

**Memorandum for the Review Committee on Quality Assurance Issues
Relating to Fresh Water Supply of Public Housing Estates of
the Hong Kong Housing Authority**

**Maintenance and Improvement Works for Fresh Water Supply System
in Public Rental Housing Estates**

PURPOSE

At the first meeting of the Review Committee we referred to the maintenance and improvement (M&I) of the fresh water supply system in public rental housing (PRH) estates. This paper discusses how we arrange for and control the quality of such works.

FRESH WATER SUPPLY SYSTEM IN EXISTING PRH

2. The fresh water supply system in our PRH stock is either originally built, or with replumbing works carried out. The fresh water supply system of about 44% of our existing PRH stock is in its original as-built design. The remaining PRH stock (56%) is mainly older estates originally completed with galvanized iron (GI) pipes. A large scale replumbing programme to replace the aged GI fresh water supply pipes by non-ferrous pipes, mainly copper pipes with compression joints, started in 1995/96 and generally completed in 2011/12. In recent years, some complete or partial replumbing works e.g. replacement of cross-lined polyethylene pipe (PEX) and lined GI pipe have been carried out.

3. The distribution of different types of fresh water supply system in PRH estates is as follows-

In-flat [∞]		Common Area		No. of Domestic Blocks	No. of Estate involved
Pipe Material	Type of Joint	Pipe Material	Type of Joint		
Copper	Soldering	Copper	Soldering	151 [▲]	120
	Compression		Compression*	503	
	Soldering	Non-Copper [#]	Mechanical	20 [▲]	
	Compression	Non-Copper [#]	Mechanical	163 [†]	16
Non-Copper [#]	Mechanical	Non-Copper [#]	Mechanical	351 [†]	37

Total: 1188[^] 173[^]

Remarks:

- The figures cover PRH estates, and therefore exclude Tenants Purchase Scheme/Buy Or Rent Option/Mortgage Subsidy Scheme/Home Ownership Scheme and non-domestic[∞] blocks of PRH estates.

The provision of hot water copper pipe with compression/soldering joints inside flat is disregarded.

* Soldering is used in isolated locations due to site constraints or availability of suitable joint components.

Non-copper pipe system is mainly in lined G.I. pipes with small portion of PEX / stainless steel pipes with mechanical joints.

^ As at 18 September 2015, water sampling tests for lead content have been carried out for 194 blocks in 46 PRH estates with their fresh water supply system originally built by the Hong Kong Housing Authority's main contractors. The 194 blocks include those marked with [▲], as well as 23 blocks completed in or after 2005 in which soldering was generally not used (from the blocks marked [†]).

M&I WORKS

4. There are four main types of M&I works to fresh water supply system commonly carried out in Estate Management Division (EMD) projects-

- (a) Repair and maintenance of defective water pipes, fitting and water taps during responsive and routine maintenance;

- (b) Partial or complete replacement of water pipes and fittings inside flat during vacant flat refurbishment;
- (c) Alteration works during large scale renovation probably involving water meter alteration; and
- (d) Large scale replumbing works, including riser pipes, up-feed/down-feed and branch pipes.

5. Majority of the M&I works are procured through District Term Contracts (DTC) and some large scale replumbing works¹ are procured through lump sum contracts². We require the contractors to engage a licensed plumber (LP)³ to execute the plumbing works and arrange all necessary submissions to the Water Supplies Department (WSD).

Materials of Fresh Water Supply Pipes

6. All plumbing works are specified in compliance with all the Water Authority's requirements. In selecting materials and specifications, we exercise additional care and control on the works arrangement as we are working in occupied premises. We need to ensure minimum disturbance to our tenants/ occupants during execution of works and we also need to take into consideration the safety and protection of works in occupied domestic flats, potential obstruction by existing fixtures and fittings, and also planning of water supply interruption period.

7. The parts used in our M&I works to fresh water supply system are listed below. Photos of the typical installations of copper pipes are at **Annex**.

1 Large scale replumbing works usually involve the whole estate, and are procured through separate lump sum contracts to achieve efficiency and effectiveness.

2 Tenderers are selected from the HA Lists of Building (Maintenance) Contractors. HA requires all listed contractors to be Registered General Building Contractor under Buildings Ordinance (Cap. 123). Only eligible tenderers with relevant experience and satisfactory past performance are invited to tender.

3 LP shall be registered by the Water Supplies Department as Grade I plumber's licence.

Inside flat: copper pipes with compression joints;
Common area: copper pipes (below 75mm) with compression joints or others mechanical joints; and
Common area: ductile iron pipes and flange joints for 75mm and above.

