

## Information and Guidance Note

SELECTION, INSTALLATION, OPERATION AND  
MAINTENANCE OF ISOLATING AND  
BOUNDARY VALVES USED IN WATER  
DISTRIBUTION SYSTEMS

## 1. INTRODUCTION

This Information and Guidance Note has been prepared in response to issues raised by the variety of valve types, materials and standards currently available. It is limited to valves used in distribution mains for above and below ground applications, within the size range DN 50-600. Guidance is given on the selection, installation, operation and maintenance of the valves.

The British Standard for gate valves for waterworks purposes, BS 5163, has been revised. The revised standard includes two types of gate valve, Type A and Type B. The Type A gate valve is of lighter construction designed for T-key operation, whereas the Type B gate valve is designed to withstand greater torques, so allowing ring key and bar or T-key operation.

Both types may also be operated by a handwheel or actuator. Metallic or resilient obturator and body seatings may be used and the valve stems may be of copper alloy or stainless steel of specified minimum tensile strength. The major features of Type A and Type B valves are summarised in Appendix A.

The use of butterfly valves manufactured to BS 5155 is also recommended for particular applications. It should be noted that this standard does not contain water quality clauses for use with potable water, other than a reference to being resistant to dezincification.

## 2. DEFINITIONS

For the purposes of this Information and Guidance Note, the following definitions are used:

**Isolating Valve** – a valve whose function is to isolate a section of main from the remainder of the distribution system. Normally the valve is in the open position, only being closed when necessary to achieve the isolation required e.g. to allow the repair of the main, to undertake leakage control, air scour or mains rehabilitation.

**Boundary Valve** – a valve situated at the boundary between operational zones. Usually the valve is in the closed

position, only being opened to allow water to be transferred from one operational zone to another.

## 3. PERFORMANCE REQUIREMENTS

The basic user requirements for isolating and boundary valves are described below. The valves to be used within a distribution system should generally be leaktight in either direction, although for particular applications where the flow will always be in one direction this may not be necessary. They should be capable of essential maintenance with the minimum disruption to supply. The valves should be resistant to both external and internal corrosion. All parts of the valve in contact with potable water should meet the Water Quality requirements detailed in Information and Guidance Note Nos. 5-01-02 and 5-01-03.

In applications where cleaning of the mains with a rigid mechanical device is likely, all valves should have a full waterway or alternatively short lengths of the pipe either side of the valve should be removable to allow the entry and removal of the cleaning apparatus.

All valves should be capable of long term operability without wear or the need for the application of excessive torque.

## 4. BELOW GROUND INSTALLATION

## 4.1 Selection

## 4.1.1 General

The valves selected should be manufactured to the appropriate British Standard or other evaluated specification with an approved third party certification quality assurance scheme.

Care should be taken to select the appropriate valve and particularly the ancillary equipment such as control gear for the environment in which it is to operate e.g. waterproofed if it is to be installed below the water table.

For most purposes, 10 and 16 bar pressure classes are adequate in nominal sizes DN 50, 80, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500 and 600.

The valves should generally be flanged for ease of installation and removal although butterfly valves



may be of the wafer type for bolting between pipe flanges. Where there is a requirement for valves with sockets and spigots, this should be achieved by using suitable adaptors. However, should valves with socket and spigot ends be selected, the specifier should ensure that the valve ends are compatible with the pipe material to which they are to be connected.

It should be noted that valves are usually supplied with clockwise closing unless otherwise specified by the purchaser. It is advisable not to mix clockwise with anti-clockwise closing valves in the same installation or distribution system.

Valve stem sealing may be either by O-rings or gland packing although the majority are manufactured with O-rings. Gate valves manufactured to BS 5163 allow the renewal of the stem sealing whilst in the fully open position.

#### 4.1.2 Up to and including sizes DN 300

Type B gate valves complying with BS 5163 should generally be used. However Type A gate valves to BS 5163 should be considered where there is adequate supervision to ensure operation by T-key only, e.g. reservoir and water treatment works. Due to their lighter construction, Type A valves may be damaged if operated by a ring key and bar or with an extension piece on a T-key. The stem thread lead is not specified for Type A gate valves in BS 5163 hence the size of the main or the position of the gate cannot be determined by counting the number of turns of the valve key unless the thread lead for the particular valve is known.

