

Commissioning Manual

EnwaMatic EM 825, EM 1252, EM 1260, EM 1665, EM 1672

Side Stream Filtration & Water Treatment Units

Applications:

New Build Projects

Refurbishment Projects

Retrofit Projects

Description of equipment / process:

EnwaMatic® units provide side stream filtration and water conditioning for closed HVAC systems:

- Side-stream filtration to less than 5 microns.
- pH control, maintaining a level of 9.0 – 10.5.
- Inhibition of corrosion – maintaining a dissolved iron level of < 1.0 mg/l.
- Regulation of hardness and scaling through calcite / dolomite media filtration.
- Removal of air through integral air separation device.
- Environmental restriction of bacterial growth.

Units are constructed from stainless steel (SIS 2343, pressure tested to 15 bar) and shall incorporate all necessary connection points, valves, flow regulator and manometers for normal operation.

Filter only applications:

ENWA can supply units operating as side stream filters only. Applications include systems where elevated pH is not suitable (i.e.) aluminium components), open cooling towers or systems where alternative types of water treatment are required.

ENWA commissioning:

ENWA will attend site to fill the unit with the five media types (supplied in white plastic buckets), seal the vessel and put into service. The installation must be complete prior to arrival, with connections to the HVAC system, mains cold water supply and drain. EnwaMatic® units should be commissioned at the earliest opportunity, particularly following chemical cleaning and flushing. If necessary ENWA can prepare a unit to be brought into service later by engineers on site.

Bacterial control:

EnwaMatic® units create a harsh environment for bacterial growth. This is achieved through elevation of pH, removal of nutrient sources and by maintaining clean internal surfaces, flow rates and temperature profiles. The process is not, however, a biocidal treatment. ENWA recommend a biocide wash on chilled water, condenser and heat recovery systems. A strategy for the monitoring and control of bacterial levels compliant with current BSRIA standards should be initiated.

Application:

Please refer to the following notes relating to specific applications. Please contact ENWA to discuss a project in more detail or request a site meeting.

New builds:

- (i) Please read the 'Start-up Strategy', located in Appendix A.
- (ii) Contact ENWA to discuss the pre-commission cleaning schedule and when ENWA is required on site. ENWA require a minimum of 2 weeks notice.
- (iii) Where necessary units can be pre-commissioned ready to be 'switched on' by a member of the commissioning managers team on site.
- (iv) The project / commissioning manager, chemical cleaning specialist and ENWA's commissioning engineer should hold a brief meeting on site to confirm the technical requirements and best course of action.
- (v) If parts of the main system are commissioned and are then subsequently isolated for prolonged periods of time, it is essential that the design chemistry is achieved before isolation occurs (i.e. pH > 9). Once established the treatment process does not need to be continuous, allowing any faults which may arise to be rectified without impact on water quality. ENWA can advise where required.

The approach to water treatment for further sections being brought on-line depends largely on relative volumes:

Small additions (< 25% total volume) can be accommodated by the normal response of the EnwaMatic® units, without dilution below the effective dose rate. These sections can be opened to the main core immediately after flushing of the cleaning agents and flooded by the existing, treated water. The EnwaMatic units will respond to the change in pH and dissolve more media to restore the new volume.

If any delays are possible between expected completion of flushing and introduction to the core volume, it would be wise to use an initial nitrite charge as detailed in (i). Larger sections should be treated as separate new builds and receive the 100 ppm synergized nitrite holding charge prior to connection to the existing, treated system.

(vi) At project completion and handover it is essential that the client is aware of their responsibility to inform ENWA of the following:

- Unidentified leakage/ losses of main system pressure.
- Water losses due to routine maintenance.
- Planned prolonged shutdown periods, e.g. CHW Off throughout winter months.

It is good practice to ensure the system water is routinely circulated and that system pumps run for as long as is practicable up to project completion.

Refurbishment:

(i) Where new heating or cooling plant is attached to existing systems, it is beneficial to commission the EnwaMatic® first, allowing time to clean the water and to ensure a non corrosive environment is established.

(ii) Where extensive chemical cleaning is employed, refer to notes for new builds.

Retrofit:

(i) EnwaMatic® units can be connected directly to existing systems in most cases. ENWA can carry out an initial condition survey free of charge to identify chemical residues or contaminants which are not compatible with the treatment process.

(ii) Flushing of the HVAC system prior to commissioning is not generally necessary. ENWA can again advise, with the option of a future media replacement on heavily contaminated systems.

Appendix A – Start-up Strategy

Pre-commissioning cleaning / initial dosing strategies:

New build systems should be chemically cleaned in the normal manner to remove construction residues and provide clean internal surfaces. These cleaned surfaces require rapid protection from corrosion (passivation) from the initiation of flushing onwards.

Pre-flush passivation:

The requirement to provide initial passivation to protect the system during flushing will be at the discretion of the chemical cleaning company. Consideration should be given to the volume of the system, the estimated time to flush and the likelihood of any interruptions.

EnwaMatic® start-up:

EnwaMatic® units are commonly driven by the main system pumps and require time to elevate system pH and establish the desired chemistry. The time period required will depend primarily on volumes, maximum flow rates achieved and initial fill water quality. In addition, many projects will experience restrictions on the continuous operation of system pumps during the initial 48 hour period.

