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ABU DHABI QUALITY & CONFORMITY COUNCIL

Abu Dhabi Specification

معايير أبوظبي الفنية

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Technical Specifications: Groundwater Meters for Non-Potable Water Supply

المعايير الفنية لعدادات المياه الجوفية لغير أغراض الشرب

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Tel +971 2 406 6666 | Fax +971 2 406 6677 | P.O. Box 853 Abu Dhabi, United Arab Emirates | www.qcc.abudhabi.ae

Table of Contents	Pages

Amendment Page

To ensure that each copy of this ADS contains a complete record of amendments, the Amendment Page is updated and issued with each set of revised/new pages of the document. This ADS is a live document which can be amended when necessary. QCC operates "Groundwater Meters for Non-Potable Water Supply" Working Group which prepared this document and can review stakeholder comments in order to review and amend this document, issuing an updated version when necessary.

Amendment			**Discard**		**Insert**	
No	**Date**	***Sections Changed**	**Page(s)**	**Issue no**	**Page(s)**	**Issue no**
		New document				

About the Abu Dhabi Quality and Conformity Council

The Abu Dhabi Quality and Conformity Council (QCC) was established by law No. 3 of 2009, issued by His Highness Sheikh Khalifa Bin Zayed Al Nahyan, President of the UAE.

QCC is responsible for the development of Abu Dhabi Emirate's quality infrastructure, which enables industry and regulators to ensure that products, systems and personnel can be tested and certified to UAE and international standards.

Products certified by QCC receive the Abu Dhabi Trustmark. The Trustmark is designed to communicate that a product or system conforms to various safety and performance standards that are set by Abu Dhabi regulators.

1. Foreword

The QCC "Groundwater Meters for Non-Potable Water Supply" working group was established in March 2019 with a view to reviewing all the existing standards related to the subject with the objective of harmonizing the required standard to be agreed by all the relevant entities at the level of Abu Dhabi Emirate. Abu Dhabi Specifications (ADS) will be developed on subjects that have no specifications or local legislation and will then be put forward to ESMA as proposed UAE Standards, and in alignment with Federal Laws and Regulations and Cabinet Decisions.

2. Purpose

The Environment Agency – Abu Dhabi (EAD) regulates all aspects related to groundwater in Abu Dhabi Emirate, including abstraction of groundwater, as per local law no. (5) of 2016 for the management of groundwater resources in the Emirate. The regulation for groundwater management developed by EAD provides a tool to aid in the planning, monitoring and management of groundwater resources. These specifications are developed as per requirements of the mentioned law and regulation to ensure continued confidence with water metering requirements; to promote accurate measurement of water abstraction to assist in the monitoring process and water abstraction permit compliance and enforcement; and to outline requirements for abstraction permit holders to meet their obligations under the mentioned regulation.

3. Acknowledgement

QCC would like to thank the members of the Working Group listed below.

