BRITISH STANDARD

BS EN 15848:2010

Water conditioning equipment inside buildings — Adjustable chemical dosing systems — Requirements for performance, safety and testing

ICS 13.060.20; 91.140.60

BSI
British Standards

National foreword

This British Standard is the UK implementation of EN 15848:2010.

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A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Water conditioning equipment inside buildings - Adjustable chemical dosing systems - Requirements for performance, safety and testing

Appareils de traitement d'eau à l'intérieur des bâtiments - Systèmes de dosage chimique ajustables - Exigences de performance, de sécurité et essais

Anlagen zur Behandlung von Trinkwasser innerhalb von Gebäuden - Einstellbare Dosiersysteme - Anforderungen an Ausführung, Sicherheit und Prüfung

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Foreword

This document (EN 15848:2010) has been prepared by Technical Committee CEN/TC 164 “Water supply”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2010, and conflicting national standards shall be withdrawn at the latest by August 2010.

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NOTE Products intended for use in water supply systems should comply, when existing, with national regulations and testing arrangements that ensure fitness for contact with drinking water.

On April 2006, EC Commission set up a revised mandate (M/136) asking CEN to propose harmonised product standards and support standards for test methods which could be used for assessing the fitness for contact with drinking water. In parallel, EC Commission has launched processes for a regulation of construction products (CPR) to be substituted to CP directive (89/106/EC) and for the revision of drinking water directive (98/83/EC).

If relevant, when the outputs of these processes are known, European product standards will be amended by the addition of an Annex Z under Mandate M136 which will contain formal references to the applicable requirements. Until such amendments, the current national regulations remain applicable.

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1 Scope

This European Standard specifies definitions, principles of construction (but not dimensions) and design, requirements on performance and operation as well as methods for testing the performance of adjustable chemical dosing systems for conditioning water intended for human consumption inside buildings (see [1]) which are permanently connected to the mains supply.

The concentration in the treated water of the active chemical(s) as well as of any other ingredient or minor component (including possible contaminants) should not exceed the parametric values laid down in the existing legislation in the Member States for the water intended for the human consumption, as implemented by the national authorities.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 55011, *Industrial, scientific and medical (ISM) radio-frequency equipment — Electromagnetic disturbance characteristics — Limits and methods of measurement (CISPR 11:2003 + A1:2004, modified)*

EN 60204-1, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2005, modified)*

EN 60335-1, *Household and similar electrical appliances — Safety — Part 1: General requirements (IEC 60335-1:2001, modified)*

EN 60335-2-41, *Household and similar electrical appliances — Safety — Part 2-41: Particular requirements for pumps (IEC 60335-2-41:2002)*

EN ISO 12100-1, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003)*

EN ISO 12100-2, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
adjustable dosing system
device used for the controlled addition of chemicals in concentrations that can be adjusted on the installation site

3.2
working range
range of treated water flow rates between which the dosing system provides the required accuracy of concentration of the chemicals within limits of concentration and pressure drop prescribed by the manufacturer.

NOTE The working range covers the range between the upper and lower working limits.

3.3
dosing agent
active chemical substance for conditioning water intended for human consumption

4 Design requirements

4.1 General

The dosing system shall function to maintain a specific concentration of the chemical in the treated water.

4.2 Dosing system components

A dosing system comprises the following elements:

a) storage tank or chemical container which contains the chemical as a liquid that will be dosed into the water pipe;

b) suction device which comprises a suction hose and a foot valve;

c) low level detection avoiding the pump to work when storage is empty;

d) dosing pump that pumps the chemical as a liquid from the storage tank or container and doses it into the main water flow;

e) overpressure valve as safety apparatus to avoid overpressure in the injection device;

f) injection device which comprises the hose between the pump and the mains, the injection valve and the backflow preventer;

g) water meter in the main water flow which transmits a control signal to the dosing pump.

4.3 Materials of construction

Parts in contact with drinking water shall comply with national regulations.

The temperature resistance of the injection system shall be specified.

4.4 Venting

The dosing system shall be designed so that accumulation of air or other gases is prevented.

Compliance with this requirement shall be checked by examination of the detailed technical design documents supplied with the system.