(Note: a small portion of the stock was replaced with lined G.I./ PEX/ stainless steel pipes with mechanical joints.)

8. We require that jointing material must not project into bore of pipes or fittings. Compression fittings or grooved end jointing or other mechanical jointing system approved by internationally recognized approval authority are specified for jointing of copper pipes. Soldering for copper pipe connections is generally not used in M&I works in EMD except at isolated locations due to site constraints or availability of suitable joint components to match existing installations.

9. We incorporate all critical criteria for compliance in the EMD General Specifications for Building Works, which is updated as and when necessary. The Specifications are updated based on latest international standards, reference to Specifications of various counterparts including Development and Construction Division (DCD), Architectural Services Department and etc., consultation with suppliers, internal users and trade associations.

Current Supervision on the Installation of Fresh Water Supply Systems

10. We vet and approve the following submissions from the contractor before works start-

- (a) Sample panel or mock-up of connected pipe works, fittings and associated supporting brackets, hangers, etc;
- (b) Material schedule showing the type, brand, material, size, manufacture and origin of pipe works, fittings and associated supporting brackets, hangers, etc. accompanied with catalogues, certificates, test reports, approval documents from respective regulatory authorities.
- (c) For large scale replumbing and vacant flat refurbishment, a sample flat with all pipe works, fittings and associated supporting brackets, etc. for the replumbing of a domestic flat before proceeding with

the actual installation for the tenants.

11. In processing the contractor's material submission, we check the specifications against the contractor's submission documents/ samples, including catalogues, samples, certificates, test reports, approval documents from respective regulatory authorities (including approval documents from the WSD, etc). Consideration is also given to whether the materials have been used in other projects⁴ and whether they have been listed under the "Material Quality Alerts" issued by DCD counterparts⁵.

12. Project team (PT) conduct checks on submissions by the contractor showing compliance of standards when materials are delivered to the site. Visual inspection and verification are carried out on materials against submitted catalogues and certificates.

13. It is the duty of the contractor to ensure and certify that the works are carried out in accordance with the specifications and drawings before notifying PT to inspect them periodically. The listed contractors employed by HA are certified to ISO 9001 for quality management, ISO 14001 for environmental management and OHSAS 18001 for occupational health and safety management. The contractors set up their management and supervising team⁶ according to the contract requirements, establish and maintain a system to ensure that works conform to the contract requirements.

14. PT conduct site inspections on a need basis to assess the quality of the works. PT also check the work completion record from contractor, sample check of work done or witness commissioning as appropriate.

15. Regarding plumbing installation works, regular site surveillance is mainly done through visual inspection of, for example, the alignment of water pipes and brackets, adequate pipe sleeves and spacing, the connection of pipes,

4 Building Material Database with records of material approval, usage and testing information is established since 2012.

5 EMD Research and Development (R&D) Unit closely liaise with DCD counterparts through regular meetings and special workgroups in sharing technical knowledge and expertise.

6 According to our DTC requirements, the contractor's management and supervising team comprises at least Construction Manager, Construction Engineer, Quantity Surveying Manager, Public Relation Manager, Environmental Manager, Quality Manager, Licensed Plumber, Site Agents, Building Services Co-ordinator, General Foreman (Building Services), Safety Officer and etc.

whether the material used comply with contractual requirements, any damage to existing or tenant's fixtures, etc.

16. Upon completion of plumbing works, the contractor and the LP inspect and test to ensure that the completed works comply with the approved drawings, statutory requirements and contract specifications. PT conduct the final inspection with the contractor to ensure that all the installations meet our requirements and standards with no leakage or defects detected.

17. For large scale plumbing works involving WSD submission, the LP of the contractor applies to the Water Authority for inspection and approval of the plumbing installation.

Quality Control and Monitoring

18. The contractor is responsible for continuous supervision of the works in order to ensure compliance with contract requirements. Our PT conduct inspections according to pre-determined frequencies, standards and procedures, and record the findings under the Maintenance Assessment Scoring System (MASS)⁷ as part of the Output Assessment.

19. In addition to the normal management and quality control of the contractor's work by the PT, the Central Assessment Team (CAT) also conduct quarterly Output Assessments.

20. Output Assessment covers standard and quality of material; quality of workmanship and finishes; job progress; site management and customer services. Sample orders are randomly chosen by CAT and materials used on site are checked against those approved/ specified.