Gate valves with resilient gates operate with lower torque than the corresponding metal faced gate valves. These also have the advantage of a clear bore with no gate recess in which debris may be trapped.

Butterfly valves up to DN 150 are particularly useful as isolating valves under air valves, due to their compact dimensions.

#### 4.1.3 Sizes above DN 300 to DN 600

Valves in this size range often require features not included in the relevant standards such as air vents, anti-friction devices, integral bypasses and gearing to reduce the operating effort. Gearing allows a greater torque to be applied to the valve, the applied torque should be checked against the minimum strength test torque for the valve particularly if gearing is to be fitted to a valve purchased without gearing. The direction of closure using the key should also be checked to ensure that it is in the required direction. The manual operation of valves equipped with gearing is limited by the unbalanced head of water acting on the valves. For guidance the limitations for standard metal gate valves are illustrated in Table 1. The valve manufacturer should be consulted when a valve is to be installed where an unbalanced head greater than that indicated is likely.

For valves required to operate with greater pressure imbalance, integral bypasses should be considered. Generally bypass valves of DN80 or 100 are suitable for valves of DN300 to 600. The bypass valve allows the pressure difference acting on the

**Table 1 – Standard metal gate valves: guide to maximum unbalanced pressure suitable for manual operation**

Valve size (DN)	Hand wheel diameter (mm)	Maximum unbalanced pressure in metres head of water with:			
		hand wheel	key	spur gearing and key	worm gearing and key
80	265	115	135	–	–
100	300	80	135	–	–
150	340	40	110	135	–
200	420	25	50	90	–
250	450	17	35	80	–
300	450	10	24	55	–
450	675	6	9	20	50
600	750	2	3	12	30

main valve to be reduced or eliminated. It is also useful for mains filling as the flow of water into the empty downstream section can be more carefully controlled than by using the main valve. It should be noted that the face to face dimension of a valve equipped with a bypass is generally greater than for the equivalent size valve without a bypass.

Gate valves have very little headloss when fully open, hence the use of valves of three quarters the diameter of the pipeline connected in line by long tapers should be considered provided the increased water velocity will not require the valve to be modified. This will reduce the cost of the valve, ease installation due to reduced weight and reduce the force required to operate the valve.

Valves in this size range are often ordered for specific functions. The specifier should consider whether tests in addition to those specified in the relevant standards, are required. It is advisable that the specifier or his agent witnesses the execution of any additional tests.

It is recommended that metal faced Type B gate valves to the revised BS 5163 should generally be used. However metal faced Type A gate valves to BS 5163 should be considered where their operation will always be by T-key, for example in water treatment works.

For sizes DN500 and above, butterfly valves with resilient seats to BS 5155 should be considered. Butterfly valves have the advantages of being more compact and are easier to operate particularly in remote control applications, although it should be noted that they should be installed in chambers, they do not provide a clear waterway and generally are leaktight in only one direction of flow. For sizes up to DN 400, butterfly valves are generally more expensive than gate valves but for larger sizes the relative costs are reversed.

## 4.2 Identification

### 4.2.1 Valve Markings

The markings on gate valves are specified in BS 5163. The body should be marked with the nominal size, nominal pressure designation, body material identification, direction of closure and manufacturer's name or trade mark. In addition the identification plate should include an identification number comprising of the British Standard number, designation of valve type and identification of trim

materials when required. BS 5163 should be consulted for full details of the markings and symbols used.

The markings for butterfly valves are similar to those for gate valves, and are specified in BS 5155.

#### 4.2.2 Functional identification

To reduce the possibility of operational errors an identification system should be used for the valves and the details marked on the record drawings. Where the existing practice is to erect marker posts with plates for all valves, this should continue with the plates being marked using the same system as for the valves. The painting of valve box covers is not recommended as the paint may wear off or appear a different colour when viewed under certain types of street lighting. In addition, it is disliked by many highway authorities and may lead to complaints particularly if done poorly. Rather than identifying every valve type, it is recommended that only valves in the following categories are marked:

- (a) Clockwise closing in a predominantly anti-clockwise area.
- (b) Anti-clockwise closing in a predominantly clockwise area.
- (c) Boundary valves.
- (d) Special cases e.g. private pipes, dialysis units.

A possible method of identification is by a coloured sleeve fitted over the valve cap. To operate the valve, the sleeve first must be removed. The background colour should signify the direction of closure with coloured bands to identify the other features.

