at the customer's boundary.

Spill Over Level: The level at which the water in a Water Tank or vessel will first spill over if the inflow exceeds the outflow through any outlet and any overflow pipe.

Stop Valve: Any device other than a draw off tap for stopping the flow of water in a pipe.

Sub Main meter: Meter install for each building inside the residential compound as tapping from compound's internal water network.

Swimming Pool Plant Room: The mechanical room for a swimming pool in which filtration, dosing and circulation of water is done through the surge or balance tank.

Stoppage Tank: Any tank other than a flushing Water Tank having a free water surface under atmospheric pressure, but does not include a drinking trough or drinking bowl for animals including poultry.

Water Booster Pumps: A set of pumps that boosts water from the main Water Tank to the villa or flat utilities. It is very important to detect the pump's total head and the height of the premises and relevant losses.

Warning Pipe: An overflow fixed to its outlet, whether inside or outside the building, so it is in a conspicuous position where the discharge of water can be readily seen.

Water Installation Works: all plumbing works within the owner premises.

6. General

6.1 General Information for Obtaining Water Supply

6.1.1 Simplified Procedure

Under the simplified procedure introduced for the design and installation of water service installations within the customers premises, water service workers have full control over the water service works under their charge and due to **KAHRAMAA** jurisdiction.

In brief, the procedure requires the water service to notify **KAHRAMAA** before commencement of water service works by submitting all plumbing drawings like site plans and schematic drawings of the water service installation. Upon completion of the water service works, the service work certifies that the water service installation is completed in accordance with **KAHRAMAA** Water Supply Regulations.

6.1.2 Water Service Work

Water service work plumbing shall only be carried out due to **KAHRAMAA** water service jurisdiction of an appropriate class as prescribed by the latest edition of this **KAHRAMAA** Water Supply Regulations. The developer / customer shall engage an appropriate water service works by consultant to design, construct, alter or repair at his own cost the water service installation within his premises to convey the supply of water from **KAHRAMAA** water networks.

6.2 Water Service Works / Plumbing Requires a Professional Engineer (Consultant)

6.2.1 **KAHRAMAA** Customers Services Department decisions are mandatory requirements for implementation in the above mentioned project during execution. The applicant at this stage is exposed to these obligations for the implementation of the project.

All materials for services connection such as pipes & fittings, electronic water meter, water meter cabinet, etc. shall be subject to and comply with the latest edition of **KAHRAMAA** general specification of main lying of materials.

Materials used in direct connection with potable water services connection must comply with the International Standards (ISO, BS, EN, DIN). These standards have a set of specifications for the materials usage.

Any material used in direct contact with potable water, that cause or are likely to cause contamination to potable water in service renewal, repair or replacement, which conveys or receives water supplied for domestic or food production purposes, should be disinfected and sterilized prior to such connection. Moreover, all materials to be used in contact with potable water must have a health certificate issued by credited and approved by **kahramaa** world wide known quality body certifier (such as one of the following listed in this Regulation).

6.2.2 Seeking Water Service

When all water service works are completed, the customer / owner will need to apply for water supply at the Customer Services Department for the installation of water service to the premises.

6.2.3 Inspections by **KAHRAMAA** Inspectors

The **KAHRAMAA** inspector will carry out checks on completed water service installation on a premises. Where the water service installation is found not to be in compliance with the requirements specified, **KAHRAMAA** will require the water service owner, developer or customer to alter, repair or rectify the water service installation.

6.2.4 Developers / customers applying for water service supply to their private property / project development need a completion certificate and will pay a connection fee, depending on the size of connection to the development. The connecting pipe will then be laid from **KAHRAMAA** water mains to the meter service cabinet after the payment is made.

6.2.5 Annual Inspection and Cleaning of Water Storage Tanks

For any part of a water service installation having any water storage tank from which water for human consumption is drawn in residential premises, the customer has to do the necessary maintenance and clean the storage tanks annually. The water service installation is required to ensure that:

1. The storage tank (including any tap fitted to the storage tank) and its ancillary equipment.
2. The premises where the storage tank and its ancillary equipment are located and are kept properly locked at all times.
3. Checks are conducted regularly for the purpose of ascertaining (including any tap fitted to the storage tank) or its ancillary equipment which comes to his knowledge.

6.3 Water Ground

6.3.1 Water Ground Tank / Break Tank Capacity

Considerations affect the storage capacity:

1. The number of customers.
2. The type of building.
3. The fitting size to be served.

The ground storage tank capacity should be sufficient for 2 days of water demand.

Each case should be judged based on its properties, but for general guidance, the following table should be used in calculating the water demand during the design.

6.3.2 Water Ground Tank Type

- the Ground Water Tank should not exceed a distance of 5 meters from the Flow Meter Cabinet/Chamber, otherwise a break is required.
- All tanks should be provided with an overflow pipe connected to the discharge line.
- The ground water tank/ break tank could be above or under the ground. For the above ground tank, the inlet height should not exceed 3 m. for the underground tank, the inlet should be with FCV (float control valve)

6.4 Buffer/Break Tank (See the word file for this point and the above)

The compound main break should be implemented in case the distance between ground tank and

meter cabinet/ chamber more than 5 m". – “the capacity of the main break tank should be ¼ of the total ground tanks

Table No.1 Unit Water Demands per day (Domestic Category)

Land Use Category	Unit	Daily Water Consumption (Litres)
Residential Building	(Per Capita)	250-400
Qatari Villas	(Per Capita)	500-800
Worker Labor Accommodation	(Per Capita)	80-150
Mixed Use Residential	(Per Capita)	250-400

(Source: **KAHRAMAA** Water Development Guidelines for Bulk Customer, April 2012)

Table No.2 Unit Water Demands (Non-domestic Category)

Land Use Category	Unit	Daily Water Consumption (Litres)
Mixed Use Commercial	(Per Capita)	60-80
Commercial Building	(Per Capita)	60-100
Mosque	(Per Capita)	10-50
Restaurant	(Per Meal)	10-20
Hotel	(Per Room)	200-300
Shop	(Per Capita)	60-80
Office	(Per Capita)	60-80
School	(Per Capita)	60-80
University	(Per Capita)	60-80
Medical	(Per Bed)	60-80
Public Amenities	(Per Capita)	20-50
Nursery	(Per Capita)	60-80
Guard House	(Per Capita)	60-80
Retail	(Per Capita)	60-80
Theatre	(Per Capita)	10-50
Stadium	(Per Capita)	15-20
Town Centre	(Per Capita)	60-80
Manufacturing	(Per Capita)	60-80

6.5 Roof Tank

- The roof tank should be under shade or shelter for conservation, and protected for direct sun radiation.
- the compound main break should be implemented in case the distance between ground tank and meter cabinet/ chamber more than 5 m
- the capacity of the main break tank should be ¼ of the total ground tanks

6.6 Roof Plumbing

- All pipes and fittings materials as per Kahramaa approval list should be thermal heat insulated by insulating materials. Materials used should be non conductive of heat (Fibrous material or Cellular material) with Aluminium cladding to protect and thermal block from direct sun radiation.

Note: The above two points will be applied to all application categories.

6.7 Water Meter Cabinet

- The Water Meter Cabinet is required for Water Meter with size ranging from Ø22mm to Ø54mm and should be compatible with the AMR System.
- Service cabinet must be installed on the boundary wall to the nearest point to **KAHRAMAA** water networks either in front of the premises or at the back of it.
- The service pipe internal diameter size must be refer to drawings NDS-SD-220A, NDS-SD-220B, NDS-SD-220C.
- The service pipe line must be embedded and installed at height 1.1 m. from the ground level (road level). (220 drawings to be add)
- Bottom of the embedded water service cabinet must be 80 mm PVC duct embedded in the wall until 0.3 m of the road level ending with 45 degrees, 80 mm PVC elbow.
- The gate valve must be installed indoors between the cabinet and the ground tank ball valve, and all fittings should be soldered.
- Water service cabinet design and specification figure No. (CSD-CSI-01-2011)
- Break tank “: Water meter cabinet should be adjacent to the plot boundary and ground water tank / break water tank should not exceed a distance of 5 meters from the Meter Cabinet

6.8 Legislation

Each building or facility could be supplied by one connection to the water network. Additional connections if necessary and deemed required for technical reasons are possible subject to concerned department approval

7. Villa, Row House & House Requirements

7.1 Ground Water Tank:

The Water Tank that holds the ultimate demand - including domestic or others.

- For Villa, Row House, Public House, Ground Water Tank is required and its capacity should be minimum 2000 US gal or 7.6 m³.
- In case of more than 7 persons, additional capacity of 85 US gallons (320 Litres) x no. of persons is required.
- The ground water capacity should be sufficient for 2 days of water demand.
- In case of villa or public house, that uses pressurized system, the ground tanks must be sufficient for relevant high consumption.
- In case of public house or villa they may have ground tanks and roof tanks.
- In case of villa with slope roof floor or gable, and workshops, the roof tank must be installed in steel stand to elevate the tank. See figure (CSD – CSI – 09 -01) will emanate the installation.
- In case of agricultural surfaces and swimming pools, it is recommended to require an extra ground storage tank which will be utilized as a separate tank for domestic ground reservoir.
- In case of mixed commercial / residential properties, separate ground / roof tanks should be provided for residential and commercials and each ground tank capacity should be sufficient for 2 days of water demand.
- The water booster pump must be installed in a legal position downstream (outlet discharge point from that tank) with a non-return valve (one directional valve) then conveyance water towards roof tank.
- Ground Water Tank should not exceed a distance of 5 meters from the Flow Meter Cabinet/ Chamber, otherwise a break is required.
- Service duct should be laid for M-Bus cabling from the water meter to the electrical meter. Service duct should be HDPE with the inner diameter of 32mm.

Roof Tank

Should be minimum (600 US gal or 2.3 m³) for public house or villa and other utilities building (guard room).

7.2 The Water Booster Pumps

- Water pump is required for boosting and conveying the water from the ground water tank to the roof water.
- All the pumps must be automatic with floating switch on (low level or high level switch).
- Water pump must be set under the maximum pressure not exceeding 3 bar or 43 PSI.
- Water pump total head should be more than 20m per head for two story buildings. Others should be decided by the designer.

8. Residential Compound Requirements

Residential compound could be one of two types:

- Pure villa compound. See figure (Housing Complex Drawing, Nos. 1 And 2)
- Combined villa & building compounds. See figure (Building Complex) or of villa and buildings, this will emanate the installation.

8.1 Water Meter Service Cabinet AMR compatible:

- Meter chamber is required in case of tie in point to the residential compound, its internal diameter should be 80mm or more, the water meter chamber is required. See figure (NDS / SD / 133).
- All tapping for branch service connection inside the compound should be from the internal water network, by using gun metal ferrule for each service connection. See (DRG.no. NDS/SD/220B).
- Villa, Raw House & House Requirements:

Service duct should be laid for M-Bus cabling from the water meter to the electrical meter. Service duct should be HDPE with the inner diameter of 32mm.

- Towers, Residential flats requirements:

Service duct should be laid for M-Bus cabling from the water meter to Main Electric (LV) Room. Service duct should be HDPE with the inner diameter of 32mm.

8.2 Compound Water Tanks (break tanks, individual villa ground tanks):

8.2.1 The villa compound water tanks requirements:

Individual villas in a compound:

- The main ground reservoir capacity should be minimum (2000 US gal).
- In case of more than 7 persons, additional capacity of 85 US gallons (320 Litres) x no. of persons is required.
- Water tank must be on concrete base 0.2m thick.
- The supply inlet point to water tank must be on top of the water tank with ball valve. See figure (House Complex Drawing, no. 1) will emanate the installation.
- The water booster pumps should be fixed legally on the downstream discharge points from water tank.
- Each villa should have a roof tank with minimum capacity (600 US gal or 2.3 m3) using the gravity as power conservation system.
- Ground Water Tank should not exceed a distance of 5 meters from the Flow Meter Cabinet/ Chamber, otherwise a break is required.