WSD's Quality Water Recognition Scheme

21. In 2003, we started to participate in WSD's "Quality Water Supply Scheme for Buildings - Fresh Water".

22. Under the Scheme, water samples are required to be taken periodically from the PRH estates for testing in accordance with WSD's guidelines. For new applications, water tests should be carried out at least

7 MASS assessment, which the performance of a contractor is regularly reflected, affects the allocation of tendering opportunities for DTCs to contractors and their evaluation of their submitted tender. HA may impose regulatory actions on contractors with poor performance, including but not limited to restriction or suspension from tendering.

once every year and for subsequent renewal applications, water tests should be carried out at least once every two years.

23. Currently, most of the PRH estates have obtained certificate of "Quality Water Supply Scheme for Buildings - Fresh Water", except those housing blocks scheduled for demolition and newly completed blocks.

ENHANCED MEASURES SUBSEQUENT TO THE INCIDENT

24. Following the incident, we have taken the following steps to enhance our quality assurance-

- (a) We will continue to require contractors to use compression joint to copper pipes.
- (b) If the use of soldering joint is unavoidable at isolated locations, prior approval will be required from the Contract Manager (CM). The contractor shall submit the application for using soldering joint with justifications, supporting documents to prove that 'lead-free' soldering material will be used, and plan showing site control ensures that only approved material/ method statement will be used on site.
- (c) If soldering joints are approved for use in isolated locations, PT shall carry out sample checking/ testing of the soldering materials by quick test method upon material delivery to site as well as when works are in process.
- (d) WSD Circular Letter No. 2/2015 issued on 11 August 2015 stipulates that with immediate effect acceptance of water supply pipes and fittings is valid for a maximum period of five years from the date of issuance of the approval letter. We have immediately required all PT to follow and enforce to all orders under DTCs and lump sum contracts issued on or before 10 August 2015. We have requested all our DTC contractors to re-submit materials for plumbing works with valid acceptance by the Water Authority for approval ⁸. We have developed a Material Checking Guide for Water Pipes and Fittings for use by PTs during their site

⁸ Until such approvals are granted by CM, the previously approved materials (if with expired WSD's approval) are only permitted for use in emergency repairs only.

supervision.

- (e) We will keep in view new WSD requirements, incorporate such requirements in M&I contracts, and issue “Maintenance Alerts⁹” to alert all EMD colleagues of actions required to comply with the latest WSD requirements.
- (f) We will continue to review and update our specifications through benchmarking with our counterparts and incorporate in our EMD General Specifications for Building Works as appropriate. We will explore the incorporation of specifications to require more active involvement of the LP in site supervision and reporting.

WAY FORWARD

25. We will liaise with WSD to review our current M&I works arrangement to fresh water supply system to ensure full compliance with their latest requirements.

ADVICE SOUGHT

26. Members are invited to advise on the paper.

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(Estate Management Division)
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SCHEDULE OF ANNEX

Annex - Photos of typical installations of copper pipes in M&I works

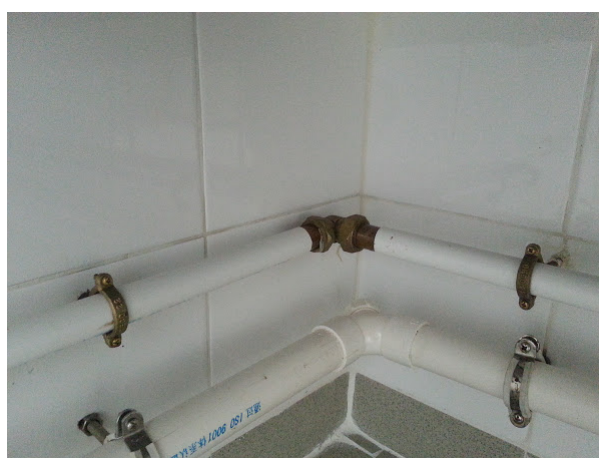
9 “Maintenance Alert” is issued by EMD Research & Development Unit to all EMD works staff for sharing technical knowledge and expertise.

Photos of Typical Installations of Copper Pipes in M&I Works

(a) Compression fittings



(b) Inside flat: copper pipes with compression joints



(c) Common area



Photo 1

Photo 1: DI pipe with flange joints from water tank connected to copper distribution pipe

Photo 2: Copper distribution pipe with mechanical joints

Photo 3: DI pipe with flange joints connected to copper pipe with mechanical/compression joints

Photo 4: Copper pipe with compression joints

Photo 5: Copper pipe with compression joints connected to water meter of tenant's flat



Photo 2



Photo 3



Photo 4



Photo 5