Similarly, the background colour of the plate should identify special cases, which should be included in the bottom slot of the plate by, for example, colour or letter coding.

The identification of valves on record drawings should be based upon the recommendations in the NWC Report No. 25 except that the legend should be extended to identify boundary valves and special cases.

### 4.3 Corrosion Protection

There is little guidance currently available on the corrosion protection of valves. This section describes the types of coatings available and the issues that the specifier should consider when deciding upon the corrosion protection required.

There are two forms of coating available for the corrosion protection of valves. These are conventional paint coatings and high performance polymeric coatings.

#### 4.3.1 Conventional paint coatings

The conventionally applied paint coatings include the traditional bituminous based coatings, epoxy paint (not to be confused with fusion bonded epoxy resin) and zinc rich paint. These are applied directly on to the valve casting by spraying or dipping. The thickness of the coating depends upon the type of paint applied but rarely exceeds  $150\mu\text{m}$ . Consequently these should be considered to give only

limited short term corrosion protection such as required during storage prior to installation. Once the valve is installed, the paint coating may suffer rapid degradation by the action of the water and through the operation of the valve. The external paint coating is particularly prone to damage prior to and during the installation of the valve.

#### 4.3.2 High performance polymeric coatings

The polymeric coatings may be sub-divided into the thermoplastic types e.g. polyethylene, nylon, polyester, PVC and the thermosetting types e.g. epoxy resins and polyurethanes. Careful preparation of the surface of the casting by grit blasting is essential to achieving a good bond between the coating and the metal. Thermoplastic coatings often require a primer or bonding agent to be applied to the casting, whereas the thermosetting coatings are generally applied directly on to the casting. For both types of polymeric coating the casting is heated typically in the range  $200^{\circ}$  to  $300^{\circ}\text{C}$ . The actual temperature depends upon the type of polymer, but is critical in achieving a coherent coating of the required thickness, generally in excess of  $250\mu\text{m}$ .

The success of polymeric coating depends upon strict quality control of the materials and process at all stages. It is recommended that spark testing of the finished coating should be specified to detect pinholing defects. The method of application, inspection and testing of the coating should comply with the requirements of BS 6374: Part 2.

Polymeric coatings are usually more expensive than the conventionally applied paint coatings, the actual cost will largely depend on the coating type and the number of valves ordered.

The performance and durability of polymeric coatings as protection systems for valves has not been subjected to detailed investigation by the Water Industry. However, they should offer much better resistance than paint coatings to abrasion by the flow of water, damage during installation and the corrosive action of the water. This is due to the inherently inert nature of the polymers used and the greater thickness of the applied coating. The smooth surface finish of the coatings should also reduce the chance of the build up of deposits and tuberculation within the valve. However, if the integrity of the polymeric coating is damaged during the storage, installation or operation, corrosion can be initiated at that point. The corrosion at the damaged area can then continue at a rate similar to that for an unprotected valve.

If the pipeline has a cathodic protection system installed, the valve manufacturer should be consulted to ensure that it will not adversely effect the external coating applied to the valve.

#### 4.3.3 Internal corrosion

Corrosion/erosion inside a gate valve may occur:

- (a) around the valve guides where there are many crevices for corrosion to occur and where any corrosion protection is likely to be worn away during the operation of the valve,
- (b) on the gate itself, particularly if it is not clear of the waterway when fully open,
- (c) on the valve bore, which may result in pitting and/or tuberculation,
- (d) dezincification of brass valve stems, avoidable through the correct material selection as specified in BS 5163.

Provided the valve is operated/maintained regularly, discussed in clause 6, any tuberculation likely to prevent operation of the valve e.g. around the valve guides, will be removed during the opening/closing cycle. However, should excessive torque be required to overcome the effects of the build up of tuberculation, components of the valve may be damaged, e.g. spindle, stem nut. The thickness of the metal in the bodies is such that it is unlikely that the valve will be significantly weakened by corrosion, although with the increasing use of valves with thinner bodies due to the introduction of stronger materials, this may become an issue.

It should be noted that resilient gate valves require a smooth surface upon which to seat. Any pitting or build up of tuberculation on the valve bore may cause leakage. To overcome the leakage, excessive torque may be applied, resulting in damage to the valve.

