

SERVICE DELIVERY STANDARD

Maintenance Water Treatment for Closed Heating and Cooling Systems



This standard is intended to cover the principles involved in the development and execution of a suitable programme of control measures associated with control of water quality in closed water systems. It is written primarily with chemical treatment in mind but the same principles can be applied where non-chemical techniques are used.

The standard is designed to cover the different distinct phases involved in delivering Maintenance water treatment for closed systems. Some requirements of the standard and associated Statement of Compliance may seem repetitive; and this is purposeful to ensure every aspect of each part of the process is considered by the Service Provider. It is recognised that a procedure may cover more than one element and so may be referenced more than once.

The delivery of the service component to a water treatment programme should include:

1. Allocation of responsibilities
2. Training and competence of all personnel involved (own staff, clients, sub-contractors, etc.)
3. Control measures (programme design and monitoring)
4. Communications and management
5. Record keeping
6. Reviews
7. Internal Auditing
8. Control of Sub-contractors and competence verification

It is imperative that CSCA member companies provide the correct calibre of staff, with experience and qualifications, and appropriate training in water treatment to allow compliance with this standard.

1. Designing a Programme

1.1 The Service provider should have detailed procedures to outline their operational approach to proposing and designing effective management and water treatment application strategies.

1.2 Such procedures will cover the application of water treatment programmes to ensure that system conditions with respect to scale, corrosion and microbiological control, meet the agreed predefined control limits. By definition, water treatment will include chemical application but should not exclude consideration of any non-chemical/physical methods of control.

1.3 A significant amount of information needs to be gathered in order to design an appropriate treatment.

1.4 A site survey should be carried out both for the gathering of technical data, but also, as applicable, for reviewing, for example, past records, conditions of existing components, pre-treatment plant and dosing equipment, reviewing current conditions and environmental restrictions.

2. Survey Procedures

2.1 Procedures should include a process for collation of all necessary plant data and survey details, to enable specific recommendations to be prepared prior to commencement of contractual negotiations (tender proposal process), or at actual start up of a new control programme.

2.2 Only competent personnel who have experience and knowledge of closed heating and/or cooling system management and associated water treatment programmes should undertake such information gathering and pre-surveys.

2.3 Furthermore, only competent personnel should use survey information to prepare technical treatment recommendations for inclusion within tender documentations.

2.4 Any recommendations made should consider all mechanical, operational, chemical and management aspects of control programmes.

2.5 Service providers should have appropriate forms or processes to carry out the survey. (*Please see Appendix 1: Technical Data Sheet - Closed Heating and Cooling Systems*) Any survey process should be available for external audit and should include consideration of, but not be limited to information detailed in **2.6** below.

2.6 The survey / information gathering should include, as appropriate:

2.6.1. Review of the current management processes (if any) to determine if they are suitable and sufficient

2.6.2. Definition and agreement with the customer of the exact scope of service supply

2.6.3. Outcomes and Key Performance Indicators agreed with the customer

2.6.4. A survey process that may include;

- i. Mechanical and operational aspects of the system e.g. volume of system, recirculation rates, make up source, critical heat exchangers, system metallurgy, plant manufacturer data, water usage, temperatures and operating pressure, etc.
- ii. Analysis of both the make-up source and system water, and seasonal variances.
- iii. Environmental restrictions with respect to drain-down, chemical treatments, etc.
- iv. A review of historical maintenance records
- v. A review of historical system data in relation to risk management, e.g. current treatment efficacy, logbooks, test certificates, cleaning records, and also system operation, e.g. corrosion failures, scale deposition, process contamination and microbiological control
- vi. Water system operational details
- vii. Locations and suitability of dosing and control equipment
- viii. Review of the fitness for purpose of any existing treatment equipment
- ix. Safe handling of chemicals, delivery, storage and application methods.
(*Please see Appendix 1: Technical Data Sheet - Closed Heating and Cooling Systems*)

2.7 It may be the case that all the required data is either not made available or is not known. Where this is the case any proposals to treat the water system must contain relevant caveats to protect the interests of both the prospective service provider and the system owner/operator. The proposals should indicate, where applicable, how the missing data may be gathered going forward.

