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Approval & Reception Procedure

DEE – Departamento de Estruturas e Edifícios		
Building Water Distribution System – Water Quality Testing	Document No.:	**ARP/DEE/018**
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1 Scope of Use

This Approval & Reception Procedure is applicable to the water quality acceptance for water supply system of new building, after cleaning and disinfection before used.

2 Reference Standard

Regulations No. 46/96/M	Regulamento de Águas e de Drenagem de Águas Residuais de Macau (RADARM)
Council Directive 98/83/EC	Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption
GB 5749-2006	Standards for Drinking Water Quality
ISO 19458:2006	Water Quality – Sampling for microbiological analysis
ISO 5667-3:2012	Water Quality – Sampling – Part 3: Preservation and handling of water samples

3 Definition

Direct supply system： Water supply system with water directly supplied to the users, and without the participation of water storage facilities in the building.

Indirect supply system： Water supply system that water passes through the water storage facilities in the building, and is then delivered to the users.

Reference water sample： Water sample from Public Water Supply System for reference use.

4 Approval Procedures

Before water quality testing, the following documents are required to be submitted for approval：

- Method statement and testing plan；
- Information of third party laboratory.

4.1. Method statement and testing plan

Testing must be performed by third party laboratory. The method statement and testing plan should be as detailed as possible, and should include at least the following content：

- Scope of testing
- Sampling location
- Sampling procedure
- Testing parameters

4.2. Information of third party laboratory

The information of the third party laboratory should include at least the following content：

- Name, address and contact details
- Working scope and ability
- Qualifications and certificates

5 Reception Requirement

5.1 Sampling location

5.1.1. Water sampling should be performed at least in accordance with the location required in *Table 1*；

5.1.2. In addition, a reference water sample is required, and the sampling location should be as close as possible to the Public Water Supply System；

5.1.3. The contractor must arrange the sampling locations and facilities in advance.

Table 1

Type	Sampling Location
Building of Class M or above	
Indirect supply system	➢ 1 sample at one of the roof tanks； ➢ 1 sample at one of the sump tanks； ➢ 1 sample at one of the drinking water taps for every downpipe (from roof tank to the users).
Direct supply system	➢ 1 sample at one of the drinking water tap in one of the apartments； ➢ 1 sample at the drinking water tap at another location within the supply system.
Building of Class P	
Direct supply system	➢ 1 sample at drinking water tap of the supply system.

5.2 Sampling and water quality requirements

5.2.1. After cleaning and disinfection, let the water stay in the internal water supply system for a stagnation period of at least 6 hours.

5.2.2. After the stagnation period, take water samples in accordance with ISO 5667-3 and 5.2.3, and conduct water quality analysis at least in accordance with *Table 2*.

5.2.3. When taking water samples, always collect the water sample for metal testing first followed by collection of water samples for analysis of chemical and physical parameters and bacteriological parameters：

5.2.3.1. At the end of the required stagnation period, place a 1-L sample bottle for metal testing under the tap. Collect 1-litre of water with the tap opened as much as possible without spillage. Never rinse the sample bottle before sample collection.

5.2.3.2. Immediately after collection of 1-L of water sample, place a 500mL sample bottle for chemical and physical testing under the tap and collect 500mL of water. Close the tap after sample collection.

5.2.3.3. Disinfect the tap in accordance with ISO 19458. Then open the tap and flush briefly. And then place a sterile sample bottle under the tap and take 250-mL sample for testing of bacteriological parameters.

Remark：The reference water sample can be prepared without stagnation period.

Table 2

Parameter		Acceptance Criteria
Bacteriological		
Total Coliforms		Not Detectable /100 mL
E. coli		Not Detectable /100 mL
Metals		
Lead (Pb)		≦10 μg/L
Chromium (Cr)		≦50 μg/L
Nickel (Ni)		≦20 μg/L
Cadmium (Cd)		≦3 μg/L
Copper (Cu)		≦2000 μg/L
Antimony (Sb)		≦5 μg/L
Chemical and Physical		
Turbidity		≦3.0 NTU
Colour		≦15 Pt/Co Colour Unit
pH		≧6.5 and ≦9.5
Free Residual Chlorine		＞0 mg/L and ≦1.5 mg/L
Conductivity	（at 20℃）	≦2500 μS/cm
	（at 25℃）	≦2764 μS/cm

6 Acceptance Criteria

- If the results of all parameters of the water sample fully comply with the requirements of the acceptance criteria in *Table 2*, the tested water supply system can be considered as acceptable.
- If the results of one or more parameters of the water sample do not comply with the requirements of the acceptance criteria in *Table 2*, depending on the situation, the part of the water supply system represented by the unqualified water sample, should be cleaned and/or disinfected, and then retest must be performed in accordance with the requirements in *Table 3*, until the results of all parameters of the water sample fully comply with the requirements of the acceptance criteria in *Table 2.*

Table 3

Parameters	**Scenarios**		
Metal parameters	fail	pass	pass
Physical and Chemical parameters	pass or fail	fail	pass
Bacteriological parameters	pass or fail	pass	fail
Parameters to be retested	***all parameters***	***all parameters other than metal***	