4.5 Radio interference and electrical safety

The dosing system shall conform to EN 12100-1, EN 12100-2, EN 55011, EN 60204-1, EN 60335-1 and EN 60335-2-41, following the provisions of Directive 89/336/EEC [2] and Directive 73/23/EEC [3].

4.6 Accessibility

All parts which have to be accessed for replenishing of the dosing agent and for operation or servicing shall be easily accessible.

4.7 Nominal size

If the dosing pump is controlled by signals from a water meter, the nominal size of its connection shall correspond to the flow rates given in Table 1. The inlet connection size of the water meter may be one size larger or smaller than the nominal size. For flange connections, the inlet flange shall conform to the nominal size.

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Table 1 — Upper limit flow rate values

Nominal size DN of water meter		15	20	25	32	40	50	65	80	100
Upper limit of flow rate	l/s	0,35	0,63	1,0	1,6	2,53	3,89	6,67	10	15,56
	m^3/h	1,27	2,27	3,6	5,8	9,1	14	24	36	56
NOTE These flow rates correspond to a velocity of approximately 2 m/s.										

4.8 Manual mode

The dosing system shall have an indication when a manual mode is activated, for example, for maintenance.

5 Performance requirements

5.1 Chemicals

The documentation shall define which chemicals are compatible with the dosing system and at which maximum concentration.

All the dosed chemicals shall conform to the relevant European Standards.

5.2 Dosing system components

5.2.1 Storage tank or chemical container

Materials selected for the manufacture of the dosing tank shall protect the contents against contamination or degradation by corrosion, light, dust, particles or any external pollutant. The design of the connection between the dosing tank and the dosing pump shall exclude any

— accidental contamination of the contents during either normal operation or chemical replacement;

— leakage of the chemical to the external environment of the system.

The normal working capacity of the chemical storage tank or container shall not exceed three months based on the minimum dosing rate for the designated chemical.

5.2.2 Suction device

The suction device shall have a backflow preventer.

5.2.3 Low level detection

The low level detection shall as a minimum stop the pump when the storage is empty.

5.2.4 Dosing pump

The manufacturer shall specify the dosing pump operating characteristics (maximum volume per stroke at maximum and medium specified operating pressure), all of which shall be tested separately. Measurements shall be carried out in accordance with to 6.2. Parameters are given in Table 2.

Table 2 — Test parameters

Stroke length of dosing pump (%)	30	60	100
Operating pressure (MPa)	Maximum specified operating pressure		
	Medium specified operating pressure		

5.2.5 Overpressure valve

Overpressure valves are meant to avoid damage of the connection between the pump and the injecting point, if applicable.

5.2.6 Injection device

Injection devices shall be designed such that backflow of drinking water into the storage tank or chemical container is prevented.

5.2.7 Water meter

Water meters shall comply with the relevant European Standards.

5.3 Protection against overdosing

Dosing systems shall be designed so that overdosing due to siphonic action or gravity flow into the drinking water supply cannot occur under any operating conditions.

It shall be made sure with suitable techniques that setting parameters cannot be changed unauthorised or mistakenly, or be exceeded.

5.4 Working temperature range

The maximum temperature shall be at least 30 °C for the water and the ambient air, in which the dosing system including accessories and fittings shall operate correctly.

5.5 Pressure conditions

5.5.1 Nominal pressure and working pressure range

The manufacturer shall specify the minimum and maximum working pressures between which the dosing system including accessories and fittings will operate correctly at the maximum permissible water and ambient temperatures.

Testing shall be carried out in accordance with 6.3.

5.5.2 Effects of pressure on dosing

Water pressure variations may influence the dosing rate. The manufacturer's instructions shall specify any additional equipment which may be necessary to correct for any such pressure variations.

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6 Testing

6.1 General

Unless otherwise stated, tests shall be carried out at ambient temperature between 15 °C and 25 °C with water of between 10 °C and 30 °C.

