

HANDBOOK ON APPLICATION FOR WATER SUPPLY

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SECTION 1 - GENERAL

1.1 Introduction and Scope of Handbook

1.1.1 The Water Supply (Network) Department of the Public Utilities Board is charged with the responsibility of operating and maintaining the water mains and connecting pipes up to the water meter. Water service installations downstream of a water meter shall be maintained by the consumer.

1.1.2 This Handbook is specially prepared to assist Developers, Architects and Professional Engineers, Licensed Water Service Plumbers, Government Departments and Statutory Boards in their application for water supply. This handbook also provide general information on water supply matters which may be of interest to all consumers. For general enquiries on water supply matters, please email to wshandbook@pub.gov.sg.

1.2 The Public Utilities Act and the Public Utilities (Water Supply) Regulations

The Public Utilities Act and the Public Utilities (Water Supply) Regulations set out the requirements of the Water Supply (Network) Department. This Handbook should be read in conjunction with the latest edition of Public Utilities Act and the Public Utilities (Water Supply) Regulations.

1.3 Singapore Standard Code of Practice for Water Services

The Singapore Standard CP48 - Code of Practice for Water Services sets out the accepted standard of good practice in plumbing work. All plumbing work should comply with this Code of Practice which is available for sale at the Standards, Productivity and Innovation Board (SPRING Singapore), 2 Bukit Merah Central, Singapore 159835.

SECTION 2 - WATER QUALITY, MODE OF SUPPLY AND TARIFFS

2.1 Water Quality and Drinking Water Standards

- 2.1.1 Water supplied by the Board is within the guidelines for Drinking Water Quality set by the World Health Organisation (WHO).
- 2.1.2 Water supplied to the western and eastern parts of the Island has slightly higher content of chloride and Total Dissolved Solids (TDS) than the rest of the Island.
- 2.1.3 Water is fluoridated.
- 2.1.4 The typical chemical and bacteriological quality of the water is shown in Appendix 1. Should there be any query on the water quality, the Developer/Consultant/Consumer is advised to consult Deputy Director, Planning, Design & Water Quality Division, Water Supply (Plants) Department or email to wshandbook@pub.gov.sg.

2.2 Water Pressure and Availability of Water Supply

- 2.2.1 The water pressure available at different parts of the Island varies depending on the elevation of the land and on the time of the day. Generally the Water Supply (Network) Department maintains a water pressure capable of supplying directly to water fittings not exceeding 25 metres above mean sea level. This means that water supply to water fittings above this level has to be indirect via water storage tanks. The daily water pressure in the distribution system varies with the consumption pattern, being at the highest when the consumption is minimum and lowest when consumption is at the peak. The following mode of supply (as stipulated in SS CP48 – Code of Practice for Water Services) is to be adopted:

	<u>Height of Highest Fittings Above Mean Sea Level</u>	<u>Mode of Supply</u>
a.	Not exceeding 25 metres	Direct supply to fittings from PUB mains.
b.	Above 25 metres but not exceeding 37 metres	Indirect supply through high level water storage tank.

- c. Above 37 metres Indirect supply through low level water storage tank with pumping to high level water storage tank.

2.2.2 The high level water storage tanks should have a minimum capacity equivalent to 24 hours consumption.

2.2.3 For mode (c), which is to be adopted for water supply to premises and tall buildings beyond the reach of direct mains pressure, the water from the Authority's mains will flow through a meter/ master meter to a low level tank with float-operated valve control. From the low level tank, pumps (with duplicate in case of breakdown) will deliver the water to high level tanks of storage capacity equivalent to one day's water requirements to cater for breakdown and emergencies. The high level storage tanks are to be provided with compartments and the pipework so arranged to enable maintenance and cleaning to be carried out without interruption to the water supply. The low level tank shall be located such that the inlet to the low level tank is below 137 metres reduced level. Where the inlet to the low level tank is between 125 metres and 130 metres reduced level, the storage capacity of the low level tank should be sized to be at least 1/5 of the daily water requirements. Where the inlet to the low level tank is above 130 metres reduced level, the capacity of the low level tank should be sized to be at least 1/3 of the daily water requirements. The total storage capacity of the low level and the high level tanks should be equivalent to one day's water requirements of the water service installations to be served by the tanks.

2.2.4 Notwithstanding the modes of water supply, water storage tanks should be provided for premises such as hospitals, industrial premises and other important installations for the purpose of maintaining a continuous and steady supply of water in the event of interruptions to the water supply. The owner of premises with the highest water fittings not exceeding 125 metres reduced level is allowed to determine the storage capacity required. Where the owner decides to provide a storage capacity of less than one day's water requirements, the owner shall undertake to bear full responsibility for the water storage needed to meet the operational requirements of the premises and shall not hold the Authority responsible for any interruption of water supply.

2.3 Water Tariffs

2.3.1 The tariffs presently applicable to the various categories of consumers are as follows:

- a. Domestic Tariff
- b. Non-domestic Tariff
- c. Tariff for shipping

2.3.2 The schedule of tariffs is subject to change by amending the Public Utilities (Tariffs for Water) Regulations made by the Board from time to time.

2.3.3 Should there be a change in use of premises from domestic to non-domestic or vice versa, the consumer is advised to write in to the Water Supply (Network) Department for a change in the tariff within 7 days from the date of such change in use.

SECTION 3 - GENERAL INFORMATION FOR OBTAINING WATER SUPPLY

3.1 Simplified Procedure

- 3.1.1 Under the simplified procedure introduced for the design and installation of water service installations within the customer's premises, water service workers have full control over the water service works under their charge and they no longer need to obtain PUB's approval and apply for PUB's inspection before turn on of water supply.
- 3.1.2 In brief, the new procedure requires the water service workers to notify PUB before commencement of water service works by submitting the site plans and schematic drawings of the water service installation. Upon completion of the water service works, water service workers are required to submit a Certificate of Satisfactory Completion of Water Service Work certifying that the water service installation is completed in accordance with the Public Utilities (Water Supply) Regulations, Singapore Standard CP48 – Code of Practice for Water Services, all other relevant statutory requirements and other PUB requirements.

