Mechanical Services Standard Specification
6.0 - Chemical Cleaning and Flushing of Water Systems

May 2010

For
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AMENDMENTS

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6.1 INTRODUCTION

This specification provides the requirement to undertake chemical cleaning and flushing of domestic and non-domestic water systems prior to handover.

The end user must be provided with clear instructions in maintaining the correct level of protection against corrosion.

For domestic water usage installations, the correct levels of water management shall be clearly defined to the end user to ensure proper and continuous maintenance of water quality.

It is fundamental that all flushing loops and bypasses are incorporated into the system as the works progress and that pre-cleaned sensitive plant can be isolated from the cleaning and flushing process at all times. This may include fan coil units, terminal heater batteries, AHU batteries, boilers, chillers, calorifiers and the like.

ALL WORKS ARE TO BE INSPECTED BY
THE TENDERING CONTRACTOR PRIOR TO PRICING

HEALTH AND SAFETY STATEMENT

Health and Safety precautions are required to be taken during the process of undertaking works within buildings cannot be underestimated.

Reference shall be made to Royal Holloway University Health and Safety Policy and Contractors Guidance documents available from Royal Holloway University of London Estates Office.

The Health and Safety Executive (HSE) publish a series of guidance documents regarding all many different methods of protecting the workforce and people in general when working with hazardous chemicals (COSH) and undertaking potential dangerous work activities.

Installers engaged in any work shall be registered with the Construction Skills Certificate Scheme (CSCS) and be in possession of a valid skills card.
6.2 **SYSTEMS TO BE CHEMICALLY CLEANED**

Flushing and chemical cleaning of pipework shall be carried out to all new and existing pipework where specified.

The extent of pipework to be chemically cleaned and treated as required shall be as follows;

- LTHW installations
- Chilled water installations
- Mains cold water pipework installations
- Cold water systems
- Hot water installations

6.2.1 **Pre-Cleaning Procedures**

A specialist shall be employed by the Installer to design and implement the pipework chemical treatment and final dosing process to be agreed by the Royal Holloway University of London.

Prior to carrying out cleaning and chemical treatment processes, the installation shall ensure that:

- All foreign matter is removed.
- Certified pressure tests have been carried out in the parts of the system to be cleaned.
- All water used for pressure testing is treated and sections are left full after testing.
- Circulation has been demonstrated to all parts of the system and leave all valves other than those used to isolate sections are fully open.
- No damage can occur to any item of plant or equipment due to cleaning and chemical processes.
- Chemicals used are compatible with system materials and all jointing compounds, etc.
- All items of plant and equipment subject to damage or blockage due to cleaning and chemical treatment processes are isolated or removed.
- Permanent or temporary by-passes are provided as necessary.
- All site discharge drains provided shall have been tested and approved adequate. Approval should be sought that the drains are suitable for the chemicals used and any pumping equipment associated with the drainage system is fully commissioned.
- Strainer baskets and filter media, incorporated within systems, are removed; and where necessary spool or stool pieces are installed.
- Suitable flushing and drainage points are provided with 50mm minimum connections, properly sited and installed, either valved or plugged.
• All automatic and manual air vents are fully commissioned.

• All requirements of COSHH regulations are complied with during the chemical cleaning and chemical treatment of the system.

• The local Water Authority has given approval to discharge the cleaning chemicals into their drainage system.

The Installers specialist shall carry out tests during the progress of the works to ensure that cleaning and chemical treatment processes are operating as required. These test results shall be submitted to The Royal Holloway University of London for acceptance.

6.2.2 Flushing, Cleaning and Dosing (Non-Domestic Services)

Flush and chemical cleaning of the water systems shall be carried out in accordance with BSRIA Application Guide A91/2001. The Installer shall prepare and submit a method statement for agreement with The Royal Holloway University of London prior to commencing flushing, cleaning, and final dosing of the system.

• The Installer shall ensure that all pipework for installation is capped, kept dry and stored above ground level.

• All loose contaminants shall be removed from pipework during installation.

• Dead legs (i.e. for future connections) must be minimised. Any dead legs should be looped out for chemical cleaning purposes.

• Jointing compounds should be WRC agreed, be suitable for the chemicals being used and be used sparingly.

• Pressure test systems no more than 48 hours before chemically cleaning/flushing is to commence. Fill water shall be treated with Biochem B300CC or equal, if chemical cleaning is not to take place within 48 hours. If system is filled for more than 2 weeks prior to water treatment works, a sample shall be taken for TVC (Total Viable Count), Pseudomonas and SRB (Sulphate Reducing Bacteria). Results to be converted to water treatment specialist for advice. If fill water is via a temporary site main, this shall be chlorinated in accordance with BSEN806 prior to fill.

• A mains water sample shall be taken for Pseudomonas, TVC and SRB’s one week before initial fill/pressure test.

• Once filled the system shall remain charged.

• Any drainage/partial draining of systems after water treatment works that are required to be carried out shall be highlighted to the water treatment specialist prior to the event.

• The Installer shall be responsible for the system from successful completion of water treatment works to handover of building. Drain downs must be avoided and system pumps must run on a regular basis. A regime shall be put in a place to ensure motorised controls are set up to allow full flow through systems on a regular basis. Routine bacteriological analysis shall be implemented during this period.
An ongoing water hygiene maintenance contract for closed systems shall be set up to commence immediately after handover to The Royal Holloway University.

The water treatment specialist shall take the following steps to minimise risk of contaminating systems with Pseudomonas Bacteria.

- All hoses/pumps/fittings used for flushing used for flushing purposes shall be chlorinated prior to use.
- System flushing/cleansing shall be carried out in accordance with BSRIA AG1/2001. A biocide wash using Biochem B300CC shall be carried out as part of the process if samples taken prior to start of works have elevated bacterial levels.
- On completion of final flush, the system shall immediately be dosed with a suitable corrosion inhibitor and biocide such as Biochem B300CC. Circulation must be achieved throughout the system at this point. In the case of combined LTHW/CHW terminal units such as fan coils, assistance may be required from the controls company to ensure that flow is achieved through both LTHW and CHW at this time which shall be arranged by Installer.
- Any dead legs must be flushed through and looped out to ensure they become part of the system circuit.
- Checks shall be carried out to ensure that chemical has circulated throughout system.
- One week after completion of water treatment works, samples will be taken for TVC (22°C and 37°C) Pseudomonas and Sulphate Reducing Bacteria. Results will determine any further action that may be required.

Note: Where work to an existing installation is being undertaken, the Installer shall prepare method statements for the work being undertaken to ensure water treatment is properly carried out to the agreement of The Royal Holloway University. The extent of flushing will depend upon the level of works being undertaken and shall be agreed with The Royal Holloway University.

6.2.3 Cleaning and Chlorination (Domestic Services)

After all flushing and testing has been satisfactorily completed, all hot, cold and mains water pipework shall be chlorinated; this shall be carried out by filling the system with the required concentration of chlorinated water, all as detailed in BSEN806 and in accordance with ACOP2000.

On satisfactory completion the system shall be drained, all outlets flushed through and finally reconnected to the existing mains and a certificate issued to state the above.

All cleaning and chlorination of the piping shall be carried out by a specialist to the agreement of Royal Holloway University of London and the Water Authority.