Name		Entity
1	Eng. Wail Suleiman	Environment Agency (EAD)
2	Dr.Mohamed Dawoud	Environment Agency (EAD)
3	Eng. Moustafa Lotfy	Environment Agency (EAD)
4	Dr.Ahmed Sefelnasr	United Arab Emirate University (UAEU)
5	Dr.Moustafa Fadel	United Arab Emirate University (UAEU)
6	Eng. Mohamed Yousif	Department of Energy (DOE)
7	Eng. Mohammed Younis	Department of Energy (DOE)
8	Eng. Mohamed Abbas Ali	Department of Energy (DOE)
9	Eng. Mohamed Shehab	Department of Urban Planning and Municipalities (DPM)
10	Eng. Antonios Vouloudis	Department of Urban Planning and Municipalities (DPM)
11	Eng. Mai AL Halabi	Department of Urban Planning and Municipalities (DPM)
12	Eng. Hamad Muhsen	Abu Dhabi City Municipality (ADM)
13	Dr.Ammar Jarrar	Abu Dhabi City Municipality (ADM)
14	Eng.Govindan Sukumaran	Abu Dhabi City Municipality (ADM)
15	Eng.Taimoura AlRejaibi	Abu Dhabi City Municipality (ADM)
16	Eng. Onoud Almarzooqi	Industrial Development Bureau (IDB)
17	Eng. Venkataramana Ayyagari	Industrial Development Bureau (IDB)
18	Eng. Saeed AL Khuroosi	Abu Dhabi Distribution company (ADDC)
19	Eng. Nasr Aziz	Abu Dhabi Distribution company (ADDC)
20	Eng. Hani Elsayed	Al Ain Distribution Company (AADC)
21	Eng. Rami Al Qerem	Abu Dhabi Agriculture and Food Safety Authority (ADAFSA)
22	Eng. Ibrahim Al Hosani	Abu Dhabi Agriculture and Food Safety Authority (ADAFSA)
23	Eng. Mohamed AL Muhairi	Abu Dhabi Agriculture and Food Safety Authority (ADAFSA)
24	Eng. Abdullah Al Nuaimi	Abu Dhabi Agriculture and Food Safety Authority (ADAFSA)

4. Scope

These specifications apply to all groundwater metering systems not intended for drinking purposes that are required by an abstraction permit holder to meet his/her obligations under the groundwater management regulation and regulatory instruments developed by EAD. It applies to meters that operate on closed pipe or conduit under full water flow. It primary covers metering for irrigation and agricultural uses, however, it is intended that it be used for non-domestic water uses.

Installation, verification and maintenance of groundwater meters are beyond the scope of this document.

The specifications do not apply to metering systems that measure treated water or potable water delivered through water transmission mains, distribution networks, or local networks. The specifications do not have jurisdiction on operations of Abu Dhabi National Oil Company (ADNOC).

5. Terms and Definitions

TERM	DEFINITION
Abstraction Permit	A document issued by the competent authority to the owner authorizing the extraction of groundwater, and specifying the amount of water authorized for extraction and the purposes designated for its use
Accuracy	The qualitative description of the closeness of the measurement to the true value, based on the measurement uncertainty which is quantitative
Competent Authority	The Environment Agency – Abu Dhabi (EAD) is the competent authority for the Emirate of Abu Dhabi responsible for environmental affairs
Emirate	The Emirate of Abu Dhabi
Governmental Department	Any governmental agency within the Emirate of Abu Dhabi that is required to obtain an abstraction permit from the competent authority
Groundwater	Water naturally located in the ground, which can be extracted by drilling wells and does not include the water of surface ponds
Groundwater Well	Any hole that is made in the ground to abstract groundwater including the installations and equipment used for this purpose
International Protection Code	A code that classifies and rates the degree of protection provided against intrusion (body parts), dust, and water by mechanical casings and electrical enclosures

TERM	DEFINITION
Meter	A measuring device or system (including its component parts) used to measure the volume of water passing through a closed conduit over a known period of time
Permit Holder/Owner	The person/entity/governmental department who has an abstraction permit and owns the land in which the groundwater well is situated or has the right to use the land or extract groundwater
Tamper	Interfere, damage or destroy a water meter

6. General Requirements

- It is not allowed for any permit holder to use a groundwater meter with standards that do not meet requirements of these specifications.
- The permit holder shall submit to EAD, on regular basis and as per requirements of the competent authority, documents that show compliance with requirements of these specifications.
- EAD shall check compliance with requirements of these specifications as part of its permitting/enforcement processes.
- EAD has the right to postpone the abstraction permit in case EAD concluded that there is no sufficient compliance with requirements of these specifications.
- Installation, verification and maintenance of groundwater meters should be conducted as per requirements of the competent authority. Please refer to relevant documents issued by EAD in this regard (EAD-EQ-PR-TG-06 and EAD-EQ-PR-TG-09).
- Permit holder is not allowed to do any modification to meter connections, pipes and fittings without written permission from the competent authority.
- The meter should be easily accessible for regular readings and maintenance.
- The permit holder is responsible for meter selection and should take into consideration all requirements mentioned in this document, in addition to other EAD requirements, when deciding to purchase a meter.
- Water flow rate should be taken into consideration when selecting the appropriate water meter, as each meter has a nominal flow at which it gives the most accurate readings.