- The compound main break tanks will be 1/4 of the total compound ground tanks demand if each separate villa in the compound has its ground tank. See figure (House Complex Drawing, no. 2) will emanate the installation
- Sectional Panel GRP Tank: Must be as per **KAHRAMAA** specifications. This tank must hold the design proposal water demand as shown table No.1 and 2. This tank should submit with all the relevant requirements in drawings at the building permit stage in the location and capacity on the appropriate 0.30m concrete plinth.
- Concrete Tank either underground or above the ground: Must be constructed due to "QCS" latest edition. The utilization of epoxy coated reinforce steel bar, in accordance with the specification, with commensurate water demand, requires the ventilation, GRP ladder and manhole cover exposed 0.10m above the floor level. To avoid the surface water entries. See figure (NDS – SD – 217A) will emanate the installation.

8.3 Compound Internal Water Network:

The internal water network inside the compound:

- Internal water network should be laid in only one side of the service road inside the compound.
- Pipes should be as per Kahramaa approval material list with the inner diameter (80mm, 100 or 150mm).
- Pipes should be laid in 0.90m as per kahramaa standard drawings (221). 0.20m sand dune is required as base for the network pipes. Further, 0.30m backfill of the sand dune over the network pipes.
- Internal water network pipe should be on the other side of the sewerage network pipes to avoid the contamination.
- All tapping for branch service connection inside the compound should be from the internal water network, by using gunmetal ferrule (gunmetal refer to BS 1400 - LG2), for each service connection. See (DRG.no. NDS/SD/220B).
- Network control valves should be gate valves, For 100-300mm-dia. pipes, use Sluice Valves; for 400-mm dia. & above: use Butterfly Valves. For 100-300mm Sluice valves: use Valve boxes (KM drawing NDS-SD- 230 Rev-01) and for 400mm- dia. & Above Butterfly Valves: use chambers
- At the service connection stage, the internal network should be inspected before the embankment of the compound internal network.
- The hydro test: The pressure test should reach 6 bar.
- Trench marker tape for all material approved by KM pipes should be laid in 0.5 m on top of water pipes
- Pipes should be laid in 0.90m depth of the road level. 0.20m sand dune is required as base of the network pipes. Further, 0.30m backfill of the sand dune over the network pipes: As per KM standards & Specifications, please refer to KM Standard drawing, NDS-SD-221
- All road crossing SC is to be provided with 150 upvc service duct as per the drawing number NDS-SD-17B- reinstatement- Rev- f

9. High Buildings: Towers, Residential flats and Offices Requirements

8.4 The residential compound water booster pumps:

- Set of 3 water pumps are required for boosting and conveying the water from the main water tanks into the internal water network.
- All the pumps must be automatic with the pressurized system to switch on.
- All pumps must be set under the maximum pressure not exceeding 3 bar or 43 PSI.
- Selection of water pumps should be with the sufficient total head.

8.5 Individual branch water meter for flats, offices or apartments:

- Water meters can be installed in each floor for all flats or apartments in dwelling buildings, moreover inside the combined residential compound.
- Branch water meters can be installed on the roof under the below conditions:
 1. Should offer 24 hours accessibility to enter the roof for monitoring maintenance meters.
 2. Minimum 2 roof tanks should be above the stair case. The downstream discharge header should be minimum 80mm tube.
 3. Those meters should be installed vertically and embedded on a small wall 2.0m in height.
 4. The bottom of the cabinets should be steel trench that protects all plumbing.
- Each villa, club house, guard house and any other utilities buildings inside the compound should have a separate meter in an approved service cabinet. See figure (CSD – CSI – 1 – 2012) and (CSD – CSI – 2 – 2012) will emanate the installation. At 1.0m bottom edges high form the compound road level.
- Flats or apartment should have a separate water meter in an approved branch water cabinet. See fig. (CSD – CSI – 2 – 2012) will emanate the installation.
- Sub main meter required for each building inside the combined compound meter should be in the approved meter cabinet compatible with the AMR system.

For residential multi stories buildings, tenement and towers requirements:

- All individual apartments, flats, offices and retail, should have a separate water meter installed on the same floor in an approved branch meter cabinet, AMR compatible.
- Citation in all relevant drawings submitted by consultant e.g. Schematic Diagram for over all buildings showing the 22mm branch water meters should be in each floor.
- All branch water meters should be installed in the approved branch meters cabinet AMR compatible. See fig. (CSD - CSI - 2 - 2012) will emanate the installation.
- The consultant must determine the location of sub meter to be closer to OTS duct (Open To Sky) through which the 100mm discharge header is pass through.
- Allusion by consultant must consider the individual meter cabinets to be in suitable location e.g. corridor for easy monitoring and handling (at 100mm from the finish floor level).
- Clear citation of the pressure reducing valve in each floor taping before the corresponding individual sub meters must be set less or equal to 3 Bar or 42 PSI for meter accuracy. See figure (CSD - CSI - 2 - 2012) will emanate the installation.
- Non Return Valve is required downstream of the proposed meter to be installed. See figure (CSD – CSI – 2 – 2012) will emanate the installation.
- Drain is required at the bottom of the cabinet conveying water to OTS Duct.

9.1 Main Water Meter Cabinet:

- Approved water meter cabinet (AMR compatible) is required for the service connection (54mm).
- It must be installed and embedded in the boundary wall of the plot or premises adjacent to **KAHRAMAA** water main. This should be mentioned in the drawing Service Site Plan (SSP) water layout in building permit stage.
- In case of large diameter water service connection required, the meter chamber must be constructed at the approved drawings BP (Building Permit) stage. See figure (NDS / SD / 133) will emanate the installation.
- Service duct should be laid for M-Bus cabling from the water meter to Main Electric (LV) Room. Service duct should be HDPE with the inner diameter of 32mm.

9.2 Branch Water Meter Cabinet (AMR) compatible is required:

- Branch meters orientation should be installed in each floor with 32mm PVC conduit with nylon robe from the branch meter cabinet AMR compatible. See figure (CSD - CSI - 2 - 2012) will emanate the installation.
- The pipe inside cabinet should be brass to install meter (sizes: 22mm-42mm)

10. Malls, Commercial centres (offices, retails, shops, Industrials,etc.)

Requirements.

- Each flat, apartment, retail and office should have separate water meters installed on each floor, inside the approved branch meter cabinet, AMR compatible. See figure. (CSD – CSI – 2 – 2012)
- The branch meter cabinet should be installed 1.0m above the floor level. The branch meter cabinet should be embedded in the wall.
- Branch water meters can be installed on the roof under the below conditions:
 1. Should offer 24 hours accessibility to enter the roof for monitoring maintenance meters.
 2. Minimum 2 roof tanks should be above the stair case with header minimum 80mm.
 3. Those meters should be installed vertically and embedded on a small wall 2.0m in height.
 4. The bottom of the cabinets should be steel trench that protects all plumbing.

9.3 Towers & multi story buildings water demand:

- The total demand for all flats and apartments is 500 US gal or 1.9 cubic meter and should be sufficient for 2 days.
- The total demand should be calculated and should be in the ground tank capacity.
- 500 US gal or (1.9m³) x total number of flats or apartments.
- The ground tank or reservoir that holds this total demand is calculated as mentioned above -this ground tank can be in the ground floor or basement.
- This reservoir or tank that holds the total demand can be a regular PE tank, a concrete tank or a sectional panel GRP tank.
- Water ground reservoir can be an approved tank, a sectional panel GRP tank or underground concrete tank. See figure (NDS-SD-217A), citation of this total demand should be made clear at the BP stage to be revised by CSD engineer.

9.4 Towers & multi stories buildings lifting pumps:

- Determine the proposal pump total head, foregoing your set of pumps total head that requires conveying the domestic water via the roof tanks.
- Determine the lifting pump total head that exceeds the tower's height, otherwise the break tanks at suitable floor is required, until it reaches the tower roof floor and conveys water by gravity to all apartments / fats / offices.
- This to be allusive clearly in water schematic diagram submitted at the BP stage.

10.1 Main Water Meter Cabinet:

- Approved water meter cabinet (AMR compatible) is required for the main service connection.
- It must be installed and embedded in the boundary wall of the plot or premises adjacent to **KAHRAMAA** water main. This should be mentioned in the drawing Service Site Plan (SSP) water layout at the building permit stage.
- In case of large diameter water service connection required, the meter chamber must be constructed at the approved drawings BP (Building Permit) stage. as in figure (GIS / STD / 52 - 06A) will emanate the installation.
- Service duct should be laid for M-Bus cabling from the water meter to Main Electric (LV) Room. Service duct should be HDPE with the inner diameter of 32mm.

10.2 Branch Water Meter Cabinet AMR compatible is required:

- Branch meters orientation can be installed in each floor with 32mm PVC conduit with nylon robe from the branch meter cabinet AMR compatible. See fig. (CSD - CSI - 2 - 2012) will emanate the installation.
- Branch water meters could be install on the roof under the below conditions:
 1. Should offer 24 hours accessibility to enter the roof for monitoring maintenance meters.
 2. Minimum 2 roof tanks should be above the stair case with header minimum 80mm.
 3. Those meters should be installed vertically and embedded on a small wall 2.0m in height.
 4. The bottom of the cabinets should be steel trench that protects all plumbing.
- Required water in the Mall (each shop, retail, office... etc.) should have a separate water meter installed in on each floor inside the approved branch meter cabinet, AMR compatible See fig. (CSD – CSI – 2 – 2012).
- The branch meter cabinet (AMR compatible) should be installed 1.0m above the floor level. The branch meter cabinet should be embedded in the wall.

10.3 Malls & commercial centres total water demand required:

- The total demand for total number of retails, shops, offices is 400 US gal or (1.5 m³) each. There should be sufficient tank for 2 days.
- The total demand should be calculated as table 1,2 (page) should be in the ground tank capacity.
- 400 US gal or 1.5m³ x total number of retails, shops, offices...etc.
- The ground tank or reservoir that holds the total demand is calculated as mentioned above. See table 1,2 (page) .
- This ground tank could be in the ground floor or basement.
- This reservoir or tank that holds the total demand can be regular PE water tanks, sectional panel GRP, concrete tanks or tanks. See figure (NDS - SD – 217A).

11. Fire system & Fire meter Requirements

- we propose to add: Ground Water Tank should not exceed a distance of 5 meters from the Flow Meter Cabinet/Chamber, otherwise a break is required.
- Water ground reservoir can be PE tanks, a sectional panel GRP tank or underground concrete tanks. See figure (CSD-09-04) / (NDS - SD - 217A) The citation of this total demand with all relevant drawings should be submitted at the BP stage to be revised by CSD engineer.

Fire systems used in buildings are usually either a sprinkler system type or a hose reel type - this will be authorized by CDD.

- A water meter is required for a fire system, upstream of the fire, if there is a separate water tank.
- A fire system inside a residential complex will be approved by CDD, but if there is a separate fire water tank, the water meter is required upstream of the tank.
- Water tanks and water demand required for fire, must be considered in calculation with the domestic demand.
- In case of separate fire tanks for the fire system in the building, the fire water meter will be installed upstream of the tanks.
- Fire system supply from the combined water reservoir; In case of combined water tanks, the fire meter should be installed down stream, within 1.5m spool pipe far from the fire water pumps.
- This should be clearly mentioned in the submitted drawings, and mentioned clearly in the water schematic diagram at the Building Permit stage, in order to be revised by CSD authorized engineers.