6.2 Operating characteristics

6.2.1 Apparatus

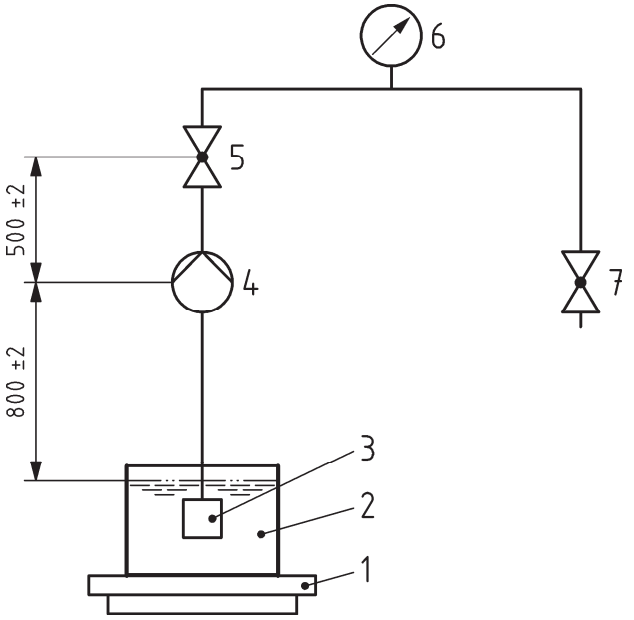
a) weighing scales with a maximum inaccuracy of 1 %;

b) timer with a minimum accuracy of 1 s. The pump is timer controlled;

c) test liquid is water with a conductivity < 10 µS/cm;

d) test rig in accordance with Figure 1.

Dimensions in millimetres



Key

1 Scales
2 Water tank
3 Backflow preventer
4 Dosing pump
5 Metering valve with 0,5 MPa spring (size in accordance with pump valve)
6 Pressure gauge
7 Pressure regulating valve

Figure 1 — Test rig for flow rate test

6.2.2 Procedure

a) Record the temperature and operating pressure.

b) Start the pump for a few minutes to purge the air.

c) Check that the water runs out of the pressure regulating valve. Adjust the valve to set pressure at maximum specified operating pressure of the pump, and check for any leakage or damage.

d) Stop the pump.

e) Reset the weighing scales.

f) Adjust the stroke length at 30 %.

g) Start the pump for a time corresponding to 1 000 pulses. The ratio of impulse to stroke shall be 1/1.

h) Wait the end of the pumping time.

i) Record the change in weight from the weighing scales.

j) Repeat the procedure, beginning from f) and adjusting the stroke length at 60 %, and 100 % subsequently.

k) Repeat the procedure, beginning from c), presetting the pressure regulating valve at medium specified operating pressure.

6.2.3 Expression of results

For each operating pressure, plot the curve giving stroke length against stroke volume. Stroke volume is obtained by dividing the weights measured in 6.2.2, i) by 1 000 (number of strokes).

6.3 Pressure test

This test applies only to the parts of the dosing system which have to support the mains pressure.

a) Locate all components behind a safety screen.

b) Develop, on the tested parts of the dosing system, a hydrostatic test pressure of 1,5 times the maximum design pressure or 1 MPa whichever is the greater over a minimum period of 30 s with the water at ambient temperature. The pressure shall be maintained for $10\,^{+2}_{-0}$ min.

c) There shall be no visible evidence of damage or leakage.

7 Labelling

The following information shall be given on a nameplate, which shall be permanently fixed to the dosing system and be legible when installed:

a) working range for the dosing pump, at specified pressure;

b) conformity with EN 15848;

c) name or identifying mark of manufacturer;

d) electrical data in accordance with EN 60335-1, EN 60335-2-41 and EN 55011;

e) maximum working pressure, in megapascals (MPa);

f) nominal size (inlet and outlet);

g) serial number of the pump.

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Annex A
(normative)

Installation, operation and maintenance

A.1 Introduction

This annex defines essential information and instructions on the installation, operation, maintenance and repair of adjustable chemical dosing systems. It transposes the general requirements in EN 15161 into specific requirements for adjustable dosing systems.

Correct operation and maintenance of the device is essential for successful and hygienic performance. Devices in compliance with this standard shall be provided with all necessary information and instructions on operation and maintenance appropriate to the device being supplied. The following information is stipulated as a minimum, it is not exhaustive and it is not intended to substitute for the supplier's instructions.

NOTE For the purpose of this European Standard the supplier is the organization whose name is identified on the product being sold. The supplier may or may not be the manufacturer.