- The permit holder must retain a copy of meter specifications provided by the manufacturer, including certification of meter accuracy and installation instructions, and make it available to the competent authority upon request.
- The meter must be selected to provide the required accuracy considering the diameter of the pipework and the expected maximum and minimum flow rates in which it will operate.
- The meter must be supplied from a manufacturer certified as compliant to ISO 9001 – Quality Management Systems and the meter's metrological accuracy must have been laboratory-verified prior to installation.
- The meter should be manufactured from sound, durable, corrosion resistant materials, and should not be adversely affected by water temperature and/or water quality including salinity. All parts of the meter in contact with water must be manufactured from materials that are non-toxic, non-corrosive and both chemically and biologically inert.
- Installation of an isolation valve upstream of the meter should be considered.

7. Water Meter Types

Water meters can either be driven mechanically or non-mechanically with each having specific attributes to suit various operating conditions. A brief overview is provided below:

- Mechanical meters: operate by a propeller, turbine or paddle wheel coupled to a measurement dial, or electronic display. These meters are suited to clear water with no debris and generally less expensive than non-mechanical types. However, they have a higher maintenance requirement. High levels of iron bacteria, calcium and high water temperatures will affect mechanical meters over time.
- Electromagnetic meters (also known as Magflow meter): non-mechanical meters mainly used in urban, wastewater and industrial systems. Magflow meters consist of a section of pipe with a magnetic field projected across it and electrodes to detect electrical voltage changes. They are useful where debris, and poor water quality is an issue.

- Ultrasonic water meters (also known as Doppler flow meters): non-mechanical meters suited to the same purposes as the magflow meter. The ultrasonic meter has a sensor that can be either inserted inside, or attached outside of the pipe. The sensor measures the water velocity in the pipe, and then converts this to flow rate.

8. Technical Requirements

- **Accuracy:**
  - The meter must be designed and manufactured such that its errors do not exceed the maximum permissible error defined as accuracy class (2) for meters ≤ DN50, and accuracy class (1) for meters > DN50 as per OIML R 49-1 of 2013.
- **Rated Operating Conditions (as minimum requirements):**
  - Ambient air temperature range of −5°C to 60°C.
  - Relative humidity range of 0% to 100%, except for remote indicating devices where the range should be 0 % to 93%.
  - Working water temperature range of 0.1°C to 38°C. The maximum admissible temperature is 50°C.
  - Working water pressure ranges minimum 0.03 MPa to a value specified by the manufacturer. As a minimum, meters must have the same working pressure range as the pipes they are designed to operate in.
  - Meters and electronic sensors should be resistant to vibration and shock up.
- **Scale:**
  - The meter must be able to record water volumes up to a level of ten (10) times average annual use with no reset facility for total water volume.
  - The meter's unit of measurement must be sensitive enough to identify at minimum one percent of the permit holder's expected annual water use.

- **Reading Display:** must be:
    - Displaying cumulative totals and rate of flow in metric units in digital form (cubic meters, m^3/hr). The cumulative totals should not change when the flowrate is zero.
    - With a scale interval such that verification can be completed practically onsite.
    - Clearly visible and easily read. The meter reading display must be free from visual obstruction at all times.
    - Capable of continuous measurement and totalizing.
    - Resistant to corrosion, dust and fogging.
- **Serial Number and Labels:**
    - Meters must have a clearly identifiable manufacturer's name or trade mark, year of manufacture, serial number, international protection (IP) and nominal flow securely attached or imprinted.
    - Meters must be labelled to show the direction of flow, orientation or any other necessary installation information to achieve the required accuracy.