12. Specification of Pipes and fittings Material for water network

12.1 All materials must have a health certificate in contact with potable water up to 50 °C as per requirement of BS 6920 "Suitability of Non Metallic Products for use in contact with Water Intended for Human Consumption with regards to their effect on the quality of Water" issued by an accredited international worldwide known quality body certifier.

All materials related to the water network inside premises or privet project shall be follow General Specification of Main Laying Materials for Water Works. (WP- P5/ S1) such as:

1. Ductile Pipes & Fittings.
2. Coupling & Flange adaptors.
3. Wrapping Tape, Putty & Primer.
4. Polythene sleeving, Trench Marker Tape & Black Adhesive Tape.
5. Heat Shrink Sleeve, Putty.
6. Gate Valve.
7. Butterfly Valve.
8. Air Valve.
9. Fire Hydrants.
10. Check Valve.
11. Surface Box.
12. Marker Post & Indicator Plate.
13. Copper Tubes & copper fittings.
14. Stop cocks.
15. Electronic Flow meter.
16. Stainless steel Repair clamps.
17. Precast concrete Chamber Units.
18. UPVC Duct for road crossing.
19. EPDM Rubber.
20. Bolts, Washers & Nuts.

13. Specification of Pipe Material for Internal Plumbing:

13.1 Suitability of materials:

- All materials must have a health certificate in contact with potable water up to 50 °C as per requirement of BS 6920 "Suitability of Non Metallic Products for use in contact with Water Intended for Human Consumption with regards to their effect on the quality of Water" issued by an accredited international worldwide known quality body certifier.
- All pipe and fittings materials should be suitable for use with the range of chemical characteristics of the water, and should comply with the W.H.O. Guidelines as detailed in General Specification of Main Laying Materials For Waterworks WP-P5/ S1
- All materials should be suitable for using and storing in the environmental conditions detailed in section 7.3 and normal working water temperature of 50 °C. (Site enviromental conditions as detailed in General Specification of Main Laying Materials For Waterworks)

The material used for internal plumbing such as:

- Copper pipes and fittings.
- Polypropylene pipes & fittings.
- CPVC pipe and fittings.
- HDPE pipe and fittings.

13.2 Copper pipes and fittings:

- The copper pipes should be manufactured to BS-2871, Part 1, table 'Y' & table 'X' / EN 1057
- Tube samples and test results including 'drift test' results shall be provided at the client's request.
- The coiled tubing should be secured against uncoiling during transit, the straight lengths should be supplied in wooden boxes, and fitted with end caps to prevent damage during transit.
- All tubes should be new and factory fresh, tubes which have developed thick 'patina' through standing in stockyards etc. will not be accepted.

Sheathing (for underground pipe only):

- The copper tubes should be externally coated over their entire length with continuous seamless polyethylene sheathing as per BS 13349. The colour of this sheathing should be green / blue.

Fittings:

- The compression fittings should be manufactured to BS - 864, Part 2, type 'B', and should be the 'manipulative' type with 2 locking rings and marked as BS 864.2.
- The capillary fittings should be manufactured to BS - 864, Part 2, and should be of the 'integral' solder ring type and marked as BS 864.
- All the above fittings as referred in Clause 3.1.1 & 3.1.2, should be suitable for use with copper tube to BS - 2871, Part 1, table 'Y' & 'X' / EN 1057, should also be suitable for underground use with potable water and should be wrapped by lubricated tape.
- All poly fittings should be compression type and shall be manufactured to BS 864, Part 3, type 'A' marked as BS 864.3 and should also be suitable for use with potable water.
- All nuts on these fittings should be hexagonal or octagonal.
- All fittings must be new, clean and recently manufactured.

Marking:

All fittings should have engraved and/or cast the following:

- a. The manufacturer's name and identification mark.
- b. British standard number.
- c. Compression Fittings - BS - 864.2 or BS - 864.3
- d. Capillary Fittings - BS - 864
- e. Poly adapters - BS - 864.5
- f. The size of the fitting in mm.

Materials:

- All fittings including nuts and bolts, unions, etc., are to be manufactured from 'gunmetal' to BS-1400 LG2 or DZR Brass, unless other materials are specified elsewhere in the specifications. Gaskets to be supplied with fittings in this section must be suitable for use with potable water.

13.3 Polypropylene pipes & fittings:

- Polypropylene Pipes & Fittings used for conveyance of potable water shall be manufactured in accordance with DIN 8077, ISO 4065, ISO 15874 or equivalent and shall be manufactured by ISO Certified Company.
- Polypropylene Pipes shall be PP-R type 3, PN16.
- Polypropylene Pipes shall be white or blue color.
- Hydrostatic Test Pressure shall be 1.5 times the working pressure.
- Polypropylene Pipes & fittings shall be Kite Marked certifying it complies with ISO 15874 or equivalent DIN, BS Standard.
- Polypropylene Pipe shall be protected with GRP duct (PVC DUCT) when laid aboveground along customer wall premises. Two sizes are allowed; 2" duct for 20mm (1/2"), 25mm (3/4") & 32mm (1") and 3" duct for 50mm (1 1/2") & 63mm (2"). The GRP duct shall be of semi-circular shape and be firmly fixed to the wall with brackets.
- Polypropylene Pipe shall have detectable warning tape of 150mm wide, 250 microns thickness to detect the pipe through metal detector.
- Polypropylene Pipes (Material): All materials coating shall be WRC, DVGW, SGS, and DWI, KIWA, NSF 61 or other worldwide known quality body certifiers in contact with potable water at +50 degrees centigrade.
- The pipes & fittings used for conveying potable water or likely to come into contact with potable water shall not constitute a toxic hazard, shall not support microbial growth and shall not give rise to unpleasant taste, or odor, cloudiness or discoloration of water.
- Polypropylene pipe and fittings shall be manufactured from natural virgin copolymer polypropylene material of a single or bi-modal process of manufacture with no added plasticizers, pigments or re-grind.

Fittings

- All fitting and valve shall be compression type (Gunmetal).
- For underground installation fitting and valve shall be made of Gunmetal BS 5433 crutch head with gunmetal ended compression couplings to fit PPR pipe both sides for all size range from 20mm up to 63mm.
- For aboveground installation inside/outside service cabinet before water meter – fitting and valve shall be of Brass tamper proof lockable type as per discretion of the concerned Engineer. Suitable size of gunmetal compression couplings at both sides shall be used in connecting PPR Pipe of all size range from 20mm up to 63mm.
- Saddle straps for service connections shall be flat boss type suitable for tapping from 1/2" up to 2" diameter ferrule. The strap shall be suitable for making service connections under pressure or dry using approved tapping machine into DI, AC Steel or PVC pipes. The saddle shall be of two parts fitted with EPDM sealing gasket in a groove on the underside of the flat boss.
- The flat boss shall be cast with a hole or marking through the boss to facilitate the drilling and tapping process. The straps shall be supplied un-drilled.

- The saddle strap shall be of gunmetal to BS 1400-LG2 with stainless steel nuts, bolts and washer to ISO 3506 and shall be suitable for a working pressure of up to 16 bar.
- The name of manufacturer, patent number, pipe diameter to which the strap is suitable, and pipe material shall be engraved on the saddle strap.
- The saddle strap shall be accompanied by manufacturer's certificate stating date of manufacture, material specification.

Marking:

Pipes shall be marked as follows:-

- Manufacturer's name.
- Standard.
- Nominal size of pipe in mm [nominal outside diameter x nominal wall thickness].
- Pressure rating in Bar.
- Month & year of manufacture.
- Body of the fittings should have Manufacturer's name/ logo.

Packaging:

All compression fittings must be individually packed in transparent protective bags indicating its type and size.

- All compression fittings must be packed in cartoon boxes.
- If only one type of product is packed, all cartoon boxes shall have a label showing the manufacturer identification, the description of the product, the drawing of the product, the relevant size and the quantity.

13.4 CPVC pipe and fittings:

CPVC is a thermoplastic polymer material used for hot and cold potable water networks.

Certificate: CPVC pipe and fittings shall be manufactured according to the following international standard ISO 15877-2009 or equivalent.

- CPVC must have a health certificate issued by Worldwide Known Quality Body Certifier in accordance with requirement of BS6920 "Suitability of non-metallic product for use in direct contact with water intended for human consumption with regards to their effect on the quality of water".
- CPVC pipe, fittings and solvent cement for joining shall be suitable for use with the range chemical characteristics of the water and complies with water quality requirement.

- Solvent cement for CPVC shall conform to the requirements of EN ISO 15877 or equivalent.
- CPVC material shall withstand 1 ppm of Chlorine (Cl₂) or chlorine dioxide (ClO₂) at a water temperature + 50 °C.

Technical data: All pipe shall be suitable for working pressure PN 16 (SDR 13.5)

Table No.3

Outside diameter		Inside diameter (mm)	Wall thickness (mm)	Weight (kg/m)
mm	inch			
16	½	13.2	1.4	0.1
20	¾	17	1.5	0.151
25	1	21.2	1.9	0.234
32	1 ¼	27.2	2.4	0.379
40	1 ½	34	3	0.582
50	2	42.6	3.7	0.896
63	2 ½	53.6	4.7	1.43

Marking:

CPVC pipe shall be marked as follows:

- Manufacturer's name and logo.
- Standard.
- Pipe size in mm or inch.
- SDR.
- Pressure rating in Bar.
- Production date.
- CPVC indicator.
- If the pipe is for potable water, a laboratory seal or mark attesting to suitability for potable water.
- Resin type or cell class according to ASTM D-1784, e.g. CPVC 23447.

Table No.4 Material composition:

Specification	Value
Density	1.500 g/m ³
Coefficient of Thermal Expansion	0.7 (x10 ⁻⁴ K)
Thermal Conductivity	0.14 W/MK
Operating Temperature	95°C
Tensile Strength (at 23 °C)	55 MPa
Operating Pressure	16 bar
Oxygen Permeation (cm ² /m.day.atmosphere) at 70 °C	<1
Water Absorption	<= 0.040 %

13.5 HDPE pipe and fittings:

Polyethylene pipes & fittings used for conveyance of potable water shall be manufactured in accordance with DIN-8074, BS 6730, BS 6572, ISO 4427 or equivalent and shall be manufactured by ISO Certified Company.

Polyethylene pipes shall be HDPE, PE-100, SDR 11, PN-16 bar.

Polyethylene pipes shall be multi-layer construction. (Black HDPE with outer layer blue HDPE)

Hydrostatic test pressure shall be 1.5 times the working pressure.

Polyethylene pipes & fittings shall be Kite Marked certifying it complies with ISO 4427 or equivalent DIN, BS standard.

Pipe manufacturers must furnish test certificate in accordance with EN 10204-3.1 for batches of HDPE supplied.

Polyethylene pipes shall be protected with GRP duct when laid aboveground along customer wall premises. two sizes are allowed; 2" duct for 20mm (1/2"), 25mm (3/4") & 32mm (1") and 3" duct for 50mm (1 1/2") & 63mm (2"). the GRP duct shall be of semi-circular shape and be firmly fixed to the wall with brackets.

Polyethylene pipe shall have detectable warning tape of 150mm wide, 250 microns thickness to detect the pipe through metal detector.

Polyethylene Pipes (Material):

Polyethylene shall be manufactured from virgin polyethylene resin of a single or bi-modal process of manufacture. Master batching and/or re-grind material is not permitted.

Polyethylene pipes installed in the water meter service cabinet between stop cock and water meter or in direct sunlight shall be black in colour, UV resistant, of solid wall construction to ISO 4427, all as per discretion of the Engineer.

the polyethylene pipe shall be confirming the specification as given in Table 5.