3.2 Water Service Work

Water service work shall only be carried out by a water service worker of an appropriate class as prescribed by the latest edition of the Public Utilities Act and the Public Utilities (Water Supply) Regulations. Developer/Consumer shall engage an appropriate water service worker to design, construct, alter or repair at his own cost the water service installation within his premises to convey the supply of water from PUB.

3.3 Class of Water Service Workers

- 3.3.1 There are two classes of water service workers, namely:
- a. A Professional Engineer (PE) registered under the Professional Engineers Act.
 - b. A Licensed Water Service Plumber (LWSP).

3.3.2 A list of Licensed Water Service Plumbers can be found on the PUB's website at <http://www.pub.gov.sg>. Any verification can also be made by calling Telephone No. 1800-7362055 (Toll-free).

3.4 Water Service Works Requiring a Professional Engineer

3.4.1 A Professional Engineer (PE) is required to be engaged by the Developer/Consumer to design and submit notification to PUB for any water service installation that requires pumping equipment or water storage tank and he shall be responsible for the supervision of any water service work undertaken on his behalf by a licensed water service plumber (LWSP).

3.4.2 The procedure for water service work requiring a PE is outlined in Section 4.

3.5 Water Service Works Requiring a Licensed Water Service Plumber

3.5.1 A licensed water service plumber (LWSP) (subject to any conditions endorsed in the license) is entitled to carry out any water service work provided that :

- a. he may only design any water service installation which is to be installed downstream after the meter position; and
- b. he shall not design any water service installation which requires pumping equipment or water storage tank.

3.5.2 The procedure for water service work requiring an LWSP is outlined in Section 5.

3.6 Capital Contribution from Developer and Connection Charges

3.6.1 Developer will be advised whether a capital contribution is required from him for the laying of new water mains. Any capital contribution must be paid outright to PUB before mainlaying commences. In addition, the Developer has to pay such costs estimated by PUB for laying of connecting pipes from PUB mains to the development.

- 3.6.2 Developers applying for water supply to their private property development need only pay a standard connection charge depending on the size of connection to the development. The connecting pipe will then be laid from the PUB water main to the meter position after the payment is made.
- 3.6.3 Developers of multi-unit private property developments which do not fall under the ambit of the Land Titles (Strata) Act shall design and install mains, connections, pumping stations and elevated reservoirs within the development in accordance with the PUB's requirements and for purposes of operation and maintenance, hand them over, together with the land (if required), to the PUB free of charge. Vesting of the land, upon which such pumping stations and elevated reservoirs are located, to the Board shall be free of charge and free from encumbrances. In addition, the Developer will be charged the standard connection charge for the cost of connecting the mains by them to PUB main based on the standard connection charges in section 3.6.2.

Note : Section 3.6.2 and 3.6.3 do not apply to developments on offshore islands and temporary water supply.

3.7 Diversion of PUB Water Mains

If the existing water mains within the proposed site are affected by the proposed development, diversion of water mains may be required. This diversion cost will be borne by the Developer, in addition to the connection charges described in Section 3.6.2.

3.8 Turn-on of Water Supply

When all water service works are completed and certified by the appropriate class of water service workers, the Consumer/Owner will need to open an account for turn-on of water supply at the NEA Customer Service Centre located at Level 2, Environment Building , 40 Scotts Road, Singapore 228231. PE or LWSP will arrange with PUB for the installation of water meter and a deposit will be charged before water supply can be turned on. Generally, a minimum of 4 working days' notice must be given before the supply turn-on date for new premises.

3.9 Random Checks by PUB

- 3.9.1 PUB will carry out checks on completed water service installation on a random basis. Where the water service installation is found to be not in compliance with the requirements specified, PUB will require the water service worker or the owner/developer or consumer to alter, repair or rectify the water service installation to the manner required by PUB
- 3.9.2 PUB will not be liable for any cost or expense incurred by owner/developer or consumer to alter, repair or rectify the water service installation to the manner required by PUB.
- 3.9.3 PUB will have the right to refuse to connect its supply to any new water service installation or to disconnect from its supply any existing water service installation which does not conform to the requirements specified on 3.9.1 until such time as the requirements are complied with.

3.10 Maintenance of Water Service Installations

3.10.1 A water service installation shall be maintained:

- a. for so long as such water service installation is connected to receive water supplied by the Board; and
- b. by the following persons:
 - (i) in respect of the water service installation between the master meter and the sub-meter, by the consumer who is liable to pay for the consumption registered by the master meter;
 - (ii) in respect of the water service installation after the sub-meter, by the consumer who is liable to pay for the consumption registered by the sub-meter; and
 - (iii) in respect of the water service installation after the meter (not being a master meter or a sub-meter), by the consumer who is liable to pay for the consumption registered by the meter.

3.10.2 Any person who is required under paragraph 3.10.1(b) to maintain any part of a water service installation shall:

- a. maintain and ensure the security of that part of the water service installation in accordance with the Public Utilities (Water Supply) Regulations and any applicable requirement specified in any standard, code of practice or guidelines adopted or issued by the Board: and
- b. notify the Board immediately of any contamination of water in that part of the water service installation which comes to his knowledge.

3.11 Annual Inspection and Certification of Water Storage Tanks

For any part of a water service installation having any water storage tank, except in residential premises without master meter, the consumer responsible for the maintenance of that part of the water service installation is required to engage not less frequently than once every 12 months, a licensed water service plumber to inspect, and where necessary, to clean and disinfect the water storage tank and certify that :

- a. the water storage tank is fit and safe for the storage of water for human consumption;
- b. the water contained in the water storage tank is free from contamination or pollution and that there is no likelihood of such contamination or pollution;
- c. water samples taken from the tank pass the appropriate chemical and bacteriological examinations;
- d. the water storage tank is properly maintained; and
- e. there is no leakage and no likelihood of leakage in the water service installation, including the water storage tank.