For water meters with electronic devices, the following additional inscriptions should be included:

- For an external power supply: the voltage and frequency. The meter should be capable to utilize solar power unit.
- For a replaceable battery: the latest date that the battery is to be replaced; alternatively provision shall be made to allow this date to be recorded in the memory of the meter upon replacement of the battery and installation of the meter.
- For a non-replaceable battery: the latest date by which the meter is to be replaced; alternatively provision shall be made to allow this date to be recorded in the memory of the meter upon installation.

- **Tamper Proof Devices:**
  - Meters must have tamper evident seals, locks, controls or other devices sufficient to limit access to, and prevent tampering with, the equipment.
  - A tamper evident seal must be capable of clearly showing whether the meter has been interfered with, and must not prevent the reading of metering equipment or affect the operation of the telemetry system for the equipment.
  - Meters must be sealed with connection in both sides so it cannot be removed without removing a tamper seal.
  - Meters that require mains power to operate shall not be able to be isolated (turned off), while the pump is able to continue to operate.
- **Data Logging:**

  It is not mandatory to fit an electronic data logger. However, the meter must be capable of being fitted with an electronic data logger. The data logger should be of compact, rugged, outdoor, battery operated, capable of transmitting data using commercially available telecom network and operate continuously in harsh environmental conditions.

  If a data logger is installed, it:
  - Should have sufficient capacity to collect, record and store no less than one year of groundwater abstraction data, at minimum daily intervals, including date of each interval and the period for which water is abstracted. It should have capability to transmit data using telecom network.
  - Should be of a memory that is non-volatile or battery backed so that data is not lost as a result of main battery replacements. The memory capacity should be expandable.
  - Should have the capability to operate with long life internal battery for at least 5 years.
  - Should be completely waterproof, sealed and pressure tested (IP-68).
  - Should be able to withstand at an ambient temperature of -5^{o}C to 60^{o}C.

- Should have ability to replace the (SIM) card in the field by the user.

The GSM modem should be capable of transmitting and receiving instructions from a central data server using secured data services and short messaging services (SMS) as a fall back. The modem should be compatible with the telecom service provider in UAE (Etisalat & Du). In addition, data should be retrieved by download data via a Universal Serial Bus or with an Ethernet link to a Laptop or any other link like RS 232.

- **Electrical Power Source:**
  - If the meter relies on an electrical power source, then it must have a non-volatile memory to ensure that recorded data is not lost in the event of power failure, the last meter reading at the time of power failure is retained and all recorded data can be retrieved.
  - External Power Supply: Meters with electronic devices shall be designed such that in the event of an external power supply failure (AC or DC), the meter indication of volume just before failure is not lost, and remains accessible for a minimum of one year.
  - Non-replaceable Battery: The manufacturer shall ensure that the indicated lifetime of the battery exceeds the operational lifetime of the meter by one year. Therefore, guaranteeing that the meter functions correctly for at least one year longer than the nominal operational lifetime of the meter. The latest date by which the meter is to be replaced shall be indicated on the meter.
  - Replaceable Battery: The replacement date of the battery shall be indicated on the meter. The properties and parameters of the meter shall not be affected by the interruption of electrical supply when the battery is replaced.
- **Protection Rating:**
  - All mechanical and electrical equipment and connections associated with the meter must be protected to at least International Protection IP67. If the meter is to be installed in an underground chamber, it should have IP68.

9. Abbreviations and Acronyms

ADNOC	Abu Dhabi National Oil Company
ADS	Abu Dhabi Specifications
DN	Nominal Diameter
EAD	Environment Agency–Abu Dhabi
ESMA	Emirates Authority for Standardization and Metrology
GSM	Global System for Mobile communications
IP	International Protection
ISO	International Organization for Standardization
OIML	International Organization of Legal Metrology
QCC	Abu Dhabi Quality and Conformity Council
SIM	Subscriber Identity Module
SMS	Short Message Services
UAE	United Arab Emirates

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