A.2 Installation requirements

A.2.1 Equipment selection

Selection of a device that is appropriate to the performance and operational expectations, and to the intended installation site, is essential. Information outlining the key installation and operation requirements shall be made available at the point of purchase, in the form of either brochures or specification sheets or clearly marked on the external product packaging. This information shall identify limitations on the location for installation in terms of dimensional requirements and environmental conditions (e.g. ambient temperature). The information shall offer guidance on frequency of periodic operation and maintenance along with any associated accessibility required. It shall also identify the water supply requirements (pressure limitations, pipe sizes) along with proximity requirements for other services which may be necessary such as availability of electric power, drainage facilities, etc.

NOTE At selection of the chemical dosing system information is provided that the usage of the dosing chemical in the concentration injected by the dosing system is suitable for all components of the existing piping system inside building.

A.2.2 Installation

Installation instructions, provided with the device, shall include a list of the components provided with the device along with a list clearly identifying any other components deemed necessary to complete a successful installation (e.g. pressure reducing valve). The characteristics of such additional equipment shall be clearly identified.

The instructions shall include a sequenced procedure outlining assembly of the components including connection to the water supply and to any other service(s) required. The instructions shall include definitive guidelines identifying the dimensional and orientational requirements essential to position the device and its ancillaries in order to provide adequate access for operation and maintenance at the chosen installation site.

In addition, the installation instructions shall include a checklist to ensure that the device is located:

— in a suitable location (e.g. clean, well ventilated, adequately illuminated and protected against pests, frost, physical damage, chemical damage, etc.) within the domestic water distribution system;

— remote or insulated from sources of heat (e.g. washing machines, dishwashers, boilers, cookers and hot water pipework);

— as close as possible to the existing distribution system and to other necessary services;

— avoiding or minimising dead-legs that can encourage stagnation.

NOTE Drinking water should be available for cleaning purposes and appropriate waste disposal facilities should be available.

A.2.3 Labelling

The device as supplied shall be labelled, with a durable waterproof label mounted on, or close to the device, with the information required by Clause 7 of this standard.

A.2.4 Commissioning

The instructions shall contain a procedure for putting the device into service including as a minimum:

— the necessity for appropriate safety equipment when commissioning or any other handling operations are carried out (dosing pumps can convey very aggressive chemicals) and to read and follow the safety data sheets instructions;

— as first step, verification that all connections are well tightened, all electrical connections are correct and all automatic control connections are correctly made;

— record in the log book of all the adjustments.

A.2.5 Hand over

The instructions shall identify that, where commissioning is carried out by a third party, this third party shall, after checking the performance of the device, hand over to the owner all of the printed instructions on its use (e.g. testing procedure and frequency, actions to be taken dependant upon the testing results), along with the updated logbook.

NOTE In its simplest form, the logbook may be a single sheet (which may be adhesive backed to secure to the device) which permits, at the very least, a record of important operations.

A.3 Operation requirements

The instructions shall include procedures on checks to be made by the user during normal day to day operation for optimum performance of the device. The checklist shall include, as a minimum, instructions on:

— the necessity for appropriate safety equipment (dosing pumps can convey very aggressive chemicals), to read and follow the safety data sheets instructions;

— the verification of the injected product quantity by checking the level in container;

— checking, if the pressure tubing is completely filled with product;

— checking pump operation with water flow (e.g. by listening to pump pulsation strokes);

— checking for any leakage, damage, deposition of particles, etc.;

— checking the water quality with respect to the treatment expectations. This operation shall be made at least every six months and the results shall be recorded in the log sheet.

A.4 Maintenance requirements

In order to maintain optimum performance of the device, the instructions shall include procedures and checks to be made at specified time intervals, including instructions on:

— the necessity for appropriate safety equipment when cleaning or any other handling operations are carried out (dosing pumps can convey very aggressive chemicals), to read and follow the safety data sheets instructions;

— checking the electrical connections;

— the minimum frequency of cleaning and service;

— cleaning of suction and delivery flap valves;

— inspection of pump membrane condition and replacement, if necessary;

— checking for any leakage of chemicals;

— checking the correct tightness of dosing pipe connections and outlet valves;

— recording in the log book all the adjustments.

