

Valves for waterworks purposes —

Part 1: Predominantly key-operated cast iron gate valves — Code of practice

ICS 23.060.30

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee PSE/7, Industrial valves, to Subcommittee PSE/7/3, Cast iron isolating, check and hydrant valves for industrial use and valves for water industry applications, upon which the following bodies were represented:

British Chemical Engineering Contractors Association

BVAA — British Valve and Actuator Association

CMF — Cast Metals Federation

Ductile Iron Producers Association

Energy Industries Council

Institution of Mechanical Engineers

Pipeline Industries Guild

Society of British Water Industries

Water UK

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 23 December 2004

© BSI 23 December 2004

First published October 1974

First revision October 1986

First published as Part 1
December 2004

Amendments issued since publication

| Amd. No. | Date | Comments |
|----------|------|----------|
| | | |
| | | |
| | | |
| | | |
| | | |

The following BSI references relate to the work on this British Standard:

Committee reference PSE/7/3

Draft for comment

04/30082123 DC

Contents

| | Page |
|--|--------------------|
| Committees responsible | Inside front cover |
| Foreword | ii |
| 1 Scope | 1 |
| 2 Normative references | 1 |
| 3 Terms and definitions | 1 |
| 4 Preferred features | 2 |
| 5 Valves for water intended for human consumption — Effect of materials on water quality | 6 |
| 6 Marking | 6 |
| 7 Preparation for storage and transport | 6 |
| Annex A (normative) Information to be supplied by the purchaser | 7 |
| Bibliography | 9 |
| Figure 1 — Typical operator — Ring key and bar | 2 |
| Figure 2 — Typical operator — T key | 3 |
| Figure 3 — Maximum overall height | 4 |
| Table 1 — Maximum overall heights | 4 |

Foreword

This part of BS 5163 has been prepared under the direction of PSE/7 to facilitate the application of BS EN 1074-1:2000 and BS EN 1074-2:2000. Along with BS 5163-2:2004, BS EN 1074-1:2000 and BS EN 1074-2:2000, this part of BS 5163 supersedes BS 5163:1986, which is withdrawn.

This standard provides guidance on certain aspects of valve selection and operation that will permit the integration of new gate valve products into water distribution networks within the UK with the minimum of physical impact and operating costs. A number of aspects of valve construction considered essential for consistency of operation are provided in this code of practice that are not detailed within BS EN 1074-1:2000 or BS EN 1074-2:2000. Guidance is also provided in this code of practice as to those aspects that might affect operating costs and thus have an impact on selection of appropriate gate valves for UK distribution networks.

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 does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 9 and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

1 Scope

This part of BS 5163 gives guidance on selection, including reference to preferred features and operation, of cast iron gate valves, complying with BS EN 1074-1 and BS EN 1074-2, with flanged ends, that are ring key and bar operated. These valves are primarily for underground use for waterworks purposes and primarily for use with water intended for human consumption in the United Kingdom.

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.

BS 5163-2, *Gate valves for waterworks purposes — Part 2: Stem caps for use on isolating valves and hydrants in pipelines carrying water for human consumption — Specification.*

BS 6920-1, *Suitability of non-metallic products for use in constant contact with water intended for human consumption with regard to their effect on the quality of water — Part 1: Specification.*

BS EN 558-1:1996, *Industrial valves — Face-to-face and centre-to-face dimensions of metal valves for use in flanged pipe systems — Part 1: PN-designated valves.*

BS EN 681-1:1996, *Elastomeric seals — Material requirements for pipe joint seals used in water and drainage applications — Part 1: Vulcanized rubber.*

BS EN 736-2, *Valves — Terminology — Part 2: Definition of components of valves.*

BS EN 736-3, *Valves — Terminology — Part 3: Definition of terms.*

BS EN 1074-1, *Valves for water supply — Fitness for purpose requirements and appropriate verification tests — Part 1: General requirements.*

BS EN 1074-2, *Valves for water supply — Fitness for purpose requirements and appropriate verification tests — Part 2: Isolating valves.*

BS EN 1092-2, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 2: Cast iron flanges.*

BS EN 1503-3, *Valves — Materials for bodies, bonnets and covers — Part 3: Cast irons specified in European Standards.*

BS EN 1982:1999, *Copper and copper alloys — Ingots and castings.*

BS EN ISO 5210, *Industrial valves — Multi-turn valve actuator attachments.*

WRc. WIS-4-52-01, *Polymeric anti-corrosion (barrier) coatings. 1992. (www.webookshop.com)*

GREAT BRITAIN. Water Supply (Water Quality) Regulations 2000. London: The Stationery Office.