2.8 Health and safety issues arising from a site survey, e.g. condition of chemical storage tanks, pumps and control equipment, should be highlighted even if their ownership or management are not part of the bid.

3. Programme Design Procedures

3.1 Each Service provider should select an appropriate treatment and control programme by utilising their in-house specialist treatment guides and or software to design a programme that can meet the specification and desired outcomes.

3.2 In summary the water treatment programme design should include (where appropriate):

- a) Design and selection of pre-treatment and dosing and control equipment
- b) Selection of products or control techniques (**See Section 3.3**).
- c) Design of the monitoring and testing programme:
- d) Chemical test selection, analytical methods, testing frequency, control limits
- e) Identification of suitable sampling points
- f) Scale, Corrosion and Microbial monitoring regime
- g) Interpretation of results and Corrective Action
- h) Reporting and record keeping
- i) Cleaning regime if appropriate
- j) Definition and agreement of desired outcomes e.g. bacterial counts, corrosion rates, etc. (**See Section 4**).

3.3 The service provider should also have a procedure, for example a **product selection guide**, to help selection of products most suitable for the system to be treated. Such guides should identify control parameters and highlight any likely limitations in the programme chosen. Evidence of product efficacy should also be provided to the client.

3.4 It is recognised that any recommended water treatment programme will require optimisation once applied. Service providers should identify service schedules and monitoring programmes that will establish the efficacy of any recommended treatment application.

4. Desired Outcomes

4.1 It is not the role of this Standard to prescribe particular techniques or technologies for the control of water conditions in closed systems. However, whatever method is employed the overall water treatment programme should be capable of maintaining the system in a clean condition, i.e.

- a) Minimal corrosion rates
- b) Non-scaling
- c) Control of biofilm
- d) Minimal suspended solids, sedimentation and settlement

4.2 In order to ensure this is achieved the desired outcomes and targets e.g. corrosion rates, control parameters, etc. should be specified in advance by the Service Provider and agreed with the client. Guidance on setting these and determining test frequency and tests required can be found in BSRIA BG 29/2012 and BSRIA BG 50/2013 and BS8552, 2012/.

5. Programme Initiation Procedures

A **Customer Service Agreement** signed by both parties should be produced to ensure that the role and expectations of the successful service provider and the customer is understood and, where appropriate, the customer is given the necessary instruction in any aspects of the programme which they may be required to implement and control. It should include (as appropriate):

- a) Explanation of the programme.
- b) Details of the schedule of service.
- c) Volumes of the chemicals to be provided under the agreement.
- d) Allocation, agreement and documentation of responsibilities .

- e) Agreement over lines of communication and reporting.
- f) Initial instruction for the client.
- g) Identification of training needs and competence of all staff involved. Including Service Provider and client staff.
- h) Agreement over success criteria (Desired outcomes, control parameters, etc.) for the programme such that meaningful assessment may be made at regular review meetings.
- i) Documenting the agreed outcomes of the Programme Initiation process.

6. Programme Execution Procedures

6.1 The execution of the service provision requires that the agreed Service Plan is followed, that each service visit results in the creation of a written or electronic Service Report, and that findings are discussed with the customer and communicated to others as required and without undue delay.

6.2 There is a requirement for adequate record keeping (**See Section 11**) and safe retention of all documentation pertinent to the service provision including consultancy and monitoring results, logging of defects, training and competency records and service provider client communication chains. This is accomplished by:

- a) Service visit and monitoring regime control process
- b) Staff training and competence reviews
- c) Reporting and communication audits/reviews
- d) Programme reviews with client (**See Section 12**)
- e) Record keeping audits

7. Programme Verification and Quality Control

7.1 It is the service provider's responsibility to ensure that the water treatment programme is being executed and managed to the required standard and is being delivered as defined by the contract. The service provider should operate an internal auditing programme to verify compliance at each customer site;

- a) Checking that required service and monitoring has been done
- b) Quality control to ensure the correct:
 - i. tests are being carried out
 - ii. control limits are employed
 - iii. interpretation of the results
 - iv. corrective actions are advised
 - v. joint reviews are taking place

7.2 It may be the case that a service provider will need to outsource elements such as chemical supply, monitoring and testing, cleaning, etc. Any such outsourcing should be verified and managed by the service provider to ensure it is and remains fit for purpose.