The instructions shall provide guidance on the hygiene precautions necessary for any maintenance operations that require dismantling of the system.

NOTE An example of good practice is as follows:

Hygiene. Maintenance operations that require dismantling the system, such that water contact parts are exposed, should be subject to careful, hygienic control in order to avoid contamination of the system. Preferably, disposable gloves should be used to avoid personal contamination of the system parts; any tools used that may come into contact with the wetted parts should be cleaned and disinfected in accordance with the supplier's instructions before use. The spent parts should be carefully disposed of and the replacement parts should remain sealed in their protective wrapping until the last practical moment.

Routine maintenance and timely replacement of consumable parts are essential to the satisfactory performance of the device.

Regular use is also important. Long periods of stagnation can give rise to off-taste in the treated water so, as with any drinking water supply, the system should be flushed before reuse, if it has been out of use for a period of several weeks or more.

A.5 Repair requirements

A.5.1 General

The instructions shall include advice stating that any corrective action carried out on the system that is not regarded as routine and, therefore, not described in the instructions, is to be performed only by a competent repair person. The instructions shall identify, either contact details for approved repair engineers or alternatively provide a route (telephone, website) for contacting the supplier to obtain information on such service.

A.5.2 Repair documentation

The instructions shall contain a statement advising that a record of any repair intervention is kept within the logbook.

A.6 Troubleshooting

The instructions shall provide guidance on trouble shooting in the event that problems occur with the device.

An example of a troubleshooting guide is given in Table A.1.

Table A.1 — Troubleshooting guide

Observation	Possible cause	Remedy
No pump operation	No hydraulic or electrical connection	Connect properly
	Low voltage	Check the voltage and if necessary send the pump for repair
	Electrical cut-out	Check the pump, and eventually send for repair
No pump suction	Suction pipe is not tight	Replace or repair the pipe
	Diameter of suction pipe is too small, or suction pipe is too long	Check with the manufacturer or supplier the instruction specifications
	Suction hose has collapsed	Rinse with high flow rate water or replace the pipe
	Suction hose has a kink in it	Install the pipe correctly or change it
	Mineral deposits in the valves	Clean and rinse the valves
	Damaged membrane	Replace the membrane
	Dosing tank empty	Refill the dosing tank
No chemical flow	Presence of air bubbles in the suction pipe and dosing chamber	Fill the dosing chamber and the suction pipe
	Inappropriate chemical consistency – too high density or viscosity	Check and adapt the dilution rate
	Mineral deposits in the valves	Clean and rinse the valves
	Valves not correctly installed	Reinstall and reassemble correctly in the flow direction
	Injection device has collapsed	Check the flow direction or remove the blockage
	Incorrect piping and parts installation	Check and reassemble piping and parts
No accurate pump flow rate	Dosing chamber is not correctly purged	Repeat the purge
	Bubbling chemical products	Adapt chemical or installation
	Valve partially scaled or dirty	Rinse valve
	Default on display for the dosing flow rate	Calibrate
	Counter pressure variation	Add a pulse buffer and a water pressure maintaining valve
	Suction pipe height variation	Maintain the suction level constant
	Siphoning	Insert a pressure maintaining valve
	Piping or other component not watertight	Replace the pipes or the parts
	Parts in contact with chemical not resistant	Change parts for resistant materials
	Worn membrane	Replace the membrane according to A.4
	Replacement of chemical (density, viscosity)	Check the concentration by using a stirrer
Noisy pump	Inappropriate flow rate (generally too low)	Adapt the flow rate

Bibliography

[1] 98/83/EC, Council Directive of 3 November 1998 on the quality of water intended for human consumption

[2] 89/336/EEC, Council Directive of 3 May 1989 on the approximation of the laws of Member States relating to electromagnetic compatibility

[3] 73/23/EEC, Council Directive of 19 February 1973 on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits

[4] EN 15161, *Water conditioning equipment inside buildings — Installation, operation, maintenance and repair*

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BSI Group
Headquarters 389
Chiswick High Road,
London, W4 4AL, UK
Tel +44 (0)20 8996 9001
Fax +44 (0)20 8996 7001
www.bsigroup.com/
standards