GREAT BRITAIN. Water Supply (Water Quality) (Scotland) Regulations 2001. London: The Stationery Office.

NOTE In the event of the regulations being revised, the latest version should apply, but care is advised as regulation numbering might change.

3 Terms and definitions

For the purposes of this part of BS 5163, the following terms and definitions apply.

3.1

stem cap

device to enable valves of different sizes and stem configurations to be operated by standard operating keys

NOTE 1 A stem cap is an operating element. See also BS EN 736-2.

NOTE 2 The socket end of operating keys should be dimensionally in accordance with BS 336 up to DN 300.

3.2

ring key and bar

operating key with a socket at its lower end, which engages with the stem cap on the valve or hydrant, and a ring at the upper end to enable a bar to be inserted, which can then be used manually to turn the valve stem

NOTE A ring key and bar is illustrated in Figure 1.

3.3

T key

operating key similar to a ring key and bar but having a fixed short-length upper bar attached centrally at right angles to the shaft

NOTE A T key is illustrated in Figure 2.

3.4

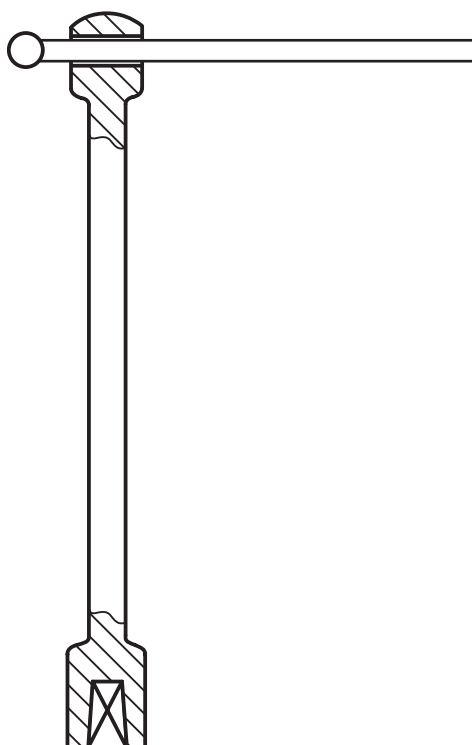
mST

minimum strength torque as specified in BS EN 1074-1

4 Preferred features

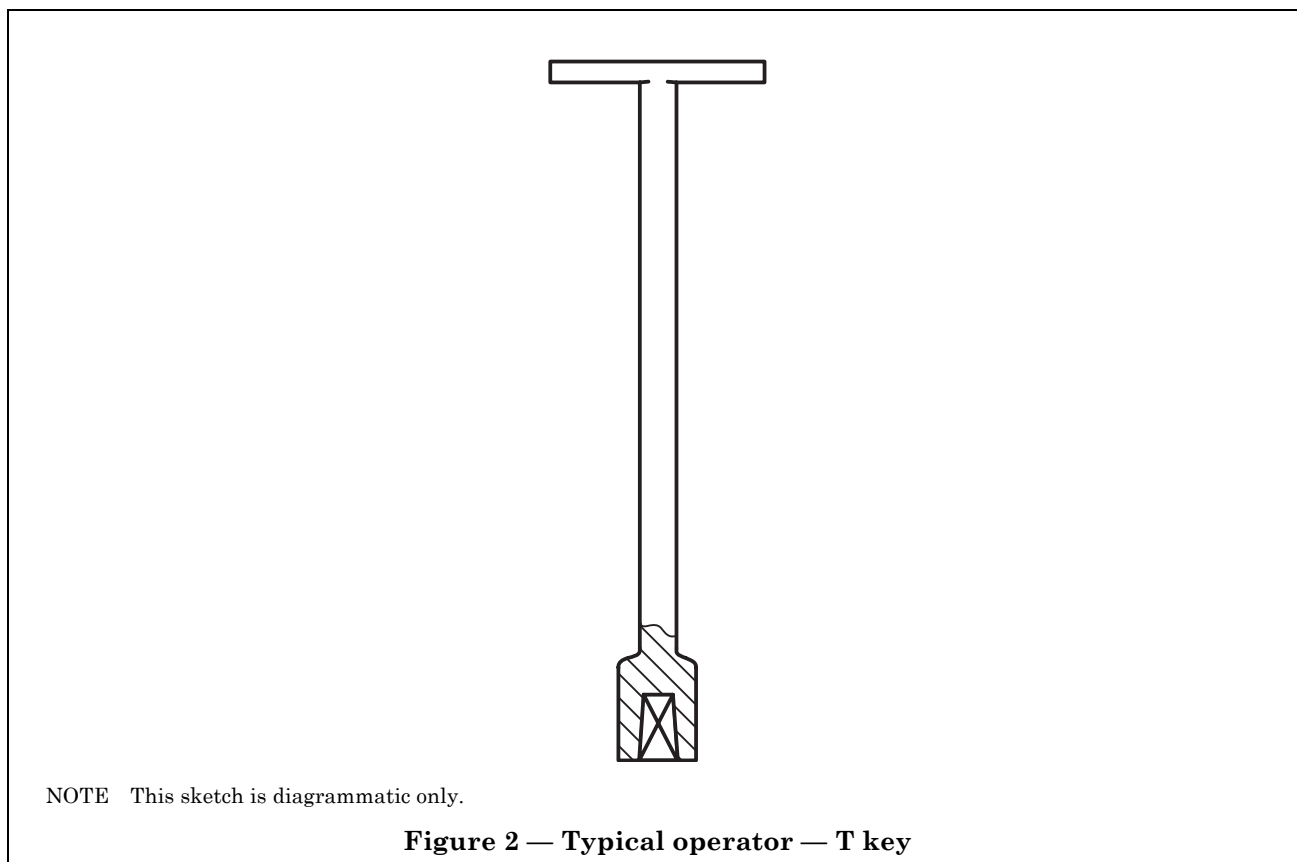
4.1 Type of valves

Gate valves complying with BS EN 1074-2 can be operated by various means, e.g. T key, handwheel or actuator, through a gearbox, or by ring key and bar. See Figure 1 and Figure 2 for examples. For UK purposes it is usual practice to use valves delivered with a stem cap suitable for use with a ring key and bar.