8. System Analysis/Monitoring Visits

8.1 Any successful water treatment and or cleaning programme will include a site visit regime, the frequency of which will be defined by the water system being maintained or treated and the commercial and/or operational risk posed in the event of system failure to operate correctly.

8.2 Systems should be monitored during various stages of their life as recommended in BS8552. During normal operating life this should be at least every three months, however for inherently higher risk systems it is suggested this is increased. At each visit, the specified range of analyses and sampling should be carried out by a competent representative of a water treatment company or service provider.

8.3 Between such visits, it could be considered necessary to carry out an abbreviated selection of tests, observations and analyses to be performed, either by trained site personnel or competent personnel from water treatment company.

8.4 The decision on whether the individual performing any such tasks is competent lies with the employer of that person. The employer should carry out regular competence checks of all staff for all tasks undertaken.

Please see Appendix 2: Competence

9. On Line Performance Monitoring

The results of chemical tests are normally quite informative and can usually provide sufficient information to enable good control of water conditions. However for high-value or potentially problematic systems it is strongly recommended that more tangible performance-monitoring is employed such as the use of corrosion test coupons, corrosion monitoring by LPR, bio-film monitor, etc.

10. Reporting and Communication

10.1 Any service to a system should be recorded either using a paper reporting system or an electronic data logging system. Where possible a signature from the customer should be obtained as verification the work has taken place.

10.2 Any report so produced should be distributed without undue delay by an appropriate method (post, fax or email) to a designated representative of the customer and copy records kept by the service provider.

11. Record Keeping

11.1 It is good management practice for the service provider to issue log books (electronic or paper) to customers to house such reports and records. *An example of a typical 'Contents List' of such a log is ATTACHED as Appendix 3.* Those log books are the property of site and responsibility for their upkeep should lie with the customer's nominated person unless otherwise specified.

11.2 The responsibility for maintaining copy documents within the service provider's company lies with the service provider themselves. However it is considered to be sound management practice for the service provider to conduct regular audits of the site logs to ensure that they are coherent and up to date.

12. Programme Reviews

12.1 All water treatment programmes will, need to be reviewed at least annually, to ensure they are delivering the desired outcomes.

12.2 The frequency of such reviews will depend on the changeability of conditions of the plant/system being treated or monitored.

12.3 A review could be a site based resurvey and audit or a simple paperwork audit as appropriate. Any such review should be recorded.

13. Service Provider Verification of Delivery of Contract

13.1 A service provider should be able to exhibit that it is delivering the requirements of a contract 'on time in full'.

13.2 To be able to do this a schedule of works will need to exist for a contract showing any tasks required in the contract and the frequency that task will be performed.

13.3 As the contract proceeds to termination or renewal, the service provider should be able to show they are monitoring the service delivery and not omitting any contractual obligations

13.4 Customer files should be maintained by the service provider to allow audit.

13.5 The service provider should be able to display a system whereby it **self audits** a percentage of service reports to check for technical correctness of what is written. Where errors are identified, it should have a system to identify if the errors are symptomatic of a failure in competence of the service engineer or systemic failure of the service provider to successfully deliver the service they are contracted to do.

13.6 The audit of service reports should include checking that:

- a) The appropriate test, observations or analyses are being performed
- b) There are specified control limits or acceptable specified conditions indicated on the report
- c) The results are being interpreted correctly by the service engineer
- d) A comment on any non conformance is being recorded to advise the customer of both the consequence of the non conformance and the corrective action

13.7 Handling non-conformances: The service provider should record the non-conformance incident rates in the sample of service reports audited. It should further seek to identify any 'common denominator' problems either due to failures by their own service engineers or customer failures.

Any identified non-conformance will need to be rechecked on the next service report to prove the non-conformance has been successfully eradicated.