

BRITISH STANDARD

Code of practice for treatment of water in domestic hot water central heating systems

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Foreword

Publishing information

This British Standard has been prepared by Technical Committee CII/62, *Treatment of water for boilers*, and supersedes BS 7593:1992, which is withdrawn.

Information about this document

This code gives guidance on the preparation of the primary circuit of wet central heating systems prior to initial commissioning or re-commissioning following major remedial work (e.g. boiler replacement) and ongoing water treatment to ensure continued efficiency in operation. Although intended to cover domestic systems with up to 45 kW heat input, it is recognized that the recommendations are also applicable to similar systems of higher heat output.

The purpose of this standard is to ensure awareness of potential problems, and of the remedies required to maintain efficiency and maximize the life of the system.

Use of this document

As a code of practice, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification, and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this British Standard is expected to be able to justify any course of action that deviates from its recommendations.

Contractual and legal considerations

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

Compliance with a British Standard cannot confer immunity from legal obligations.

In particular, attention is drawn to the following statutory regulations.

The Water Supply (Water Fittings) Regulations 1999 [1]

The Health and Safety at Work, etc. Act 1974 [2]

The Control of Substances Hazardous to Health Regulations 2002 [3]

The Building Regulations 2000, as amended (particularly Approved Document L1) [4]

The Building (Scotland) Regulations 2004 [5]

The Building Regulations (Northern Ireland) Statutory Rules 2000 [6]

The Trade Effluent (Proscribed Processes and Substances) Regulations 1989 [7]

The Hazardous Waste (England and Wales) Regulations 2005 [8]

The Special Waste (Scotland) Regulations 1996 [9]

The Hazardous Waste (Wales) Regulations 2005 [10]

The Hazardous Waste Regulations (Northern Ireland) 2005 [11]

1 Scope

This British Standard gives recommendations on best practice for the preparation of the primary circuit of wet central heating systems prior to initial commissioning or re-commissioning following major remedial work (e.g. boiler replacement) and the ongoing water treatment to ensure continued efficiency in operation.

NOTE For specialized systems, such as those containing solar thermal panels and heat pumps, refer to the manufacturer's instructions.

2 Objectives of system water treatment

The objectives of water treatment may be summarized as follows:

- a) to minimize corrosion of the system metals;
- b) to inhibit the formation of scale and sludge;
- c) to inhibit the growth of microbiological organisms;
- d) to maintain the engineering design specifications and energy efficiency of the system; and
- e) to restore energy efficiency of the system where appropriate.

3 Causes of problems in central heating systems

3.1 Corrosion

Corrosion is generally a process of oxidation of metals which, in a central heating system, can result in restriction of circulation and/or failure of components, for example perforation of radiators. Corrosion in a central heating system is promoted by the following.

- a) Poor system design and/or installation, e.g. oxygenation of the circulating water by excessive make-up, pumping over or sucking down at the open vent, incorrect sizing of the cold feed pipe, inadequately sized or incorrectly installed feed and expansion cistern.
- b) Ingress of air, e.g. at mechanical or poorly soldered joints. Some plastics pipe allows the ingress of oxygen into the system water (see BS 5955-8).
- c) Electrolytic (galvanic) action between dissimilar metals. Metals/alloys which are less noble (more active) are the most susceptible to corrosion (see Table 1). However, the position of some metals (especially aluminium and stainless steels) in Table 1 can change depending on conditions, e.g. pH.

Table 1 **Electrochemical series**

Metal	Activity
Copper	More noble (less active)
Brass	
Gunmetal	
Stainless steel	
Lead-free solder	
Tin	
Lead	
Steel	
Cast iron	
Galvanized iron	
Aluminium alloys	
	Less noble (more active)

- d) Deleterious materials, e.g. flux residues, jointing compounds, residual cleanser, and/or foreign matter remaining after inadequate cleaning or flushing, or oils and greases left over from the manufacturing process of system components.
- e) Certain characteristics of the system supply water. For example, some naturally soft waters with low alkalinity and low pH are generally more corrosive towards system metals. Some artificially softened waters, particularly those from softeners not conforming to BS EN 14743, might contain high levels of aggressive anions (e.g. chloride) that can promote pitting of ferrous and non-ferrous metals, e.g. stainless steel and aluminium.
- f) Other sources of chloride, which include fluxes, hydrochloric acid and washing-up liquids.
- g) The presence of anaerobic bacteria resulting in acidity.
- h) Incorrect, unsuitable or poorly applied or maintained water treatment products.
- i) The formation of corrosion products deposited or plated out in the system.

Corrosion is most aggressive when there is a steady source of supporting reactant, e.g. fresh water make-up or re-aeration of the system water.

NOTE Further information on corrosion in re-circulating systems is given in BS EN 14868.

3.2 Scale and sludge

“Hardness” is the term which describes the concentration of calcium and magnesium salts dissolved in water, usually expressed as calcium carbonate (CaCO_3) equivalence. Waters may be classified as given in Table 2.