3.12 Security 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, except in residential premises without master meter, the consumer responsible for the

maintenance of that part of the water service installation is required to ensure that:

- a. no person, except with the authority of the consumer, has access to:
 - (i) the storage tank (including any tap fitted to the storage tank) and its ancillary equipment; or
 - (ii) the premises where the storage tank and its ancillary equipment are located;
- b. the storage tank (including any tap fitted to the storage tank) and its ancillary equipment, and the premises where storage tank and its ancillary equipment are located, are kept properly locked at all times;
- c. checks are conducted regularly for the purpose of ascertaining whether sub-paragraph b is being complied with;
- d. proper records are kept of:
 - (i) persons granted access to the storage tank (including any tap fitted to the storage tank) and its ancillary equipment, or the premises where the storage tank and its ancillary equipment are located, under sub-paragraph a; and
 - (ii) checks conducted under sub-paragraph cand that such records are made available for inspection by the Board's officers; and
- e. the Board is notified immediately of any unauthorized access to the storage tank (including any tap fitted to the storage tank) or its ancillary equipment which comes to his knowledge.

3.13 Water Supply to Landed Residential Premises

For landed residential premises with water fittings above 125m RL, owners have the flexibility of deciding when they would like to install the water tank. Owners who opt to install the water tank at a later date, however, must make the necessary provision now for the space and structural loading for installing the tank in future when necessary.

3.14 Water Storage Capacity

The following considerations affect the storage capacity:

- a. the number of customers;
- b. the type of building; and
- c. The number of fittings to be served

Each case should be judged based on its merits, but for general guidance, the following table may be used.

Type of Building	Storage in Litres per Head
Dwelling houses and flats	150*
Hostels	90
Hotels	135
Offices without canteens	35
Offices with canteens	45
Schools	15

* Based on an average consumption of 20m³/month for private residential house or an apartment with 4 to 5 persons.

3.15 Provision of Separate Piping System for NEWater Supply in Commercial and Industrial Developments

NEWater will be supplied for air conditioning cooling towers in buildings and for suitable process water use in industrial premises. A separate NEWater pipeline network will be built that will eventually reach these buildings and industrial premises. All new commercial and industrial development proposals are therefore required to provide a dedicated NEWater pipe system now to take in NEWater when the supply becomes available. For locations where the NEWater pipeline network will only be available after 2011, space provisions need to be made now for the new development proposals to facilitate NEWater pipe system installation in future.

SECTION 4 - PROCEDURE FOR WATER SERVICE WORKS UNDERTAKEN BY A PROFESSIONAL ENGINEER

4.1 Water Service Work Undertaken by Professional Engineers

The type of water service work undertaken by Professional Engineers (PEs) are given in section 3.4. The procedure involves 6 stages as follows:

- a Pre-Planning Consultation with PUB;
- b Notification of Water Service Work Undertaken by PE;
- c Payment for Capital Contribution, Connection Charges and Diversion Cost (if applicable);
- d Supervision of Water Service Work by PE;
- e Submission of Certificate of Satisfactory Completion of Water Service Work;
- f Turn-On of Water Supply.

4.2 Pre-Planning Consultation Stage

4.2.1 PEs shall consult PUB as early as possible on matters pertaining to the supply of water to the proposed development. PEs shall direct all enquiries to Water Supply (Network) Department.

4.2.2 The common issue that may be discussed during the pre-planning consultation stage includes:

- a. availability of water mains in the development vicinity;
- b. mode of water supply;
- c. position of meter;
- d. risk of contamination to PUB network through backflow; and
- e. impact on existing mains and installation, etc.

4.2.3 PEs shall provide location and layout plans together with details such as:

- a. estimated water requirements;
- b. type of development;
- c. phasing of development;
- d. platform level of development;
- e. reduced level of highest direct supply water fittings;

- f. temporary water supply requirement during construction stage; and
- g. approximate date of completion of project including date when water supply is expected to be turned-on.

4.3 Notification of Water Service Works

4.3.1 Prior to the commencement of water service work, PE will need to submit 1 set of site plan, 1 set of water reticulation schematic drawing to PUB together with a notification form (Notification of Water Service Work) stating the following :

- a. water requirement (breakdown of water requirement is needed if the water requirement exceeds 1000m³/month);
- b. date of commencement;
- c. date of expected completion; and
- d. particulars of the Licensed Water Service Plumber (LWSP) (refer to section 4.5).

4.3.2 Notifying PUB before commencement of water service work is a mandatory requirement.

4.3.3 In addition, PE will need to declare and certify that

- a. the water service installation is designed in full compliance with the Public Utilities (Water Supply) Regulations, Singapore Standard CP 48 – Code of Practice for Water Services, other Authorities' requirements, relevant statutory requirements and other PUB's requirements;
- b. potable water storage tanks are not located below sanitary pipes and other non-potable pipes;
- c. all the water fittings to be installed in the water service installation will comply with standards prescribed/stipulated by PUB; and
- d. all water conservation measures will be adopted.

4.4 Payment for Capital Contribution, Connecting Charges and Diversion Costs

Where PUB water mains are not available

- 4.4.1 A feasibility study on the provisions of a water supply scheme in the proposed area shall be made by PUB. The Developer/Consultant will be advised in writing on the required capital contribution, if any, or the requirements to provide the necessary water supply infrastructure within his development as described in Section 3.6.1. If a capital contribution is required, the Developer/Consultant will have to make the payment before mainlaying commences.

Where PUB water mains are available

- 4.4.2 Diversion of existing water mains may be required if the existing mains are affected by the proposed development. Developer/Consultant will be advised on the diversion charges and payment will have to be made to PUB before diversion commences.
- 4.4.3 If a capital contribution is required, the Developer/Consultant will have to make the payment before mainlaying commences. Similarly, if a diversion of water mains is required, Developer/Consultant has to make the payment to PUB before diversion commences.
- 4.4.4 The capital contribution/diversion charge is in addition to the water connection charges or costs to be paid for laying the connecting pipe from the PUB main to the meter position. Time taken for mainlaying, diversion and installation of water connecting pipe depends on nature and magnitude of the work.
- 4.4.5 Payment of the connection charges, the capital contribution (if required) or diversion cost can be made at PUB Service Centre located at Upper First Storey, 111 Somerset Road #01-09.