NOTE This sketch is diagrammatic only.

Figure 1 — Typical operator — Ring key and bar



4.2 Dimensions and tolerances

4.2.1 Face-to-face dimensions and tolerances

Where valves rated PFA 10 and PFA 16 are used, then the face-to-face dimensions and tolerances should be as specified in Table 3, Basic Series 3 in BS EN 558-1:1996.

Where valves rated PFA 25 are used, the face-to-face dimensions and tolerances should be as specified in Table 3, Basic Series 19 in BS EN 558-1:1996.

For valve sizes above DN 1000, the face-to-face dimensions should be by agreement between purchaser and manufacturer.

4.2.2 Body flange dimensions

Valves should comply with BS EN 1092-2, as is required by BS EN 1074-1.

However, where valves are required to be installed in existing pipework installations, then the body flange details may be by agreement between purchaser and manufacturer.

4.2.3 Maximum height dimensions

In order to accommodate the typical depths of burial of pipelines in the UK, valves should be selected with consideration of a maximum overall height dimension as given in Table 1 and illustrated in Figure 3.

4.3 Operational features

4.3.1 Features

It is recommended that only valves with the following features should be used:

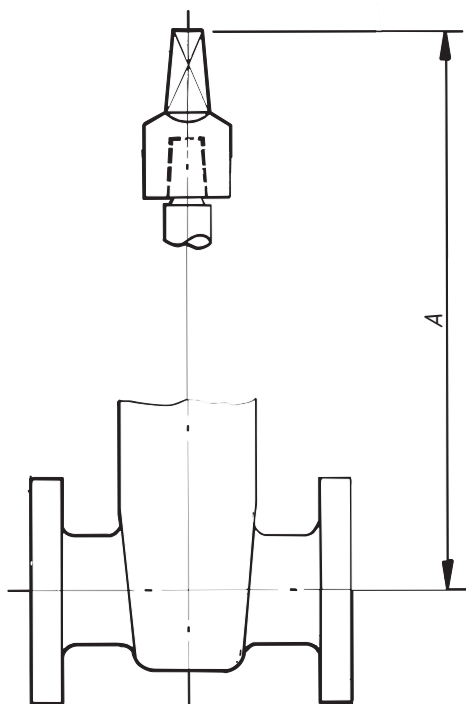
- a) inside screw stem (non-rising) with a stem thread lead of 12 mm;
- b) wedge type obturator;
- c) clearway bores as defined in BS EN 736-3.