ENWA therefore recommend an initial dose of 100 ppm Synergised Nitrite is added immediately post flushing at the same time as the EnwaMatic® unit is activated. This will ensure adequate protection during the initial hours of operation, without a nitrite residue remaining once established. All future inhibition requirements will be met by the EnwaMatic® unit.

Where system pumps cannot be operated continually for the first 48 hours, an elevated dose of 200 ppm Synergised Nitrite should be employed.

Biocide dosing:

ENWA recommend an initial biocide wash for all systems. A strategy for the monitoring and control of bacterial levels compliant with current BSRIA standards should be initiated. This is solely the clients responsibility and not a function of the EnwaMatic®.

The closed systems should be filled and topped up with mains water. It is best practice to treat this water to prevent unnecessary introduction of bacteria e.g. A chlorine dioxide dosing system. The EnwaMatic® units will restrict bacterial growth through pH elevation and removal of nutrient sources. However, it remains best practice to carry out an initial biocide wash to ensure a clean system at start-up.

The most commonly used products are broad spectrum, isothiazalines, which work well alongside our units. Other products can be used – the primary consideration is that they remain effective at elevated pH levels (> 9). The product ‘Pentalube’ is effective at elevated pH’s and its level can be easily monitored using a test kit. (MSDS sheets and supplier contact details can be provided on request).

The ongoing maintenance strategy should incorporate regular testing (including TVC's (Total Viable Counts), SRB's (Sulphate Reducing Bacteria) and Pseudomonads. Any increase in bacterial levels can then be identified at an early stage and additional biocide dosing undertaken as required.

Auto-dosing units can be employed to administer the biocide treatments. More aggressive, irregular treatments based on requirements identified from bacterial counts are generally preferred to maintaining a constant concentration of biocide within the system. Quantities of chemicals can be reduced, and problems with resistance developing minimised.

Glycol/ biocide top – up:

Dosing pots often present a H&S risk and if they are used infrequently and left isolated they also create dead legs. The connective pipe work to our units can be used to provide a combined set up. Two horizontally mounted 't' pieces with isolating valves and plugs need to be installed on the inlet and outlet pipework to our units. A dosing pot can be either temporarily or permanently connected to these points.

Using the unit pipework cuts down the number of infrequently used dosing pots and potential dead legs in the system. The chemical specialist could then bring a portable pot to site to facilitate dosing with appropriate cleaning procedures to prevent cross contamination of systems.

Site specific requirements:

ENWA will endeavour to work closely with the mechanical contractor, commissioning manager and water treatment specialist to determine the optimum start-up strategy for each project.

Even though new builds and refurbishment projects are meticulously planned there will always be the element of the 'unknown' due to human intervention.

Some examples include:

Replacement of temporary power supplies to system pumps. The timing of this could disable them during the critical 'start –up' phase and should be avoided.

Lagging of pipework can result in valves being isolated and left isolated. It would be advisable that flows through our units are checked as often as possible during the 'start-up' phase.

Areas that do not require 'Permit to Work' certificates are particularly susceptible to incidents/interference/damage. If units are installed in such an area it is prudent to check the units prior to commissioning and as often as possible thereafter.

Appendix B - Client pre-commissioning checklist

- All power to the units is live and all electrics are wired up; e.g. FC4 device, panel and additional pump.
- Electrical cables should be run in a suitably sized and supported conduit. If cables need to be extended use black flex, 3 core, 0.75 mm.
- Make sure the pressure side of the pump goes to unit inlet and suction side to units outlet.
- **Ensure** that the **drain** is plumbed in before filling the unit with mains water.
- Tighten the inspection cap (It has an O-ring do not over tighten), fill the units with mains cold water. Check that the drain can take the mains cold water flow without flooding the plant room. Isolate MCWS leave unit sealed.
- FC4 - **Must** be fitted as per manufacturers instructions.
- All other plumbed connections should be pressure tested to 1.5 times system operating pressure.
- All buckets of media should be onsite and stacked next to the unit (All buckets of media supplied to site are labeled with an individual units serial number and must remain with that unit).
- If applicable please send material data sheets informing us of any chemical dosing. e.g. glycol, biocide.
- If everything is completed contact ENWA to schedule the site visit.
- If there is an issue with the installation when the ENWA engineer arrives on site, the engineer will ask whether the client can fix the issue. If this is not possible a return visit will need to be scheduled and will be chargeable.
- If the media is not stacked with the unit when the engineer arrives on site, any additional time taken to locate media or any loss of media will be chargeable.
- If the environment in which the work is to be conducted is not safe or it increases the risk to ENWA staff then the engineer will ask whether the client can fix the issue. If this is not possible a return visit will need to be scheduled and will be chargeable. Such situations include but are not limited to the following:
 - Risk of exposure to asbestos.
 - Sanitation issues e.g. Avian faeces.
 - Unprotected elevated walkways.
 - Unidentified dust from insulation and or walls.
 - Flooded plantrooms.
 - Smell of gas.
 - Confined spaces.