4.5 Supervision of Water Service Works

PE shall properly supervise any water service work undertaken on his behalf by a LWSP and ensure that the LWSP does not do or omit to do anything in contravention of the requirements.

4.6 Submission of Certificate of Satisfactory Completion of Water Service Work

Within 7 days upon completion of the water service work, the Professional Engineer shall inspect the water service installation and submit a Certificate of Satisfactory Completion to PUB to certify the following:

- a. water service installation carried out by licensed water service plumber has been completed and found to be in accordance with the Public Utilities (Water Supply) Regulations, Singapore Standard (SS) CP 48 Code of Practice for Water Services, any requirements imposed by PUB, other Authorities' requirements and other relevant statutory requirements;
- b. potable water storage tanks shall not be located below sanitary pipes and other non-potable water pipes;
- c. all the water fittings installed in the water service installation are of the types that comply with standards prescribed / stipulated by PUB; and
- d. water service installation and the associated electrical devices and equipment have been tested and are safe and acceptable for operation.

4.7 Turn-on of Water Supply

Where applicable, water supply will be turned on upon receipt of the Certificate of Satisfactory Completion of Water Service Work and after the Owner/Developer has opened an account with PUB as described in Section 3.8.

4.8 CORENET e-Submission System

PUB is one of the agencies participating in Building and Construction Authority's (BCA) CORENET e-Submission System. PEs are encouraged to execute the above procedures through the CORENET e-Submission System. Information on the system can be found on <http://www.corenet-ess.gov.sg/>. For general enquiry on the e-submission system, you can write to :

CORENET e-Submission Administrator
Building & Construction Authority
Maxwell Road #02-00
Tower Block, MND Complex
Singapore 069110

SECTION 5 - PROCEDURE FOR WATER SERVICE WORKS UNDERTAKEN BY A LICENSED WATER SERVICE PLUMBER

5.1 Water Service Work Undertaken by Licensed Water Service Plumbers

The type of water service work undertaken by Licensed Water Service Plumbers are given in section 3.5. The procedure involves 4 stages as follows:

- a. Notification for water service work;
- b. Payment for connection charges/ sub-meter fees (if applicable);
- c. Submission of Certificate of Satisfactory Completion of Water Service Work; and
- d. Turn-on of water supply (if applicable)

5.2 Notification for Water Service Work Undertaken by Licensed Water Service Plumbers

The procedure for notifying PUB on water service work undertaken by Licensed Water Service Plumber are as follows:

- a. Prior to the commencement of water service work, the licensed water service plumber is to submit a notification form (Notification of Water Service Work Form) to PUB. Alternatively, the notification form can be submitted through BCA's CORENET e-Submission System.
- b. Notifying PUB before commencement of water service work is a mandatory requirement.
- c. A site plan indicating the location of the water meter, schematic drawing of the water reticulation system and breakdown of the water requirement (for cases $> 1000 \text{ m}^3/\text{mth}$) shall be attached with the Notification of Water Service Form.
- d. On receipt of the Notification of Water Service Work, a reply will be sent to the Developer/Owner with a copy sent to the Licensed Water Service Plumber. Where applicable, a quotation for payment to PUB will be attached to the reply.

5.3 Payment for Connection Charges/ Sub-Meter Fees

Payment to the PUB for the costs of the new connection, sub-meter fees, etc. as given in the quotation can be made at PUB Service Centre located at Upper First Storey, 111 Somerset road #01-09. . Where applicable, the connecting pipe will be laid from the PUB main to the meter position after payment is made by the developer/owner.

5.4 Submission of Certificate of Satisfactory Completion of Water Service Work

Within 7 days upon completion of the water service work, the Licensed Water Service Plumber shall notify the Water Supply (Network) Department that the work is completed using a Certificate of Satisfactory Completion of Water Service Work to certify the following:

- e. the water service installation carried out by licensed water service plumber has been completed and found to be in accordance with the Public Utilities (Water Supply) Regulations, Singapore Standard (SS) CP 48 Code of Practice for Water Services, any requirements imposed by PUB, other Authorities' requirements and other relevant statutory requirements;
- f. the potable water storage tanks shall not be located below sanitary pipes and other non-potable water pipes;
- g. all the water fittings installed in the water service installation are of the types that comply with standards prescribed / stipulated by PUB;
- h. the water service installation and the associated electrical devices and equipment have been tested and are safe and acceptable for operation;

5.5 Turn-on of Water Supply

Where applicable, water supply will be turned on upon receipt of the Certificate of Satisfactory Completion of Water Service Work and after the Owner/Developer has opened an account with PUB as described in Section 3.8.

5.6 Temporary Water Supply

- 5.6.1 Developer/Consultant must apply to the Water Reclamation (Network) Department for sanitary and drainage facilities for the construction site.
- 5.6.2 Simultaneously, Developer/Consultant must engage a Licensed Water Service Plumber and the same procedure as provided in section 5.2 shall be adopted by the water service plumber. Water supply will be turned on upon receipt of the Certificate of Satisfactory Completion of Water Service Work and after production of written clearance from the Water Reclamation (Network) Department.

5.7 Urgent Repair Work

- 5.7.1 Urgent repair work on defective pipes and fittings inside premises may be carried out by a Licensed Water Service Plumber without submitting the usual notification forms prior to proceeding with the urgent repair work.
- 5.7.2 The Licensed Water Service Plumber shall submit a Certificate of Satisfactory Completion of Water Service Work not later than seven days after completion of the urgent repair work.
- 5.7.3 "Urgent repair work" shall not mean extension or addition of extra fittings to the existing water service installation.

5.8 Extension of an Existing Water Service Installation

- 5.8.1 When a Licensed Water Service Plumber proposes to carry out an extension involving fixing of not more than one extra fitting, he may proceed with the work at his convenience, and upon completion, he shall notify Water Supply (Network) Department using a Certificate of Satisfactory Completion that such extension is completed.
- 5.8.2 This information shall be submitted not later than seven days after completion of work.
- 5.8.3 For extension of an existing water service installation and fixing of more than one extra fitting, the same procedure as provided in section 5.1 to section 5.5 shall be adopted by the Licensed Water Service Plumber.