Table No.5 The specification of the polyethylene pipe.

Specification	Value
Min density measured according to ISO 1872	949 Kg/m ³
Melt flow rate measured according to ISO 1133	@ 2.16 Kg. load= 0.18g/10min. @ 5 Kg. load = 0.18/10min.
Ttensile strength at yield	18 Mpa
Elongation at break	600 %
Elongation	10 %
Thermal conductivity	0.32 W/m ^o K
Vicat softening point at 1 Kg. load	122°C
Flexural Modulus- astM d790	900 MPa
tensile strength astM d638	30 MPa
Hdt @ 0.46 MPa – astM d648	90°C
Hdt @ 1.82 MPa – astM d648	58°C

Length And Size:

the polyethylene pipes are normally supplied in coils as per the specification given in Table 23 (or in bundles of straight lengths of 12 up to 500m as per the discretion of the Concerned Engineer).

Table No.6 The polyethylene pipe sizes (in mm) and coils (in meters)

nom. Ø	Min. Ø	Max. Ø	Min.Wall thickness	Max. Wall thickness	Max. Coil length
20	20	20.30	2.30	2.80	500
25	25	25.30	2.30	2.80	400
32	32	32.30	3.00	3.50	300
40	40	40.30	3.70	4.30	300
50	50	50.30	4.60	5.30	300
63	63	63.40	5.80	6.70	200

the ovality of the pipe in coils as manufactured shall not exceed the value of 0.06 of the nominal size of the pipe.

the ovality of the pipe in coils after relaxation and straight pipe shall not exceed the value of “1 + (0.008 of the nominal size of the pipe).

Fittings:

all fitting for polyethylene pipes (HDPE) shall be compression type (Gunmetal) and all details are given in Section 15.

Stop Valve:

For underground installation - stop valve shall be made of gunmetal BS 5433 crutch head with gunmetal ended compression couplings to fit HDPE pipe both sides for all size range from 20mm up to 63mm.

For aboveground installation inside/outside service cabinet before water meter stop valve shall be of brass tamper proof lockable type as per discretion of the concerned engineer. Suitable size of gunmetal compression couplings at both sides shall be used in connecting HDPE pipe of all size range from 20mm up to 63mm.

Flanged Fittings:

Flange adaptor to join HDPE pipe to flanged equipments (63mm od HDPE pipe to 2” Ø flange to BS 4504 / ISO 7005, BS EN 1092-2 with PN 16 rating). Material: black coated steel or SG Iron to BS EN 1563:1997 Grade EN-GJS-450-10, Gasket: EDPM compound Grade ‘E’.

Saddle Straps:

Saddle straps for service connections shall be flat boss type suitable for tapping from ½” up to 2” diameter ferrule. The strap shall be suitable for making service connections under pressure or dry using approved tapping machine into DI, AC steel or PVC pipes. The saddle shall be of two parts fitted with EPDM sealing gasket in a groove on the underside of the flat boss.

The flat boss shall be cast with a hole or marking through the boss to facilitate the drilling and tapping process. the straps shall be supplied un-drilled.

The saddle strap shall be of gunmetal to BS 1400-IG2 with stainless steel nuts, bolts and washer to ISO 3506 and shall be suitable for a working pressure of up to 16 bar.

The name of manufacturer, patent number, pipe diameter to which the strap is suitable, and pipe material shall be engraved on the saddle strap.

The saddle strap shall be accompanied by manufacturer’s certificate stating date of manufacture, material specification.

Ferrule:

Ferrule shall be of gunmetal BS1400-LG2 body with gunmetal compression coupling outlet suitable to fit directly with HDPE service pipe of all size from 20mm to 63mm, for underground application. Gunmetal with PE compression coupling outlet is unacceptable.

Ferrules shall be the screw down valve type allowing for the shut off of the flow by means of “Ω” square head spindle extending from the top cap for opening and closing. The valve shall close clockwise.

The ferrule stem, banjo, spindle, inner plug and top cap shall be of gunmetal to BS1400-LG2. the washers shall be of EPDM and shall provide the sealing between the outer body and the ferrule stem. A polyethylene top plug shall prohibit the ingress of dirt.

The ferrule shall be designed as a main stem with a 360° swivel outlet at 90° with control of water flow via the threaded inner plug. the inlet shall be male taper thread to BS 21.

The ferrule shall be suitable for drinking water at a temperature of up to 50°C and capable to sustain a working pressure of up to 16 bar without leakage.

The ferrule shall permit the installation of service connection using under pressure tapping through flat boss saddle straps.

Joints:

Fittings shall be of the slide and tighten type using a dynamic sealing method and positive grip.

Marking:

Pipes shall be marked as follows:

- Manufacturer’s name.
- Standard.
- Nominal size of pipe in mm [nominal outside diameter x nominal wall thickness].
- SDR.
- Pressure rating in Bar.
- Month & year of manufacture.
- Body of the fittings should have Manufacturer’s name / logo.

Packaging:

All compression fittings must be individually packed in transparent protective bags indicating its type and size.

all compression fittings must be packed in cartoon boxes.

If only one type of product is packed, all cartoon boxes shall have a label showing the manufacturer identification, the description of the product, the drawing of the product, the relevant size and the quantity.

14. World Wide Known Quality Certification Bodies:

Handling & storage:

Pipes and fittings shall be handled and stored carefully as per manufacturer's recommendation.

From manufacturer to laying stage, pipes & fittings shall be stored and transported in covered area to avoid direct sunlight.

All damaged pipe & fitting due to mishandling shall be rejected.

Table No.7

<p>WRC Evaluation And Testing Center, WRAS "Water Regulations Advisory Scheme".</p> <p>Fern Close, Pen-y-Fan Industrial Estate Oakdale, Gwent NP11 3EH, U.K.</p> <p>Tel.: +44 (0) 1495 248 454 Fax: +44 (0) 1495 249 234 www.wras.co.uk info@wras.co.uk</p>	<p>DVGW "The German Technical And Scientific Association For Gas And Water".</p> <p>Josef- Wirmer - Straße 1-3, D - 53123 Bonn, Germany</p> <p>Tel.: +49 228 9188 5 Fax: +49 228 9188 990 www.dvgw.de info@dvgw.de</p>	<p>Kiwa Water Research</p> <p>Groningenhaven 7 3433 PE Nieuwegein PO Box 1072 3430 BB Nieuwegein, Holland</p> <p>Tel: +31 30 606 9511 Fax: +31 30 606 1165 alg@kiwa.nl</p>
<p>WRc - NSF</p> <p>Henley Road, Medmenham, Marlow Bucks SL7 2HD, U.K.</p> <p>Tel.: +44 (0) 1495 636 500 Fax: +44 (0) 1495 636 501 www.wrcnsf.com wrcnsf@wrcplc.co.uk</p>	<p>NSF "National Standard Foundation".</p> <p>P.O. Box 130140 789 N. Dixboro Road Ann Arbor, MI 48113-0140, USA</p> <p>Tel.: +1 734 769 8010 Fax: +1 734 769 0108 www.nsf.org info@nsf.org</p>	<p>SIRIM QAS International Sdn. Bhd</p> <p>1, Persiaran Dato Menteri, Seksyen 2, Peti Sural 7035 40911 Shah Alam Seiangor Darul Ehsan, Malaysia</p> <p>Tel: +60 3 5544 6400 Fax: +60 3 5510 9439 www.sirim-qas.com.my</p>
<p>LaboratoRI SpA</p> <p>Via Vitorchiano, 165/167 00189 Roma, Italy</p> <p>Tel.: +39 06 5799 2600 Fax: +39 06 5799 2629 www.laboratorispa.it soultion@laboratorispa.it</p>	<p>Aquacheck Ltd</p> <p>Europa Business Park, Barcroft Street BURY, Greater Manchester BL9 5BT, U.K.</p> <p>Tel.: +44 (0) 161 7638 777 Fax: +44 (0) 161 7638 788 www.aquacheck.co.uk aquacheck@aquacheck.net</p>	<p>Australian Water Quality Center</p> <p>Hodgson Road, Bolivar, South Australia P.O.Box: Private Mail Bag 3, Salisbury SA 5108</p> <p>Tel.: +8 8259 0211 Fax: +8 8259 0228 awqc@sawater.sa.gov.au www.awqc.com.au</p>

Note: The manufacturer should get a certificate for their product for the suitability in contact with potable water at 50 °C, as per the requirement of BS 6920 or equivalent, from one of these quality certification bodies (Laboratories). All submitted certificates shall either be "original" or a "notarized copy". If the certificate does not state such information, the full test report (form the certifier) for the raw material or material product (including the product name, test conditions and methods, extract temperature for the sample, and the final results) must be either an original or a notarized copy by a third party.

15. Customer Number Plate

Plate indicating the customer number shall be fixed on the corresponding premises. See figure (Drawing No. FSD / FCS / 65). This customer number shall be the reference number in the billing system for the relevant customer account for both **KAHRAMAA** services.

16. Appendix

16.1 Typical drinking water quality:

Table No.8 W.H.O. and E.U. Guidelines

Parameters	Unit	KM Requirement (MCL)
Physical		
pH	-	6.5 - 8.5
Appearance	Qualitative	Acceptable
Chemical		
Total alkalinity as CaCO ₃	mg/l	60 - 120
Lead	mg/l	0.01
Manganese	mg/l	0.05
Aluminium	mg/l	0.2
Disinfectants		
Chlorine dioxide	mg/l	≥ 0.05 mg/l
Disinfection by-products (DBP)		
Bromate	µg/l	10
Trihalomethane (THM)		
Chloroform	µg/l	200
Microbiological		
Total coliform	cfu	Nil per 100ml

Table No.9 Bacteriological Quality of Drinking Water

Guideline Value	Organisms
Must not be detectable in 100 ml sample.	All water intended for drinking E. coli thermo tolerant coli form bacteria.
Must not be detectable in 100 ml sample. In the case of large supplies, where sufficient samples are examined, must not be present in 95% of samples taken throughout any 12 month period.	Treated water entering the distribution system. E. coli thermo tolerant coli form bacteria total coli form bacteria.

17. Water Conservation Regulations

16.2 Site Environmental Conditions:

The State of Qatar is classified as being among the world’s most arid and desert regions. The rainfall is concentrated in the winter and spring period (December to March) with an average of 50 - 80 mm per annum. No discernible pattern in rainfall occurrence is apparent, but there is a tendency of rainfall to occur more often during February and March. Rainfall can be heavy, with poor natural drainage, resulting in surface flooding.

Table No.10

Month	Temperature ° C			Humidity %	
	Mean Max.	Mean Min.	Mean Daily.	Mean Max.	Mean Min.
January	22.3	13.1	17.5	90.7	51.9
February	22.7	12.7	17.5	82.8	38.7
March	27.5	16.8	21.8	85.3	40.9
April	31.3	20.0	25.3	80.9	37.3
May	37.6	24.3	30.7	67.6	20.8
June	41.0	26.0	33.6	64.2	20.1
July	41.5	28.3	34.6	71.0	24.6
August	40.7	28.3	34.1	77.7	30.7
September	38.3	25.9	32.0	86.5	38.9
October	35.2	23.0	29.0	83.7	37.0
November	29.8	19.5	24.5	89.9	37.6
December	24.8	14.5	19.4	86.1	46.5

Relevant forms for the water services application are available in the appendix:

- Residential Complex Internal Water Network Hydro Test.
- Temporary Supply, Diversion and Increase Meter Diameter.
- Building Permit Form.
- Building Permit Form for Bulk Customer.
- Water Inspection Check List.