The points discussed above also apply to butterfly valves, except that the operation of the valve will not remove any tuberculation from the disc or valve seat.

#### 4.3.4 External corrosion

Provided that the valve is installed either in a chamber, or encased in a concrete anchor block, external corrosion is unlikely to be a problem. If the valve is buried directly into the ground, the risk and extent of external corrosion will depend upon the corrosive nature of the soil. The significance of the thickness of the metal body also applies as discussed in 4.3.3.

#### 4.3.5 Guidance

The guidance given in Table 2 is based upon the points discussed in 4.3.2 and 4.3.3:

Butterfly valves, due to their design, are relatively easier to protect against internal corrosion. In aggressive conditions, alternative methods of providing enhanced internal corrosion protection of butterfly valves for example by lining should be considered. The valve disc in all applications should be manufactured from corrosion resistant materials as specified in BS 5155 or be protected by a high performance polymeric coating. If the valve is to be used in particularly aggressive conditions such as may be encountered in some water treatment processes, the material specification should be discussed with the valve manufacturer.

Table 2 – Corrosion protection requirements

	Gate valves			Butterfly valves
	metal gate	resilient gate	high strength Body	
<b>External protection</b>				
In chamber	X	X	X	X
In concrete	X	X	X	-
In non-aggressive soil	X	X	O	-
In aggressive soil	O	O	O	-
<b>Internal protection</b>				
Non-aggressive conveyed water	X	O	O	X
Aggressive conveyed water	O	O	O	O

KEY: X conventional paint  
 O enhanced protection  
 - not applicable.

#### 4.4 Installation

Prior to installation, the valves should be checked as detailed in BS 6683 to confirm that they comply with the requirements of the order, are not damaged and are free from foreign matter.

Generally gate valves below DN 300 are buried directly underground whereas gate valves size DN 300 and above are usually installed in purpose built chambers. Butterfly valves should always be installed in chambers. Where the depth of cover is such that the valve cap cannot be reached with the key, the valve should be equipped with an extension piece securely fixed to prevent movement relative to the valve.

It is essential to anchor the valve securely to prevent longitudinal movement or twisting of the valve during operation, causing subsequent damage to the pipeline. The relationship between anchoring and open end or closed end installation is discussed in clause 8. Suggested methods for anchoring are:

- i) casting concrete around the valve body providing that future removal of the valve from the pipeline will not be required.
- ii) where there is no thrust or movement along the pipe, encasing the valve body in well compacted granular sub-base Type 1 as defined in HMSO publication, specification for road and bridge works.
- iii) bolting to the flanges of the pipeline, providing that the pipeline is in turn securely anchored.

The assembly of the flanged joints is detailed in BS 6683, the main points being:

- i) it is essential for the flanges to be parallel before assembly and,
- ii) the flanges and gasket should be free from any surface defect or damage that may result in leakage.

For guidance on the selection of rubber gasket material, refer to BS 2494 and Information and Guidance Note No. 4-40-01.

The specification of the surface box should be to BS 5834 suitable for the valve type and size to facilitate maintenance work on the valve.

The location of valves is influenced by several factors including the operational requirements of the pipeline, hydraulic considerations and the general environment.

The following information is taken from WRC Engineering Report No. ER 173E.

Line valves should be installed to restrict the number of consumers isolated by a pipe failure. As a general guide, it should be possible to limit the loss of supply to no more than about 50 properties.

Where a valve is sited on a branch from a feeder main, it should be positioned as close to the branch tee as practicable to allow for isolation of the branch in the event of pipe failure and for other maintenance purposes. Where a ring main is to be laid, valves should be installed at both connections to the feeder main so that the ring main may be fed from either direction.

The interval between valves may be extended where their primary purpose is to isolate sections of main for repair purposes. However the maximum interval between valves should not exceed 800m.

Valves will also be required at the boundaries of pressure and supply zones.

Wherever possible valves should be sited to allow easy access, e.g. at field boundaries, in footpaths or verges rather than in the carriageway.

## **5. ABOVE GROUND INSTALLATIONS**

Valves installed above ground are often in a less demanding environment than those installed below ground and may be sited within a weatherproof building. The valves are generally operated by hand-wheel or actuator i.e. a short lever arm as opposed to the T-key or ring and bar used for valves below ground.