5.9 Cleaning of Water Storage Tanks

Where a water service worker proposes to clean a water storage tank in any premises, the same procedure shall be adopted as provided in section 5.2.

SECTION 6 - METERING REQUIREMENTS

6.1 Water Supplies to be Metered

Metering of water supply is practised in Singapore and except with the consent of the Water Supply (Network) Department, no supply of water will be given unless through a meter.

6.2 Meters

6.2.1 The following are the terms used to describe different functions of meters:

- a meter - any appliance or device supplied by PUB to measure, ascertain or regulate the amount of water taken or used from the supply of PUB.
- b master-meter - meter registering water all or part of which is subsequently registered by one or more sub-meters.
- c sub-meter - meter owned and maintained by PUB which registers all or part of any water which has already been metered since leaving the water main. A fee of \$20 (exclusive of GST) is payable per submeter for application with more than one submeter.

6.2.2 Every meter will be fixed and maintained by the Water Supply (Network) Department and will remain the property of the Water Supply (Network) Department.

6.2.3 All residential units must be metered individually for the water consumption.

6.2.4 A master and sub-meter scheme is applicable for multi-unit residential, commercial and industrial premises. Under this scheme, water is supplied to multi-unit premises through master meters which register the total volume of water used in the premises. The master meter account holder shall pay for the water charges based on the difference between the registration of the master meter and all the submeters, including leakages.

6.2.5 Any property with one assessment number will be granted one and only one meter. However, the following exceptions may be made:

- a If there are separate tenants occupying houses or apartments which have separate entrances, kitchens and bathroom facilities, one meter per house or apartment is permitted.
- b If a building is divided into entirely and absolutely separate apartments with separate entrances and if the same tariff is not applicable to all the apartments, then one meter per apartment is permitted.

6.3 Recommended Size of Meters based on Monthly Consumption

The following table gives the recommended size of meters based on monthly consumption of water:-

Size of Meter (mm)	15	25	50	100	150
Recommended Maximum Consumption (m ³) per Month	130	700	5,000	20,000	45,000

6.4 Guidelines on Meter Positions

The position of the meter to be installed at any premises shall be determined by the Water Supply (Network) Department. Water meters shall be installed above ground. As a guide, the meter shall be installed in such a position that it can be easily accessible for meter installation, reading and maintenance work and at the same time its position should be unobtrusive. For new private landed housing developments, standard meter compartment as shown in Figure 1, shall be provided at the gate pillars. For renovation projects involving construction or reconstruction of gate pillars, customers are strongly encouraged to include this standard meter compartment at the gate pillars. Big meters of sizes 25 mm and above, fitted above ground and outside the building should be housed in suitable brick or concrete chambers with drainage outlets. The chamber is to be constructed by and at the expense of the Developer/Owner. The design of the meter chamber (see details in Singapore Standard CP 48) shall comply with the requirements of the Urban Redevelopment Authority and/or other relevant Authorities and be subject to the approval of the Water Supply (Network) Department.

SECTION 7 - WATER FITTINGS

7.1 Water Fittings

- 7.1.1 Developer/Consultant/Owner shall ensure that all water fittings to be used shall comply with the Standards and requirements stipulated by PUB and their use in water service installations shall conform to the Public Utilities (Water Supply) Regulations and Singapore Standard CP 48 – Code of Practice for Water Services.
- 7.1.2 A water fitting shall be deemed to comply with the stipulated Standards if it is certified or tested as complying with such Standards by a product certification body or a testing laboratory accredited by the Singapore Accreditation Council (SAC) or its Mutual Recognition Arrangement (MRA) partners.
- 7.1.3 A list of the stipulated Standards and requirements which the water fittings shall comply with can be found at PUB's website at <http://www.pub.gov.sg>. If the Standards and requirements for a water fitting are not available, the developer/consultant/owner shall approach PUB to stipulate the necessary Standards and requirements for compliance.

SECTION 8 - WATER REQUIREMENTS FOR FIRE SERVICES

8.1 Fire Service in Premises

- 8.1.1 The Water Supply (Network) Department shall be notified of the fire service in premises where such a service is necessary or expedient to enable water to be drawn from the PUB supply for the purpose of abating fire in such premises and where all necessary approvals have been obtained (from the Building Control Division and the Fire Safety & Shelter Department). Such fire service will have to include the provision of adequate storage tank or tanks, together with the necessary ancillary equipment, pipes and fittings to meet the flow and other requirements as specified by the relevant authorities.
- 8.1.2 The cost of the fire service including all connections to the PUB main and the provision of any meter will have to be borne by the Developer/Owner.
- 8.1.3 The design of fire service system including private hydrants shall also comply with the mode of supply as stipulated in Singapore Standard CP48 - Code of Practice for Water Services (see Section 2.2 of this handbook).
- 8.1.4 In view of the fluctuation in pressure in PUB watermains, storage tanks with pumping equipment should therefore be provided to maintain a satisfactory fire-fighting service to meet the requirements of the Fire Safety & Shelter Department and to comply with the relevant code of practice for fire service. The Water Supply (Network) Department however, shall not be responsible for damage or loss caused by disconnection, diminution or failure of the supply due to water restriction or any other causes.

8.2 Storage Tanks for Fire-Fighting Equipment

A storage tank for fire-fighting is not a potable service and it is essential to ensure that:

- a. A potable service (for domestic purpose) shall not derive its water supply from a non-potable fire service where separate tanks are provided.

- b. A non-potable fire service may derive its water supply from a potable service if the former is provided with an approved anti-back flow (anti-siphonic) device or fitting(s) installed in an approved manner to avoid any possibility of contamination by the reverse flow of water.
- c. Tanks supplying water for domestic purposes should not be used as suction tanks for wet rising mains.
- d. Arrangements can be made for the domestic supply to be drawn off in such a manner that the requisite reserve of water for the wet rising main is always preserved. Such arrangements must have the prior approval of the Water Supply (Network) Department and the Fire Safety & Shelter Department.