- Minimum recorded related humidity is 100 %.
- Maximum recorded direct sunlight temperature is 75° C.
- Maximum recorded ambient shade temperature is 51° C.
- Minimum recorded ambient shade temperature is 0° C.
- Site elevation is 2 - 20 M AOD (State of Qatar).
- Prevailing winds are mainly northerly occasionally with south easterly gusts up to 140 Km / h.
- Sandstorms though not severe, do occur and can persist for several days.
- The site is not subject to industrial pollution, but due to being near the coast, the air can be salt laden with occasional fog. During the winter and spring periods, severe electrical storms with sheet and forked lightning can occur.

1.0 Water Conservation:

Considerable amount of energy is consumed to deliver and treat the water we are using every day. By reducing the water use by efficient means will reduce the water consumption and the energy required in distribution network and treatment plants. In designing plumbing systems, utilize new techniques and options that can lead to maximum water efficiency and water savings. The plumbing system for new and addition to existing buildings by all consultants, customers and developers shall comply with the requirements of section 1.1 A & B of this chapter.

01.1 A) Maximum allowable flow rates for plumbing fixtures:

1. Water Closets:

The flush rates of single flush Water Closets either flush tank, flushometer tank or flushometer valve operated shall not exceed 4.9 L/flush (or 1.28 gpf). In case of dual flush toilets the flush rate shall not exceed 6 L/flush (or 1.6 gpf) for full flush and 4.2 L/flush (or 1.1 gpf) for reduced flush.

Control valve shall be installed on the inlet line to the flush tank/flush valve in order to shutoff them in case of leakage.

Water Closets shall conform to the applicable requirements of Section 420, International Plumbing Code 2006. The conformity shall be verified by laboratories accredited by International Institutions.

2. Urinals:

The flush rates for all type of Urinals shall not exceed 1.9 L/flush (or 0.5 gpf). The urinal system shall be flushed only after usage.

Urinals shall conform to the applicable requirements of Section 419, International Plumbing Code 2006. The conformity shall be verified by laboratories accredited by International Institutions.

3. Faucets:

The flow rates of faucets shall not exceed the flow rates stipulated in Table 1.1

Table No.11 Maximum allowable flow rate for faucets

#	Plumbing Fixtures/Fixture fittings	Maximum allowable flow rate
1	Lavatory Faucet – Residential Occupancy (Residential, Hotel-Guest rooms only, Hospital-patient rooms only)	5.7 L/min (or 1.5 gpm) at an operating pressure of 4 bar (60 PSI)
2	Lavatory Faucet – Nonresidential occupancy	3.8 l/min (or 1 gpm) at an operating pressure of 4 bar (60 PSI)
3	Kitchen Sinks	8.3 L/min (or 2.2 gpm) at an operating pressure of 4 bar (60 PSI)

Exclusion: Bath tub taps or any other taps where a pre-quantified amount of water need to be filled are excluded from requirements of Table 1.1

Lavatories & Sinks shall conform to the applicable requirements of Section 416 and Section 418, International Plumbing Code 2006. The conformity shall be verified by laboratories accredited by International Institutions.

4. Showers:

The flow rate of shower head or hand held showers shall not exceed 9.5 L/min (or 2.5 gpm) at an operating pressure of 5.5 bar (80 psi).

Showers shall conform to the applicable requirements of Section 417, International Plumbing Code 2006. The conformity shall be verified by laboratories accredited by International Institutions.

01.1 B) Irrigation:

1. Type of Irrigation System

Consumers with irrigation water requirement exceeding 1 m3 per day and/or the irrigated area is greater than or equal to 100 m2 shall comply with the following requirements:

- Flood irrigation is not allowed. Projects shall use irrigation systems such as drip irrigation or sprinkler systems or bubbles along with timers or weather based controllers.
- Separate irrigation tanks to be used.

2. Restricted potable Water Usage for Irrigation

- Consumers shall not use potable water if the irrigation water requirements exceed 85 m3 per day and/or the irrigated area is greater than or equal to 7000 m2.
- Consumers shall use Treated Water and/or Treated Grey water and/or condensate recovery or any other non-potable water resources to meet the requirements. Treated water used for irrigation should meet applicable health and safety standards of the state of Qatar prescribed by competent authority.

3. Metering of water use for irrigation

Consumers with irrigation water demand of more than 25 m3 per day • Shall submit irrigation plan detailing species type and irrigation system.

- Provide a separate meter for Irrigation water consumption.
- Track the consumption on monthly basis.
- Submit water consumption data to KAHRAMAA when requested.

01.1 C) Water Conservation Plumbing Guidelines

In addition to plumbing practices stipulated in other sections of this regulation the following practices are recommended.

- Water tanks exposed to direct sun shall be insulated or shaded to reduce the heat gain.
- Water supply pipes exposed to direct sun shall be insulated.
- Minimize the length of pipes from water heaters to tap/faucets and showers in order to reduce the heat loss from the pipes.

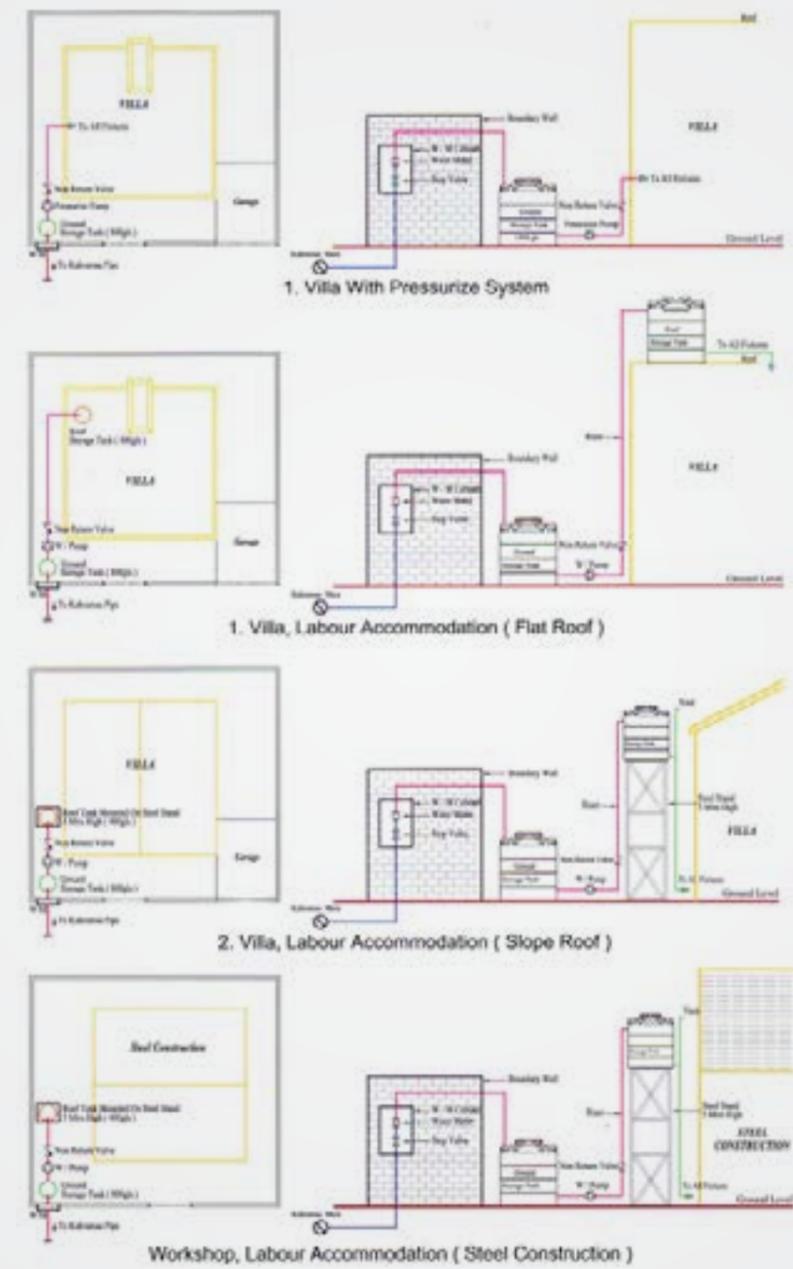
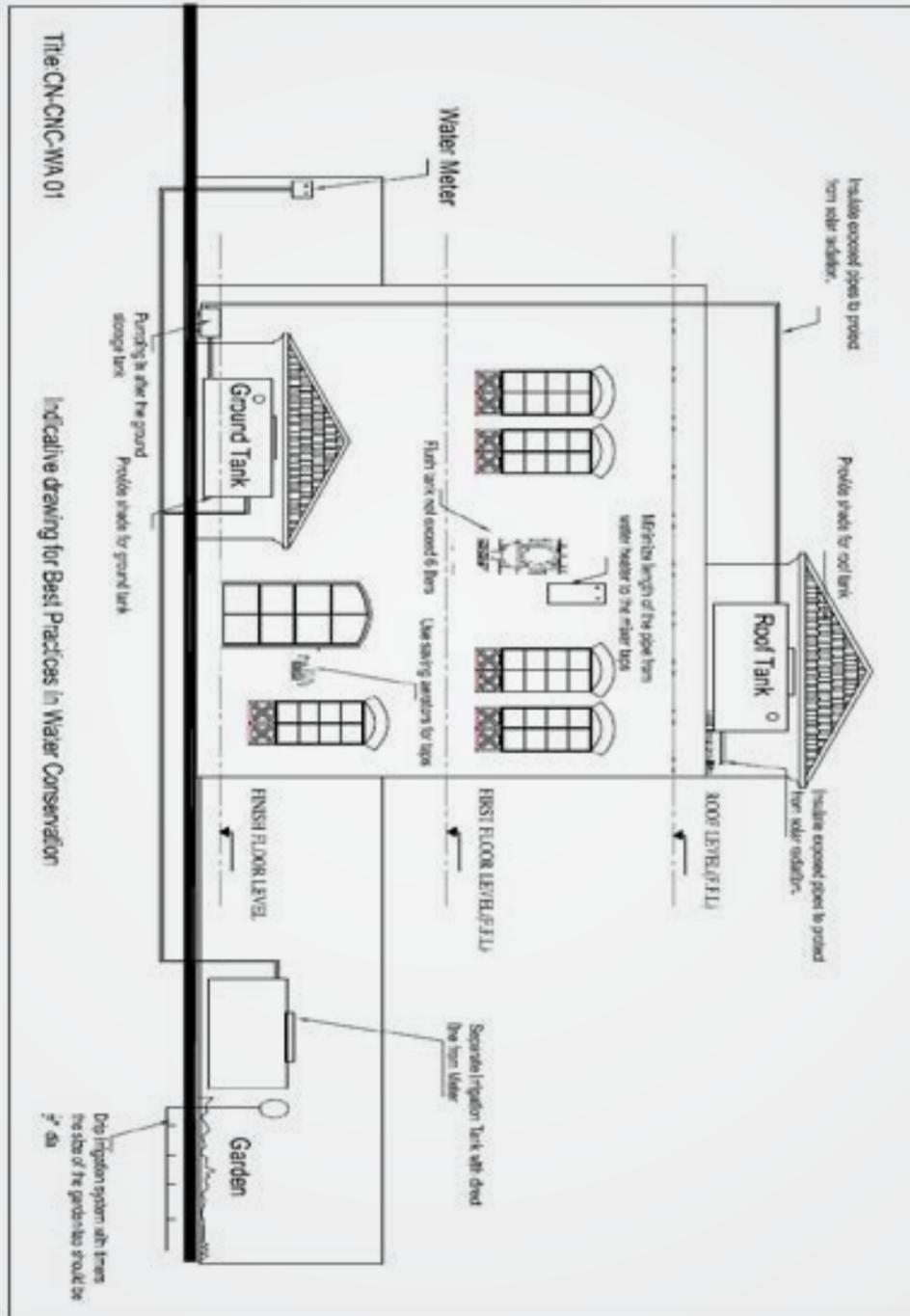
01.1 D) Non-Conventional Energy for Plumbing Applications:

Non-conventional energy sources for plumbing applications like solar water heater are encouraged. The best practices stipulated in this section are demonstrated in the drawing CN-CNC-WA 01.