Table 1 — Maximum overall heights (see Figure 3)

| Nominal size DN | Centre of waterway to top of stem cap (max), A mm |
|--------------------|--|
| 50 | 460 |
| 65 | 485 |
| 80 | 530 |
| 100 | 590 |
| 125 | 640 |
| 150 | 695 |
| 200 | 830 |
| 250 | 940 |
| 300 | 1 030 |
| 350 | 1 210 |
| 400 | 1 290 |
| 450 | 1 390 |
| 500 | 1 470 |
| 600 | 1 710 |

For sizes of valves greater than DN 600 overall heights should be agreed between purchaser and manufacturer.

NOTE The heights stated do not take into account any additional height caused by the fitting of a gearbox, handwheel or actuator.



Key

A Maximum overall height (see Table 1)

Figure 3 — Maximum overall height

4.3.2 Stem sealing

When the seal is a toroidal sealing ring or a lip seal device, it is recommended that:

- a) the user selects valves where at least two such seals are used;
- b) in all designs of seals, except stuffing boxes and glands, an additional device should be positioned above the seals to prevent the ingress of foreign matter;
- c) stem seals should be capable of being replaced, with the valve under pressure and in the fully open position.

NOTE The user is warned that there might be some leakage to atmosphere during this operation.

4.3.3 Stem caps

Unless otherwise specified, valves should be selected with stem caps conforming to BS 5163-2.

4.3.4 Actuator operations

For valves operated by electric actuator or gearbox, users should ensure that the dimensions of valve mating details comply with BS EN ISO 5210.

When gearboxes or powered actuators are fitted to valves, it is essential that care be taken in design and operation to ensure the torque input to the valve stem cannot exceed the mST of the valve.

4.4 Coatings

Users should select valves in which all cast iron components exposed to the external environment or to the water contained in the valve are fully coated to provide protection against corrosion. The user should ensure that where polymeric barrier coatings are used they are in accordance with WIS 4-52-01/02.

Vulcanized or bonded elastomer acting as a seating medium should provide an equivalent level of protection against corrosion. Such elastomers should comply with BS EN 681-1:1996 Type WA.

The user should also ensure that where areas of cast iron are threaded and not corrosion protected as a consequence, then that surface area has either been isolated from the atmosphere and the water in the valve by seals or suitable sealing compounds, or a suitable corrosion protection has been applied to the surface of the iron.

Areas of cast iron behind metal trim valve seats should also be similarly protected.

4.5 Materials

In support of the requirements for the materials for manufacture of valves (see BS EN 1074-1), it is recommended that users should select valves whose materials comply with the following.

- a) Cast irons: BS EN 1503-3.
- b) Stainless steel: used for manufacturing valve components, should have a minimum 13 % chrome content.
- c) Copper alloys:
 - 1) If ingots or castings are used, BS EN 1982:1999.

NOTE The following grades and their equivalents have traditionally been used for a considerable time. Other alloys may be used with agreement between manufacturer and purchaser.

Leaded Gunmetal to BS EN 1982:1999 grade CC491K, CuSn5Zn5Pb5-C (equivalent to BS 1400:1985, LG2).¹⁾

Leaded Gunmetal to BS EN 1982:1999 grade CC492K, CuSn7Zn2Pb3-C (equivalent to BS 1400:1985, LG4).¹⁾

Aluminium Bronze to BS EN 1982:1999 grade CC331G, CuAl10Fe2-C (equivalent to BS 1400:1985, AB1).¹⁾

Aluminium Bronze to BS EN 1982:1999 grade CC333G, CuAl10Fe5Ni5-C (equivalent to BS 1400:1985, AB2).¹⁾
 - 2) If rod or bar is used, BS EN 12163.
 - 3) If forging stock is used, BS EN 12165.
- d) Resilient materials: BS EN 681-1:1996 Type WA.
- e) Lubricants should be non-detrimental to other materials with which they might come into contact.

¹⁾ BS 1400:1985 has been withdrawn, superseded by BS EN 1982:1999.