8.3 Fire Sprinkler System

- 8.3.1 A separate main of adequate size shall be laid from the meter position to supply the sprinkler system only. This main shall be provided with a double check valve assembly. The connection and installation of sprinkler shall be carried out in accordance with the requirements of the Fire Safety & Shelter Department.
- 8.3.2 All tubing used for a fire sprinkler shall be given a distinct separate colour paint to avoid any possibility of cross-connection made through wrong identification of different pipe system in the building.
- 8.3.3 Water in the sprinkler system shall be drained off periodically by the operation of a 'drain-cock'.
- 8.3.4 Owners wishing to install a fire sprinkler system are advised to provide a storage tank of sufficient capacity, if necessary with pumping facilities, in order to maintain continuous supply at all times.
- 8.3.5 The whole meter system (potable as well as fire-fighting) shall be housed in a suitable chamber.

SECTION 9 - WATER CONSERVATION

9.1 Water Conservation

9.1.1 It is important that potable water is used efficiently and effectively at all times. Water conservation measures as required by PUB must therefore be adopted in both domestic and non-domestic premises, including construction sites in order to conserve water.

9.1.2 Only water products and fittings that are labeled under PUB's Mandatory Water Efficiency Labelling Scheme shall be installed and used. The water efficiency ratings under the Scheme are as shown below:

Water Products/Fittings	Zero Tick Rating	1 Tick Rating	2 Tick Rating	3 Tick Rating
Shower Taps & Mixers (Litres / min)	> 9	> 7 to 9	> 5 to 7	5 or less
Basin Taps & Mixers (Litres / min)	> 6	> 4 to 6	> 2 to 4	2 or less
Sink/Bib Taps (Litres / min)	> 8	> 6 to 8	> 4 to 6	4 or less
Flushing Cisterns - Dual Flush (Litres / flush)	NA	> 4.0 to 4.5 (full flush)	> 3.5 to 4.0 (full flush)	3.5 or less (full flush)
		> 2.5 to 3.0 (low flush)	> 2.5 to 3.0 (low flush)	2.5 or less (low flush)
Urinals & Urinal Flush Valve (Litres / flush)	NA	> 1.0 to 1.5	> 0.5 to 1.0	0.5 or less or waterless urinals

9.1.3 The water conservation measures to be adopted at various areas include the following:

- a All new domestic and non-domestic developments, existing domestic and non-domestic premises under renovations

Only water fittings, apparatus, appliances and products that are labelled with at least a 1-tick water efficiency rating and above under PUB's Mandatory Water Efficiency Labelling Scheme shall be installed and used.

b Toilets/Washrooms in all domestic and non-domestic premises

All new premises and premises undergoing renovations which involve the replacement of water closets shall only be installed with dual-flush low capacity flushing cisterns. This is applicable to all domestic premises. For non-domestic premises such as commercial/industrial premises, this is only applicable if flushing cisterns are to be used. Public toilets shall as required by the National Environment Agency (NEA) be fitted with flush valves.

c Toilets/Washrooms in all non-domestic premises (including the common amenities of condominium)

- i) Install self-closing delayed-action taps at all wash basins.
- ii) Install self-closing delayed-action shower taps at all shower points.
- iii) Install constant flow regulators at all wash basin mixers, shower mixers and bib taps.

d Kitchens/Stalls/Cooking areas in all non-domestic premises

Install constant flow regulators at all sink taps and mixers.

e Canteens (excluding cooking areas)

Install self-closing delayed-action taps at all wash basins and wash troughs.

f Laboratories

Install constant flow regulators at all wash basin and sink taps except for safety reasons.

g Vehicle washing areas

- i) Construct earth removal platforms and water recovery systems for washing of vehicles at construction sites.
- ii) Construct water recovery systems or adopt other water conservation measures as prescribed by PUB at vehicle washing point for other premises where washing of vehicles are required.

h Condominium, Residential apartment Units/ Hotel rooms / Massage rooms / Hospital wards / Family-type hostel units

Install constant flow regulators at all wash basin taps, wash basin mixers, shower taps, shower mixers, bib taps, sink taps and mixers.

i Other areas in domestic (where applicable) and non-domestic premises.

- i) Wherever possible, use alternate sources of water (such as industrial water, high grade industrial water, sea water, NEWater etc) for non-potable uses such as production process, cooling, irrigation, general washing, fire-fighting, etc.
- ii) Set up water pre-treatment plant for boiler usage to reduce boiler blowdown.
- iii) Set up water recovery system for boilers, wherever possible, to recover condensate as make-up water.
- iv) Set up water recycling system, wherever possible, to reclaim process water for reuse in the production process and other non-potable purposes such as cooling, irrigation, etc.
- v) Use non-water cooled (such as air-cooled, refrigerant-cooled, etc) systems for cooling purposes wherever possible.
- vi) Recycling facilities shall be incorporated into any bath which has a capacity, measured to the overflow level of the bath, exceeding 250 litres.
- vii) Install private water meters to measure water consumption at various areas such as cooling towers, swimming pools, kitchens, guestrooms, gardens, landscaped areas, toilets, boilers, etc and to monitor and track the water consumption at these areas for water usage and leakage control management.

9.1.4 Water conservation measures as stipulated in the Public Utilities (Water Supply) Regulations and Singapore Standard CP48 - Code of Practice for Water Services must also be adopted.

Note:

- 1) Constant flow regulators are not required where (i) the water pressure at the fittings is less than 1 bar or (ii) the water fitting is labelled with at least a 1-tick water efficiency rating.
- 2) All water fittings provisions for disabled shall be in accordance with the requirements stipulated in the BCA's Code on Barrier Free Accessibility in Buildings
- 3) All allowable flowrates and timing for self-closing delayed action taps, constant flow regulators and other water fittings and appliances are given in Appendix 2.

- 4) For all new developments and premises undergoing renovations, only water products and fittings that are labelled with at least a 1 tick water efficiency rating and above shall be installed and used. For other instances, if a zero tick tap or mixer is used, it is to be installed with the appropriate constant flow regulator to achieve the flow rates shown in Appendix 2.

SECTION 10 - OTHER TYPES OF WATER

10.1 NEWater

10.1.1 NEWater refers to the high quality water recovered from the final treated effluent from our Water Reclamation Plants, using the latest membrane technologies. The typical quality of NEWater is given in Appendix 3 as a guide.