WATER INSTALLATIONS CODE

WATER INSTALLATIONS CODE

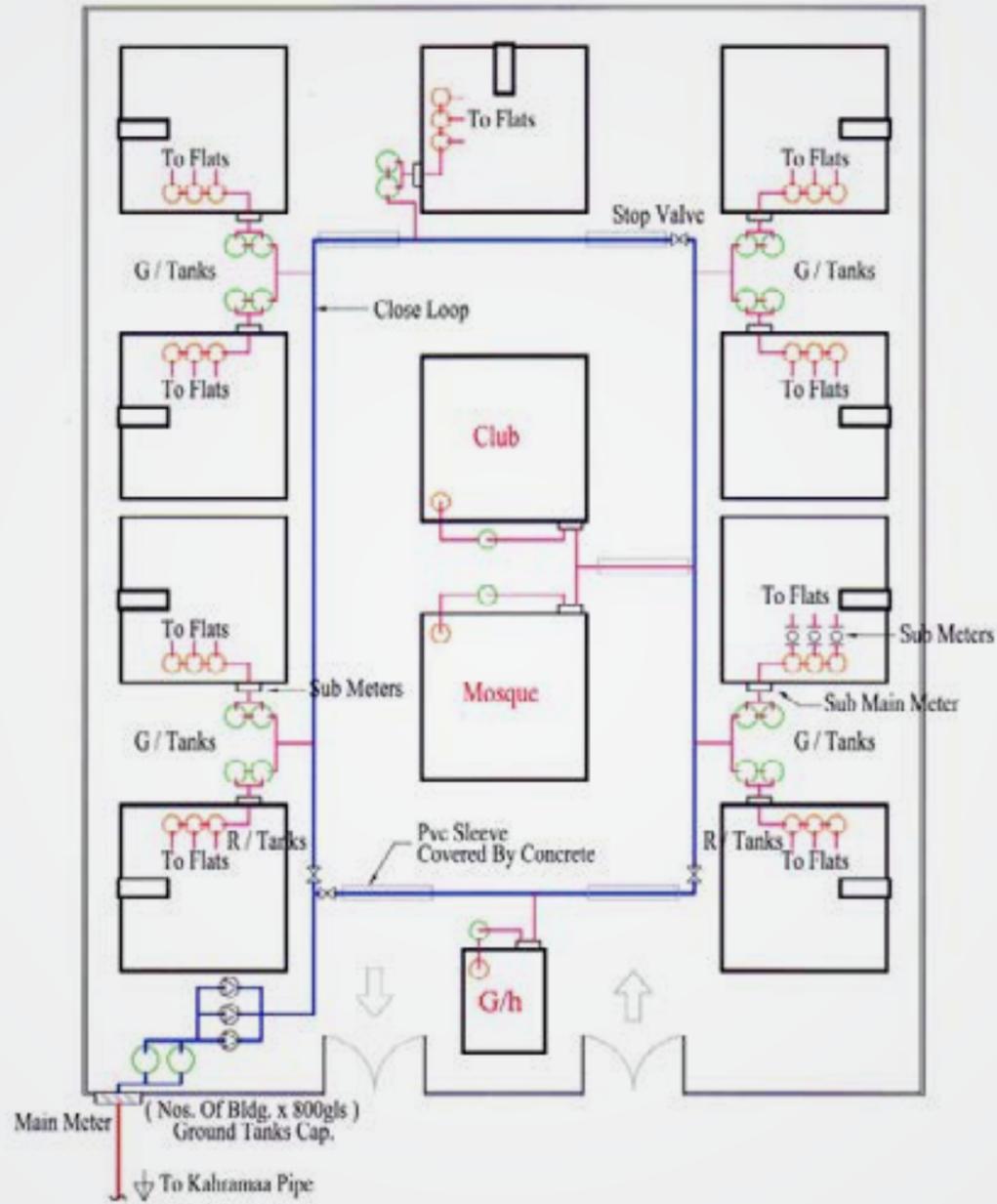
18. Drawings & Forms



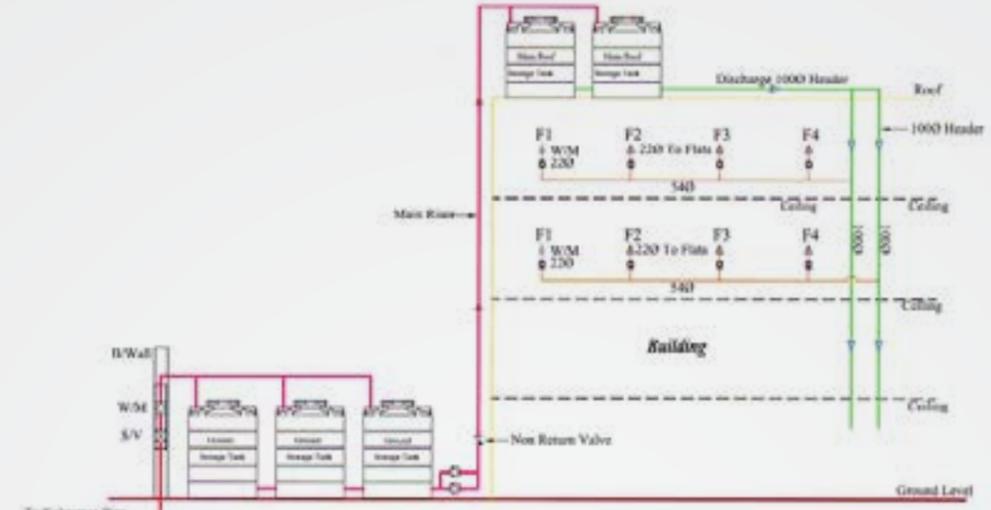
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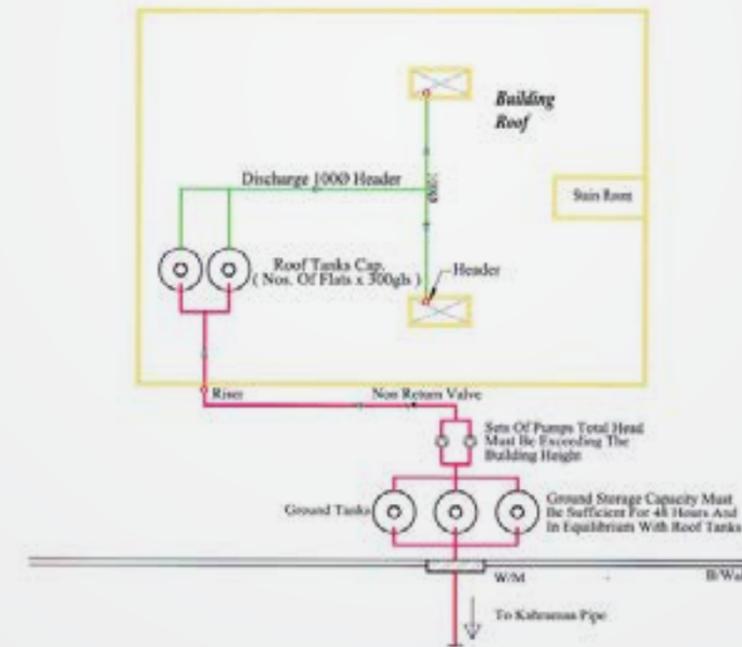
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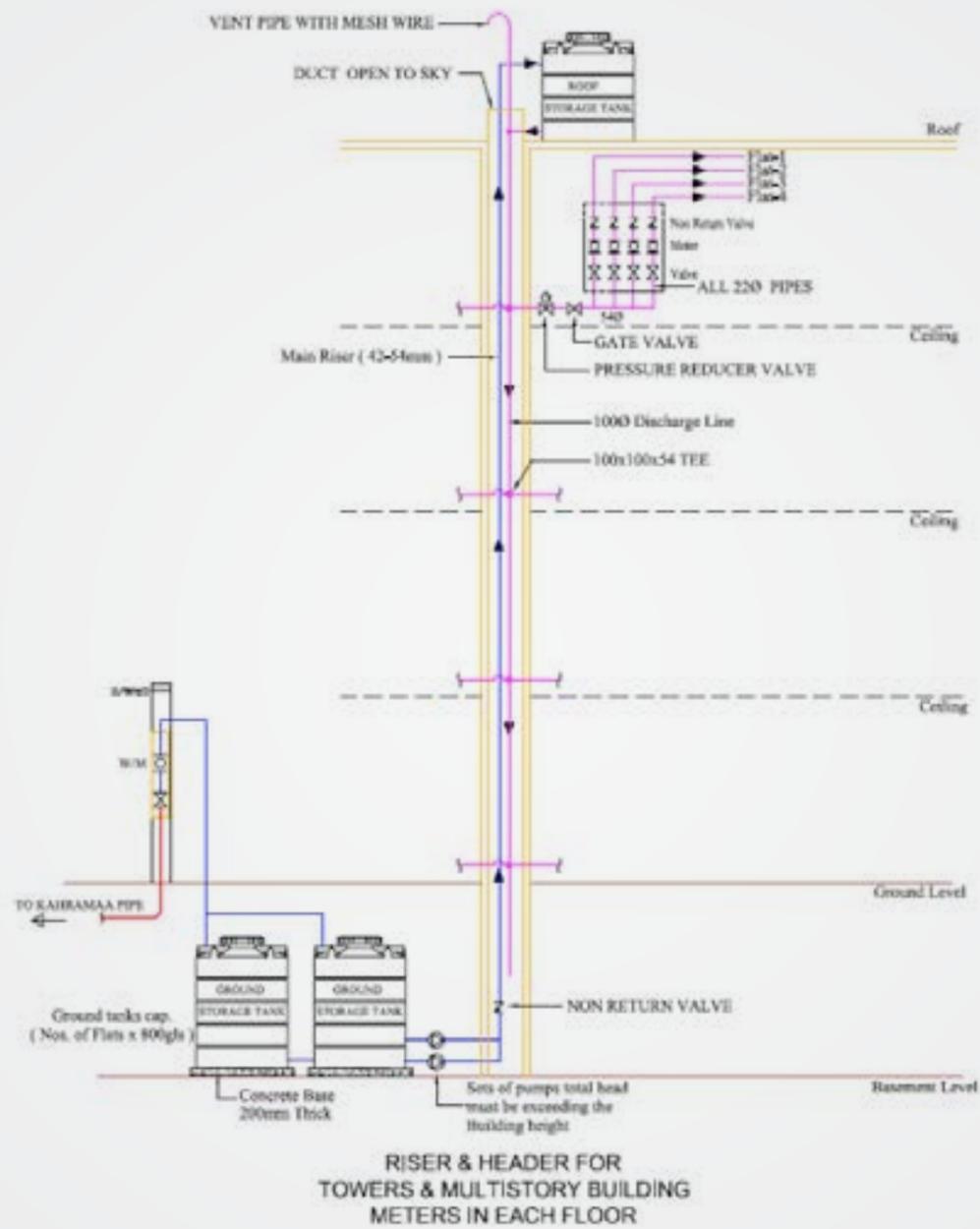
Building Complex



