Standard Requirements for Supply and Installation of Automatic Meter Reading (AMR) Outstation

The Automatic Meter Reading (AMR) System for water supply shall be able to provide the Water Authority (WA) with timely and historical metering data, status outputs and alert signals where applicable for operation and monitoring of the smart water meters. The infrastructure of the system consists of AMR Outstations and AMR Master Station. The AMR Master Station and the smart water meters, including master meters and check meters (if any) will be provided by the WA. The Purchaser/Grantee shall supply (except smart water meters), install and commission the AMR Outstation according to the following requirements and any other requirements as specified by the WA from time to time.

1. AMR Outstation

An AMR Outstation shall be designed to collect the metering data from the smart water meters and transmit to the AMR Master Station at the WA. The requirements of the key components of the AMR Outstation shall be as follows:

a. Smart water meters

Smart water meters will be provided by the WA for installation by Purchaser/Grantee. Based on the water consumption of customers, the smart water meters shall be of mechanical, electromagnetic (EM) type or other types as deemed appropriate by the WA.

i. The mechanical water meter shall be equipped with a meter interfacing unit (MIU) capable of recording and storing the meter readings and status in its internal memory with date and time stamps. The stored metering data shall be transmitted and stored in a data concentration unit (DCU) via the hard-wired Meter-Bus (M-Bus) communication protocol.

ii. The EM water meter shall be equipped with a converter capable of generating electric pulse output for AMR application. A pulse-to-M-Bus converter for interfacing of metering data in pulses with DCU in M-Bus protocol shall be required and provided by the Purchaser/Grantee at his own expense. The metering data shall be transmitted and stored in the DCU via the hard-wired M-Bus communication protocol.

b. Data Concentration Unit (DCU)

The DCU shall be provided by the Purchaser/Grantee at his own expense to serve as the M-Bus master of the M-Bus network, which is designed to collect metering data at a programmable interval from the MIUs of mechanical meters and/or the signal converter of EM water meters connected to the network. The metering data stored in non-volatile memory of the DCU shall be transmitted to the AMR Master Station via communication network. Additional DCU shall be provided, when necessary, to serve all the smart water meters.

c. Programmable Logic Controller (PLC)

The PLC shall be provided by the Purchaser/Grantee at his own expense to facilitate automatic, remote control and monitoring of equipment such as DCU, power supply, battery, communication equipment, etc.

d. Communication Equipment

Communication equipment shall be provided by the Purchaser/Grantee at his own expense to facilitate the communication and data transmission between the AMR Outstation and the AMR Master Station.

e. Cabling Facilities and Works

A complete cabling system shall be provided by the Purchaser/Grantee at his own expense. It shall consist of supply, installation, connection and termination of power cables, control cables and communication network cables including associated conduits to all equipment. The Works shall be completed by competent workers of the trade.

f. Backup Battery Unit

A battery charger and backup battery unit shall be provided by the Purchaser/Grantee at his own expense. It shall provide the backup power to the system when the input power source is interrupted.

2. Data Transmission

Communication network services for the AMR Outstation shall be **provided by the Purchaser/Grantee at his own expense** to enable the AMR Outstation to securely communicate with the AMR Master Station for data transmission through broadband/mobile (e.g. 3G/4G/5G) communication networks or other means as deemed appropriate by the WA for Testing and Commissioning (T&C) and operation of the AMR Outstation **before and after handing over of the system** to the WA.

3. Electricity Power Supply

A 220V 50Hz a.c. power supply shall be **provided by the Purchaser/Grantee at his own expense** at all necessary locations for operation of the AMR Outstation. The Purchaser/Grantee shall continue to provide the power supply at his own expense **before and after handing over of the system** to the WA.

4. Testing and Commissioning (T&C)

Each individual item and equipment of the AMR Outstation shall be checked and tested to ensure that it performs in accordance with the specified requirements and is in satisfactory working conditions. Final acceptance test for full function of the AMR Outstation including successful data transmission to the AMR Master Station shall be arranged and conducted by the Purchaser/Grantee to the satisfaction of the WA. The final acceptance test shall be completed on or before the Building Covenant date.