10.1.2 At present, NEWater is available in:

- Ulu Pandan Cluster - Western and Central areas such as Jurong Island, Tuas, Jurong and City
- Bedok Cluster - Eastern Areas such as, Pasir Ris, Tampines, Bedok, Changi, Chai Chee and Loyang
- Kranji Cluster - Northern areas such as Woodlands, Kranji and Yishun
- Seletar Cluster - North-eastern areas such as Ang Mo Kio

10.1.3 High-tech manufacturing industry, such as wafer fabrication plants, further treat NEWater to ultra-pure water standards for their processes use. NEWater is also used for non-potable purposes, such as for industrial processes, air conditioning cooling tower and general washing.

10.2 Industrial Water

10.2.1 Industrial Water (IW) is a source of water supply from Jurong Industrial Water Works for non-potable use. IW is obtained by further treating the final effluent from Ulu Pandan Water Reclamation Plant, to a standard suitable for use in industrial applications. The typical quality of IW is given in Appendix 4 as a guide.

10.2.2 IW is only supplied to industries on Jurong Island.

10.2.3 Companies using IW include chemical plants and petroleum refineries. IW is generally used for cooling applications.

10.3 Enquiries

Any enquiries on the supply of NEWater should be made to PUB_NEWater_Demand_Centre@pub.gov.sg or pub_one@pub.gov.sg

Enquiries on the supply of NEWater can also be submitted through the following webpage address: <http://www.pub.gov.sg/NEWater>

10.4 Ground Water or Well Water

Application to extract ground water and any enquiry should be made to:

Chief Engineer
Central Building Plan Unit
National Environment Agency
40 Scotts Road #12-00
ENV Building
Singapore 228231

Potable Water Quality (Typical Values)

Chemical & Physical Characteristics (In mg/l where applicable)	*Water from Choa Chu Kang & Bedok Waterworks	**Water from Other Waterworks	WHO Guideline Values (1993)
Colour (Hazen Unit)	< 5	< 5	15
Turbidity (NTU)	< 5	< 5	5
pH Value	7.0 – 9.0	7.0 – 9.0	@
Conductivity (umhos/cm)	250 – 550	80 – 300	@
Taste	Unobjectionable	Unobjectionable	Unobjectionable
Odour	Unobjectionable	Unobjectionable	Unobjectionable
Nitrate (as N03)	0.5 – 7.0	0.5 – 15.0	50
Fluoride (as F)	0.5 – 0.7	0.5 – 0.7	1.5
Total Dissolved Solid	200 – 350	60 – 250	1000
Total Alkalinity (as CaCO3)	20 – 50	10 – 50	@
Total Hardness (as CaCO3)	50 – 100	20 – 100	@
Chloride (as Cl)	35 – 100	5 – 50	250
Sulphate (as SO4)	30 – 60	5 – 40	250
Phosphate (as PO4)	< 0.10	< 0.10	@
Silica (as SiO2)	1 – 10	3 – 12	@
Iron (as Fe)	< 0.04	< 0.04	0.3
Manganese (as Mn)	< 0.05	< 0.05	0.5
Copper (as Cu)	< 0.05	< 0.05	2
Aluminium (as Al)	< 0.10	< 0.10	0.2
Residual Chlorine (as Cl, Total)***	<2.0	<2.0	5.0
Bacteriological Characteristics			
Total Coliform Bacteria (Counts/100 ml, 35°C, 24 hrs)	< 1	< 1	< 1

@ No guideline value

* Raw water is drawn from estuarine reservoirs. The treated water is normally supplied to western and eastern parts of Singapore.

** Raw water is drawn from upland reservoirs and rivers. The treated water is normally supplied to the rest of Singapore.

*** The residual chlorine present in tap water is in the form of chloramines or free chlorine.

Typical values for potable water are only guides and may vary with varying quality of raw water or change of source of water supply due to PUB's operational requirements. They are well within the WHO Guidelines for Drinking Water Quality. Customers will have to treat potable water further if they need water of higher quality for specific applications, such as for process use in factories. It is not necessary to treat potable water further for drinking purpose.

ALLOWABLE FLOW RATE AND TIMING FOR SELF CLOSING DELAYED ACTION TAPS

Area of Usage	Specification
i) Basin Tap	<ul style="list-style-type: none"> • Flow rate not more than 6 L/min and timing between 2 and 3 sec. • Use of special sensor tap with flow rate of 2L/min, water supply automatically cut off when hand is removed from the tap or the preset timing of not more than 30 / 60 seconds is reached, whichever is earlier.
ii) Shower tap	Flow rate not more than 9 L/min and timing between 13 and 15 sec.

ALLOWABLE FLOW RATE FOR CONSTANT FLOW REGULATORS

(Applicable to All Types of Premises)

Area of Usage	Specification
i) Basin Tap	Flow rate not more than 6 L/min
ii) Sink / Kitchen tap and wash area	Flow rate not more than 8 L/min
iii) Shower	Flow rate not more than 9 L/min (except for Hotels to be remained at 12 L/min)
iv) Other areas	Flow rate not more than 8 L/min

Note : Constant flow regulator are not required where (i) the water pressure at the fitting is less than 1 bar or (ii) the water fitting is labelled with at least a 1-tick water efficiency rating. As a guide, these regulators need to be installed only where the static pressure at the fitting exceeds 1.5bar.