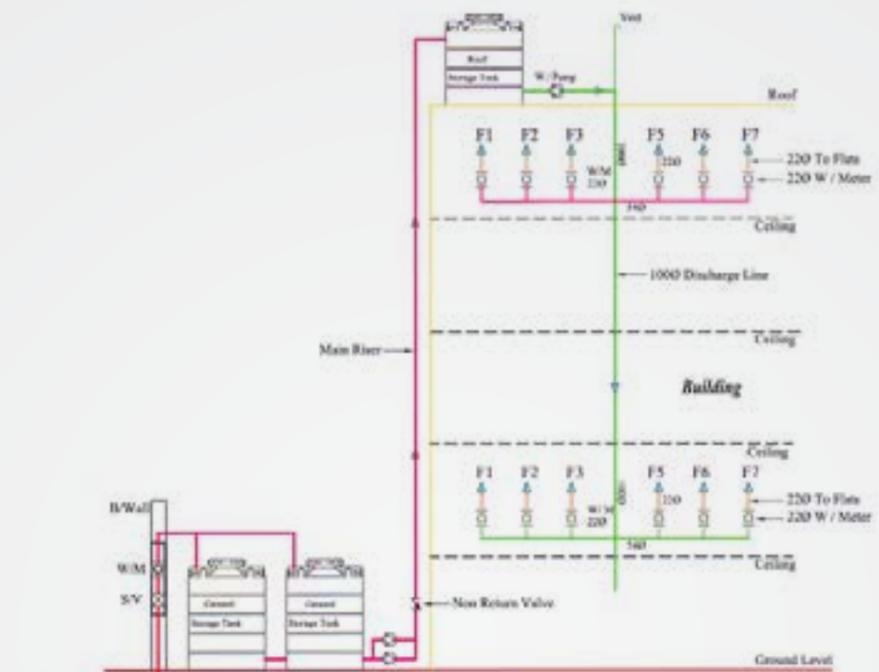
Typical Arrangement Detail



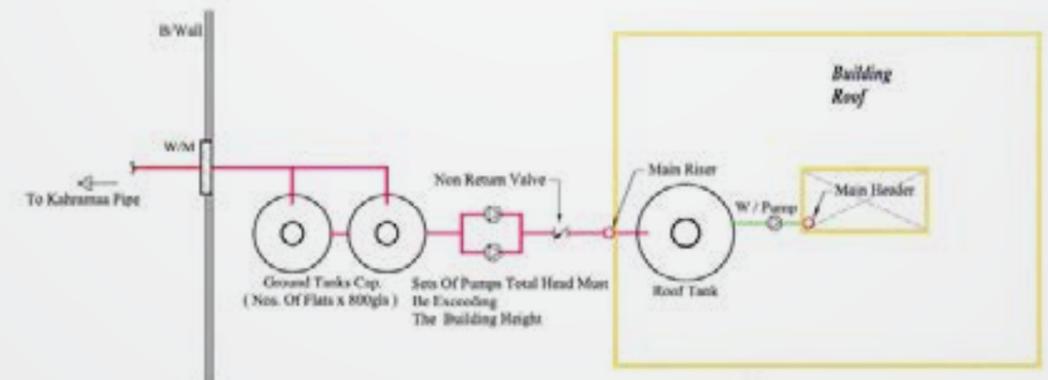
Multistory Building With Two Header Installation Of Individual Water Meters On Each Floor (Drg. No. : 2)



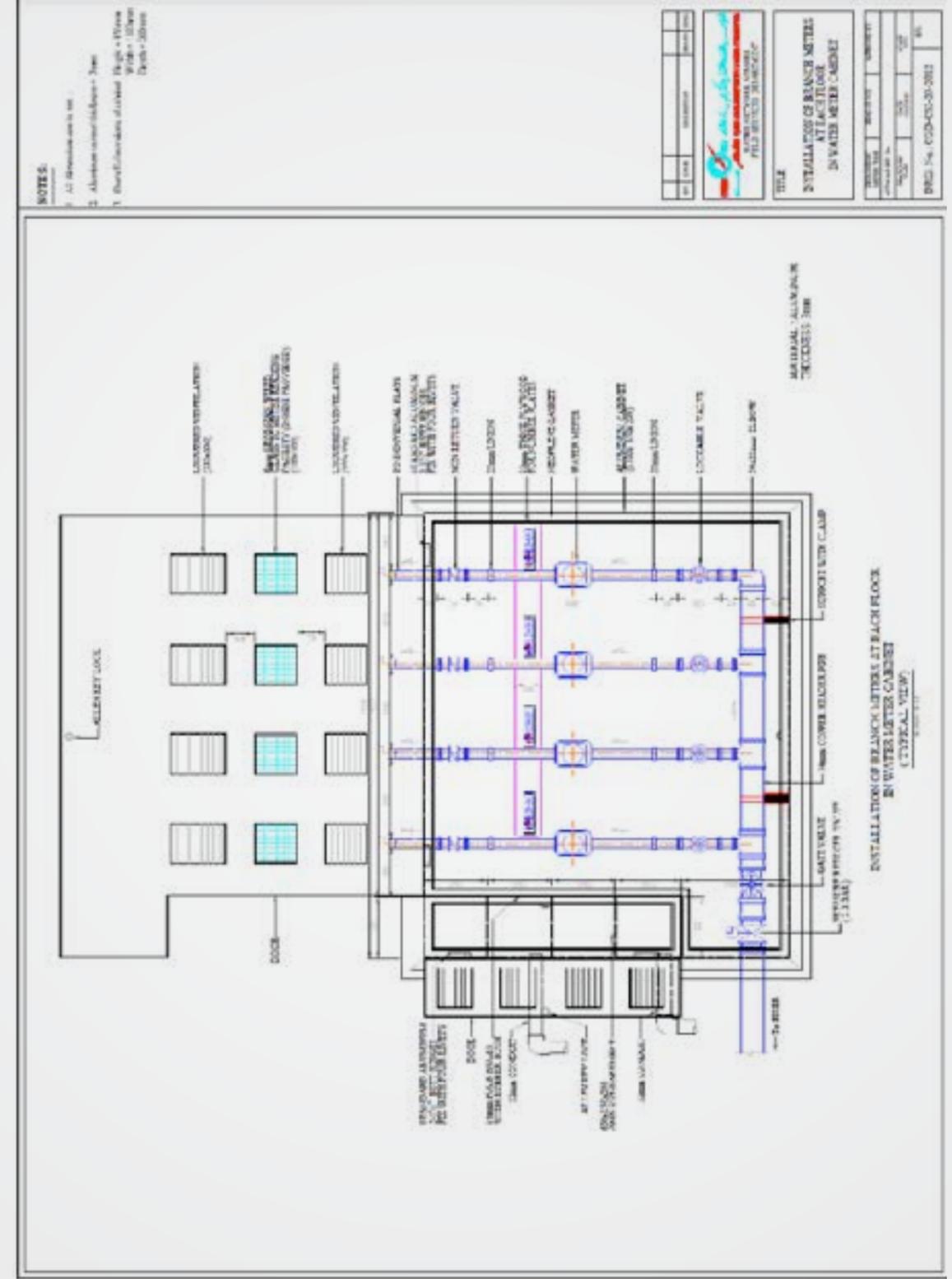
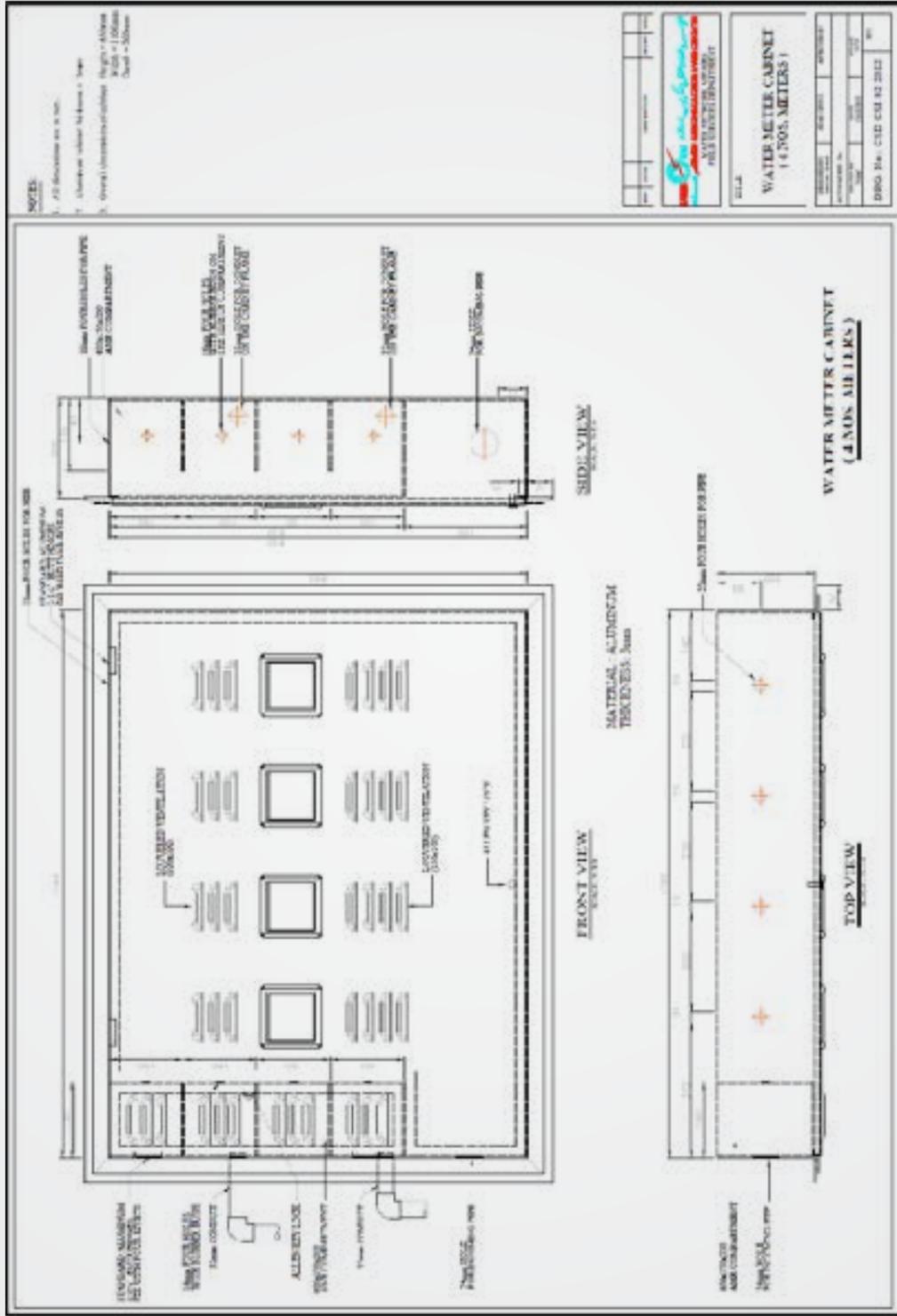
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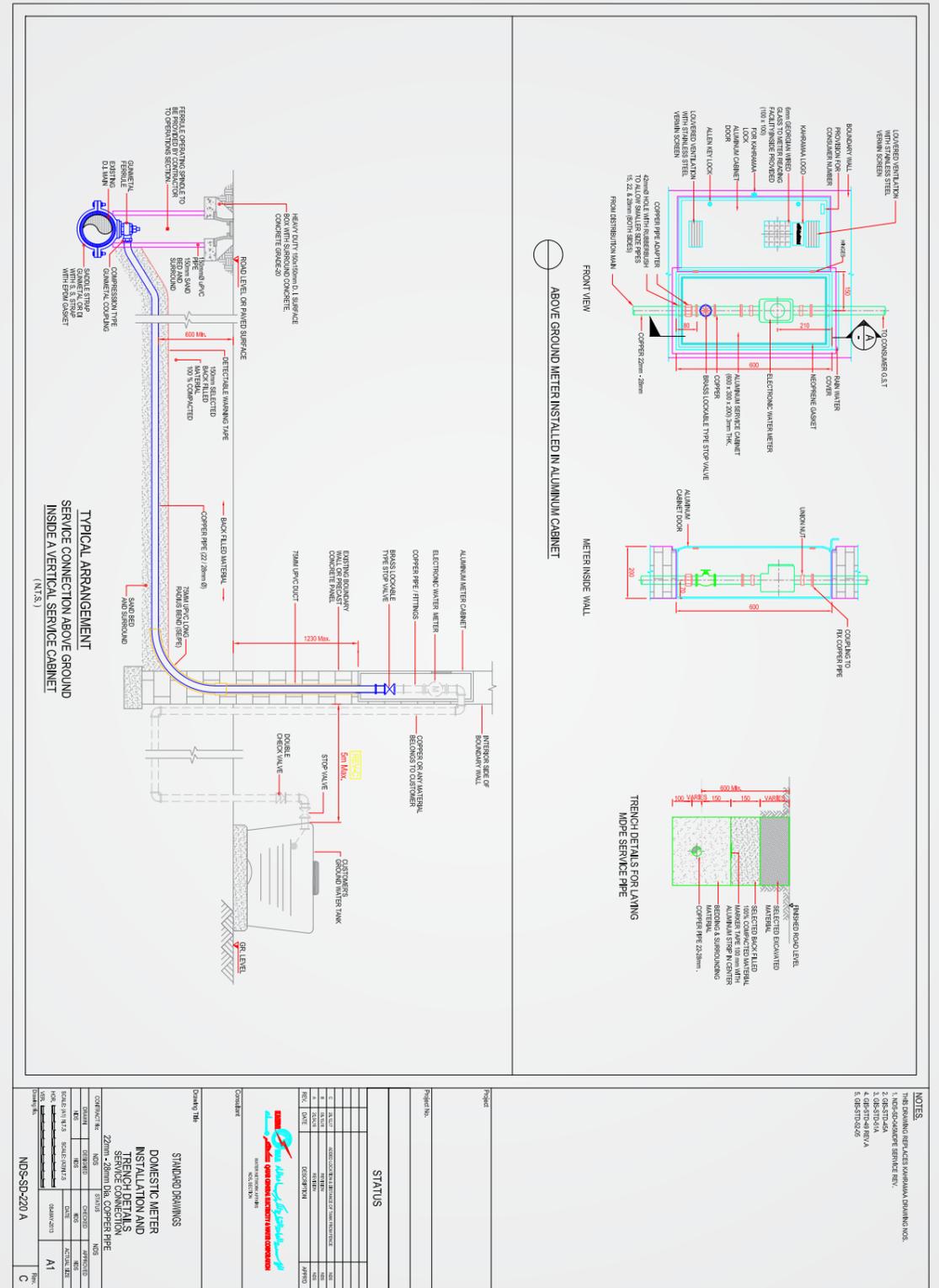
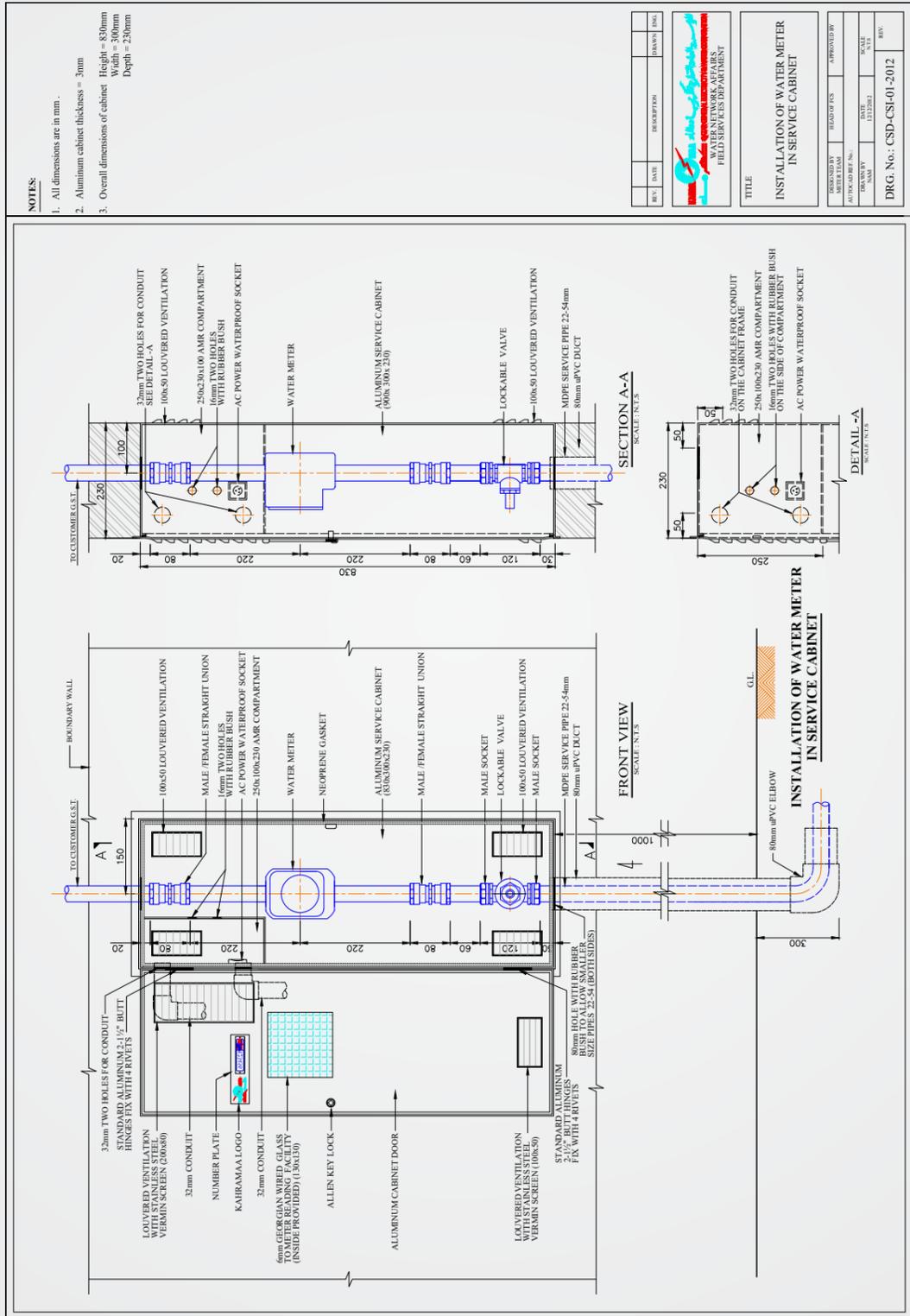