5. System Transfer for Operation and Maintenance

Upon successful commissioning of the AMR Outstation by the Purchaser/Grantee to the satisfaction of the WA, when requested by the WA, the

whole system including all the smart water meters and the associated MIUs, DCU(s), cabling system, associated equipment and communication network shall be handed over to the WA for operation and maintenance.

6. Warranty

All the equipment supplied and installed by the Purchaser/Grantee shall be subject to a warranty against defects and workmanship for 24 months from the handing over date of the AMR Outstation to the WA.

7. Submissions

a. An AMR Outstation proposal detailed the design, layout and equipment for building up the AMR Outstation shall be submitted to the WA for approval prior to commencement of installation work.

b. A Testing and Commissioning procedure shall be submitted to the WA for approval prior to commencement of testing and commissioning work.

c. An Operation and Maintenance manual complete with all necessary documentation, catalogues, drawings, reports, test certificates and T&C records shall be submitted to the WA for approval prior to handing over of the system.

8. Civil Requirements

a. All water meters shall be housed in a meter room or meter boxes as per the requirements set out in the Technical Requirements for Plumbing Works in Buildings.

b. At least two cable conduits shall be provided to run through the meter room of each floor and terminate with a 150mm (h) x 150mm (w) x 75mm (d) adaptable box in each of the meter rooms for installing M-Bus cables and network communication cables.

c. AMR panel (for housing of PLC, DCU and communication equipment) shall be installed in the meter room (hereinafter called AMR equipment room). If one AMR panel is provided, the panel shall be housed in the meter room on the ground floor, or near the ground floor, so as to facilitate ease communication network connection and maintenance works. If more than one AMR panel is provided, the panel shall be housed in the meter room at the middle floor level, or at an appropriate floor, to minimise the length of M-Bus cable from smart water meters to the AMR panel.

d. A 220V 50Hz a.c. power supply with a 13A fuse spur unit and a wall space of 1,000mm(h) x 800mm(w) x 300mm(d) for mounting an AMR panel shall be provided.

e. Should the requirements specified in (d) above cannot be met in the meter room(s), a covered and lockable area on the same floor level of the respective meter room shall be provided for mounting the AMR panel instead. In such case, two cable conduits running through the above-

mentioned meter room to the AMR equipment room shall be provided and to be terminated with 100mm(h) x 100mm(w) x 50mm(d) adaptable boxes.

f. A cable conduit running through the AMR equipment room to the telecommunication room shall be provided and to be terminated with 100mm(h) x 100mm(w) x 50mm(d) adaptable boxes.

g. For cases with more than one AMR equipment room within a development, a cable conduit running through those of the AMR equipment rooms for network communication cables shall be provided and to be terminated with 100mm(h) x 100mm(w) x 50mm(d) adaptable boxes.

h. If master meter and check meter positions are provided, two cable conduits running through the master meter room and check meter room to the AMR equipment room shall be provided and to be terminated with 150mm(h) x 150mm(w) x 75mm(d) adaptable boxes, or individual AMR panel with associated electricity power supply point and telecommunication cable conduit shall be provided at each of the meter rooms.

i. All conduits specified above shall be of 25mm concealed galvanised steel. All provided adaptable boxes complete with covers shall be of concealed galvanised steel.

j. The installation location of the AMR panel, battery charger panel, battery panel and any other auxiliary equipment should be easily accessible to facilitate the operation and maintenance works. The AMR panel and auxiliary equipment should not be installed under any pipework.

k. The maximum distance between the terminal box to either of the smart water meter shall be 1.5 metres.

l. If the cables run across the access or without proper supports, suitable fixed cable conduits and flexible conduit shall be provided for cable protection.

9. Reference Documents

The Purchaser/Grantee shall further note "Introduction of the AMR System in WSD", "Typical Drawings for the Supply and Installation of AMR Outstation" and "Standard Specification for AMR Outstation" issued by the WA, which can be obtained via the following website, in relation to the AMR Outstation(s):

http://www.wsd.gov.hk/en/plumbing-engineering/automatic-meter-reading/index.html