BEST PRACTICES ON WATER CONSERVATION FLOW RATE

Area of Usage	Specification
i) Basin Tap & Self Closing Delay Action Basin Taps	Flow rate not more than 2 L/min
ii) Sink / Kitchen tap and wash area	Flow rate not more than 4 L/min
iii) Shower Tap & Self Closing Delay Action Shower Tap	Flow rate not more than 5 L/min
iv) Other areas	Flow rate not more than 4 L/min

Quality of NEWater (Typical Values)

Parameters (in mg/l unless otherwise stated)		NEWater quality
1	Aluminium (Al)	< 0.1
2	Ammonical Nitrogen (as N)	< 1.0
3	Barium (Ba)	< 0.1
4	Boron (B)	< 0.5
5	Calcium (Ca)	4 – 20
6	Chloride (Cl)	< 20
7	Colour (Hazen units)	< 5
8	Conductivity ($\mu\text{S}/\text{cm}$)	< 250
9	Copper (Cu)	< 0.05
10	Fluoride (F)	< 0.5
11	Heterotrophic Plate Count (CFU/ml, 35°C, 48 h)	< 300
12	Iron (Fe)	< 0.04
13	Manganese (Mn)	< 0.05
14	Nitrate (NO_3)	< 15
15	pH value	7 – 8.5
16	Silica (SiO_2)	< 3
17	Sodium (Na)	< 20
18	Strontium (Sr)	< 0.1
19	Sulphate (SO_4)	< 5
20	Total Dissolved Solids	< 150
21	Total Hardness (CaCO_3)	< 50
22	Total Organic Carbon	< 0.5
23	Total Residual Chlorine (Cl)	< 2
24	Total Trihalomethanes	< 0.08
25	Turbidity (NTU)	< 5
26	Zinc (Zn)	< 0.1
27	Total Coliform Bacteria (Counts / 100ml)	Not detectable
28	Enterovirus	Not detectable

QUALITY OF INDUSTRIAL WATER (TYPICAL VALUES)

PARAMETERS (IN MG/L UNLESS OTHERWISE STATED)		INDUSTRIAL WATER
1	Colour (Hazen Units)	10 - 20
2	Turbidity (NTU)	0.5 - 2.0
3	pH Value	6.8 - 7.3
4	BOD ₅ (5 days at 20° C)	1.0 - 5.0
5	Suspended Solids	< 8
6	Total Solid	350 - 1,300
7	Dissolved Oxygen	3.5 - 7.0
8	Free Ammonia	< 5
9	Chloride as Cl-	100 - 500
10	Total Hardness as CaCO ₃	100 - 250
11	Phosphate as P (PO ₄ -P)	1 - 4
12	Alkalinity as CaCO ₃	30 - 80
13	Conductivity (umhos/cm)	600 - 1,600

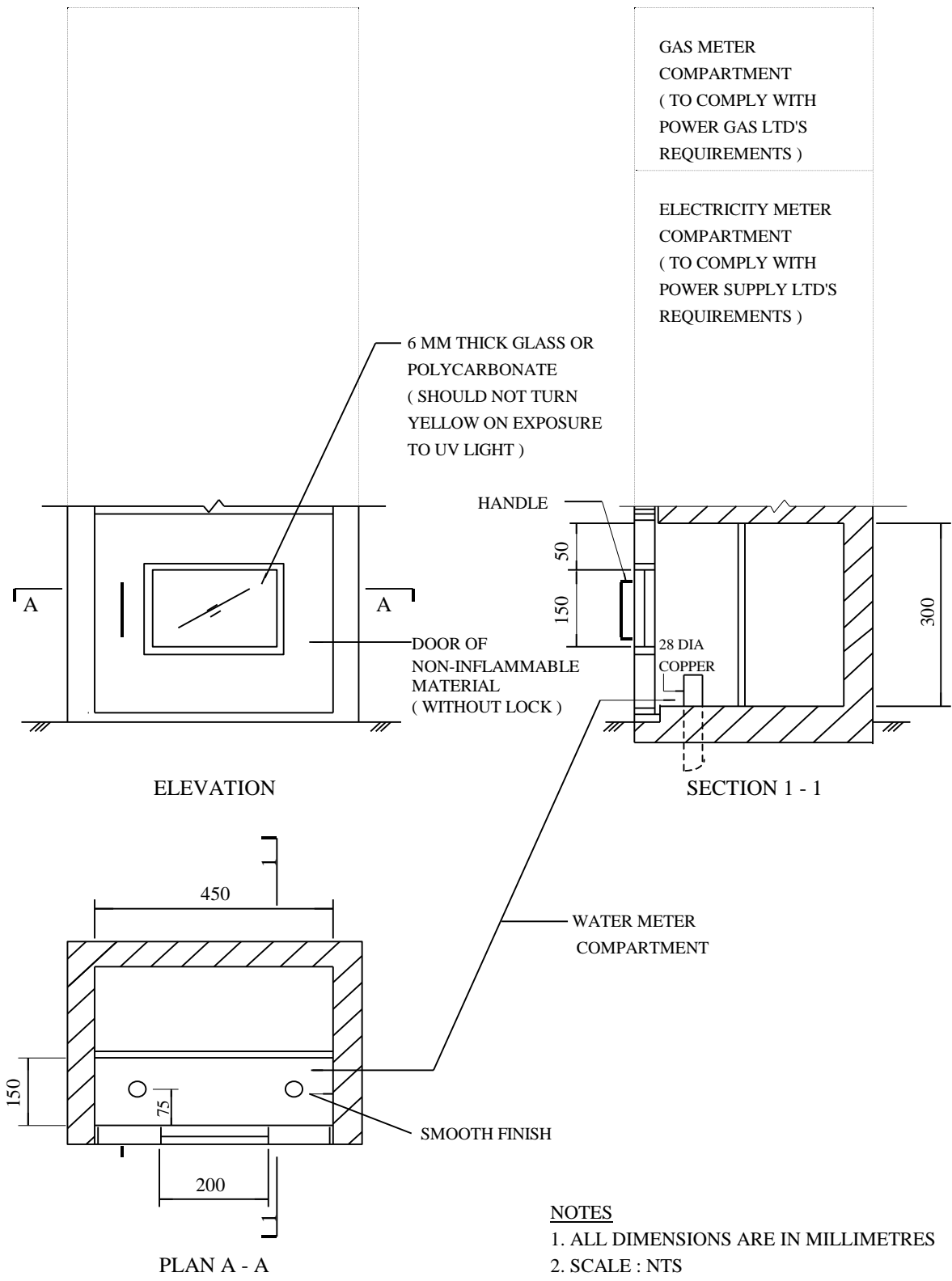


FIGURE 1 : STANDARD WATER METER COMPARTMENT AT GATE PILLAR (FOR LANDED PROPERTIES)