Typical Arrangement Detail



Multistory Building With One Header (Drg. No. : 1)





NDS-SD-220 A

NOTES
1 All dimensions are in mm.

INSTALLATION TEMPERATURE C°	MIN. BENDING RADIUS R
+20	20 x d
+10	35 x d
0	50 x d

MDPE PIPE MINIMUM BENDING RADIUS
(N.T.S.)

NSE
 NATIONAL SOCIETY OF ENGINEERS
 REGULATORY AUTHORITY
 FOR THE WATER SUPPLY AND SEWERAGE SERVICES

TITLE
 MDPE PIPE MINIMUM BENDING RADIUS

PROJECT No. _____
 CONTRACT No. _____
 DATE _____
 DRAWN BY _____
 CHECKED BY _____
 DESIGNED BY _____
 DATE _____
 DRG. No. CS/912D55

NOTES

WATER

ELECTRICITY

Length = 10 cm
 Breadth = 2.5 cm
 Thickness = 1.2 mm
 Material = Aluminium

CUSTOMER'S NUMBER PLATES (SAMPLES)

NSE
 NATIONAL SOCIETY OF ENGINEERS
 REGULATORY AUTHORITY
 FOR THE WATER SUPPLY AND SEWERAGE SERVICES

TITLE
 CUSTOMER'S NUMBER PLATES

PROJECT No. _____
 CONTRACT No. _____
 DATE _____
 DRAWN BY _____
 CHECKED BY _____
 DESIGNED BY _____
 DATE _____
 DRG. No. P/000008



Customer Services Dept. Installation Sec.
Inspection water Check list

..... / / : Date : Area : IN
: Building

Total Offices Shops Flats

NO Yes : Approved S S P -

NO Yes : Approved Schematic Diagram -

NO Yes : Approved Roof Plan -

NO Yes تم تثبيت لوحات أرقام الكهرباء والمياه -

Total Others Building Villa : Res. Compound

No Yes : Approved S S P -

No Yes : Hydro test network submitted -

Diameter Many One Cabinet : Meter Cabinet

available 80mm Duct ~ NO Yes Approved Cabinet

NO Yes Correct fitting in cabinet

Yes : Available GRP NO Yes Water Proof Socket

NO NO Yes : Chamber

Not approve HDPE DI Diam. : Pipe in chamber

Total capacity No. of tanks Sectional Tank Concrete Regular : Ground Tanks

Separate Meter No. Tanks Combined Separate : Fire Tank

Horizontally Roof floor Ground floor In each floor : Meters Oreintation

available NRV Available G V Approved Branch Mete Cab.

Flat supply hydro check OK Roof tank filled for inspc. Stickers fixed

2nd Inspection 1st Inspection : Site Inspection by
: Inspector

4th Inspection 3rd Inspection

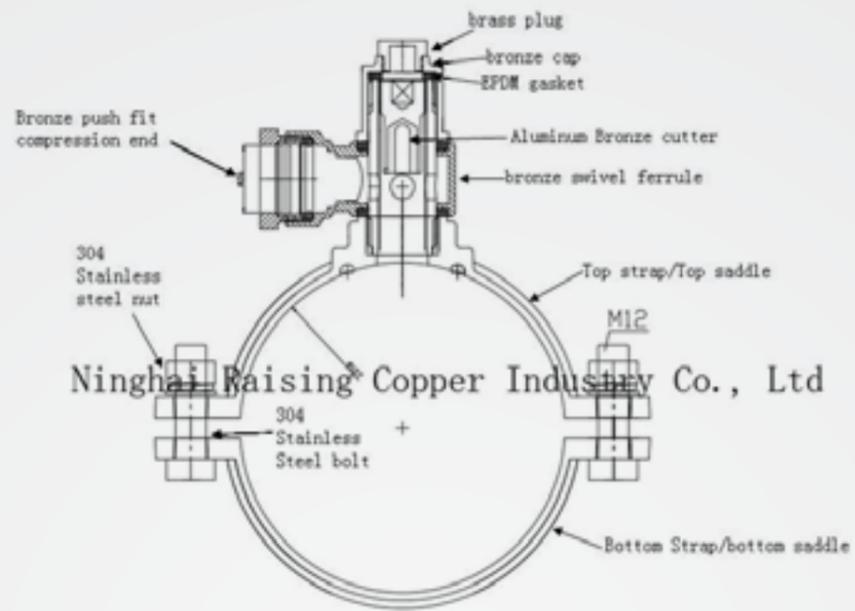
.....: Senior Inspector Sing.



Gun Metal Ferrule tapping from compound internal water net work to the corresponding villa or other



Gun Metal Ferrule tapping to individuals from the compound interna water network



Tapping saddle



Insulation of all tubes to be protected from direct sun radiation



Insulation of copper pipes for roof plumbing



Insulation of PP R tubes on roof plumbing



Thermal Insulation of PPR tubes at roof Plumbing



Thermal Insulation for cooper tubes in roof plumbing

WATER INSTALLATIONS CODE

WATER INSTALLATIONS CODE