5 Valves for water intended for human consumption — Effect of materials on water quality

When used under the conditions for which they are intended, all materials in contact with or likely to come into contact with water for public supply should be introduced in accordance with the requirements of Regulation 31 of the Water Supply (Water Quality) Regulations 2000 or Regulation 27 of the Water Supply (Water Quality) (Scotland) Regulations 2001.

NOTE This applies pending the introduction of a European Acceptance Scheme (EAS).

All materials that are likely to come into contact with water intended for human consumption in the UK should comply with BS EN 1074-1 and, for non-metallic materials including lubricants, the requirements of BS 6920-1.

6 Marking

To ensure that a valve is suitable for use with ring key and bar operation it is important that valves are clearly differentiated. Users should therefore select cast-iron valves that have been marked, not only with the marking specified by BS EN 1074-1 but also with the number of this code of practice (i.e. BS 5163-1) to indicate their suitability for use with ring key and bar operation. Similarly users should also ensure that seat trim is indicated on the valves, e.g. RES for resilient seated valves and CF for copper alloy seated valves.

7 Preparation for storage and transport

7.1 If packaging arrangements are to be agreed between manufacturer and purchaser as permitted by BS EN 1074-1, the recommendations in Clause 6 should be taken into account.

7.2 After testing, each valve should be drained of the test fluid, cleared of any extraneous matter and suitably protected in preparation for storage and transport.

7.3 Valve obturators, except in resilient seated designs, should be in the closed position when despatched to protect the obturator from transport damage.

The obturator in resilient seated valves should be protected from direct ultra-violet light by being fully opened or by the use of protective packaging or end caps.

NOTE BS EN 12351 covers end caps.

Annex A (normative)**Information to be supplied by the purchaser**

The following information should be agreed between the purchaser and supplier:

- a) number and year of this British Standard (i.e. BS 5163-1:2004);
- b) number and year of BS EN 1074-1;
- c) nominal size (DN);
- d) nominal pressure (PFA);
- e) whether a resilient seated or metal seated valve is required;
- f) trim materials required;
- g) form of stem sealing required;
- h) fluid to pass through valve if other than potable water;
- i) maximum differential pressure in operation;
- j) whether a handwheel is required;
- k) direction of closure;
- l) if actuator operation is required, details of the power supply and service conditions;
- m) whether a test certificate is required;
- n) requirements for any special marking;
- o) special requirements for despatch;
- p) whether the valve will be used in a closed end or open end application;
- q) orientation of the valve stem and seats when the valve is installed;
- r) for valves above DN 600, the size of stem cap and overall height requirements;
- s) if by-pass valves are required, any variation of face-to-face dimension;
- t) any special gearing requirements;
- u) for valves above DN 1 000, the face-to-face dimension required;
- v) for existing pipework, details of any special body flange requirements.

Bibliography

Standards publications

BS 336, *Specification for fire hose couplings and ancillary equipment.*

BS 1400:1985, *Specification for copper alloy ingots and copper alloy and high conductivity castings.*²⁾

BS EN 12351, *Industrial valves — Protective caps for valves with flanged connections.*

²⁾ BS 1400:1985 has been withdrawn, superseded by BS EN 1982:1999.

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: +44 (0)20 8996 9000. Fax: +44 (0)20 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: +44 (0)20 8996 9001. Fax: +44 (0)20 8996 7001. Email: orders@bsi-global.com. Standards are also available from the BSI website at <http://www.bsi-global.com>.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: +44 (0)20 8996 7111. Fax: +44 (0)20 8996 7048. Email: info@bsi-global.com.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: +44 (0)20 8996 7002. Fax: +44 (0)20 8996 7001. Email: membership@bsi-global.com.

Information regarding online access to British Standards via British Standards Online can be found at <http://www.bsi-global.com/bsonline>.

Further information about BSI is available on the BSI website at <http://www.bsi-global.com>.

Copyright

Copyright subsists in all BSI publications. BSI also holds the copyright, in the UK, of the publications of the international standardization bodies. Except as permitted under the Copyright, Designs and Patents Act 1988 no extract may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, photocopying, recording or otherwise – without prior written permission from BSI.

This does not preclude the free use, in the course of implementing the standard, of necessary details such as symbols, and size, type or grade designations. If these details are to be used for any other purpose than implementation then the prior written permission of BSI must be obtained.

Details and advice can be obtained from the Copyright & Licensing Manager. Tel: +44 (0)20 8996 7070. Fax: +44 (0)20 8996 7553. Email: copyright@bsi-global.com.