### **5.1 Selection**

The general considerations detailed in 4.1.1, 4.1.2 and 4.1.3 also apply to valves for above ground installations except that due to their lower operating torque Type A gate valves to BS 5163, equipped with handwheels or actuators may be considered in preference to Type B gate valves. This may enable a smaller and therefore lower cost actuator to be specified. Butterfly valves to BS 5155 should also be considered, particularly where space considerations are important.

### **5.2 Identification**

#### **5.2.1 Valve markings**

For details of the valve markings, refer to 4.2.1.

#### **5.2.2 Functional Identification**

Many of the issues discussed in 4.2.2 also apply to above ground installations. Suitable coding should be used with the information contained on a plate securely fixed on to the valve.

### **5.3 Corrosion protection**

The external corrosion of valves above ground should generally be less critical than for valves installed below ground, although the factors influencing internal corrosion will be the same. Further details are given in 4.3.

### **5.4 Installation**

Valves installed above ground are generally solidly bolted to the flanges of the pipework. Where additional anchoring is required, this should be achieved by either strapping or bolting the valve on to a concrete anchor block or by the use of tie bars.

The assembly of the flanged joints is detailed in BS 6683 and summarised in 4.4.

Gate valves should be installed in horizontal pipes with the valve stems vertical, or in vertical pipes with the stem horizontal. If this cannot be complied with the valve manufacturer should be consulted prior to placing the order to ensure that the valve will perform satisfactorily in the required orientation.

## **6. MAINTENANCE**

A regular maintenance programme for all valves is advisable, but the cost should be carefully weighed against the benefits resulting from such a programme. It may be that regular maintenance is justifiable only for selected key valves for which there would be major repercussions in the event of the failure of the valve to operate.

The simplest form of maintenance is to partially close/open valves which are normally open to clear any tuberculation from the guides and valve seats. This will also confirm that the valve can still be found, is accessible and still operable. The waterman should also take note of any non-routine maintenance required such as replacing damaged valve boxes, leaking glands, valve caps, bent spindles, etc. For many valves normally in the closed position, only visual inspection is possible.

The frequency of routine checking will depend upon local conditions such as the nature of the water. However, it is recommended that valves larger than DN 300 should be operated at least twice per year, smaller valves at least once every four years. It may not be possible to check all the valves as recommended due to the resources available, checks should then be concentrated on all valves above DN 300 and the smaller valves in critical situations.

When a pipeline is opened up, it is advisable to take the opportunity to remove the headworks of the valves for detailed inspection, maintenance or renewal.

A record should be kept for each valve detailing the location, manufacturer, type, size, direction of opening, number of turns to fully open or close and the normal position of the gate particularly for

valves on large distribution and trunk mains. The date of operating the valve plus any comments may also be recorded. This information may usefully be held on a computer file that will periodically generate a list of the valves due for checking.

Integral bypass valves should also be checked and operated when the main valve is checked. Similarly any gearing should be checked and greased. Any defects found during the routine checks should be rectified in a planned manner rather than wait for an emergency or valve failure to occur.

## 7. STORAGE

Gate valves should be prepared for storage as specified in BS 5163 and be stored in accordance with manufacturers' recommendations. Generally for valves with metal gates, the valve should be stored with the gate in the fully closed position. For resilient gate valves, the gate should be in the fully open position or slightly open with the end faces covered with opaque, rigid material.

Butterfly valves should be prepared for storage as specified in BS 5155 with the valve disc unseated and the body ends of lined and resilient seated valves sealed with opaque, rigid material.

Ideally the valves should be stored indoors at a temperature sufficient to prevent condensation, particularly for valves equipped with actuators. If the valves are stored outdoors, the valves should be supported off the ground and protected by a weatherproof cover to prevent the ingress of water which may freeze resulting in damage to the valve.

The rubber components of valves should not be exposed to heat or direct sunlight or be near any electrical equipment capable of generating ozone, e.g. mercury vapour lamps, high voltage electrical equipment or any equipment which may give rise to electric sparks or silent electrical discharges. Recommendations for the storage of rubber components are contained in BS 3574.

Should long term storage of valves be necessary, the valve manufacturer should be consulted about any additional precautions that may be required e.g. protective coatings. Gland packings may dry out during long storage and should be checked before the installation of the valve.

## 8. TESTING

The test requirements for gate valves are detailed in BS 5163. Generally valves are hydrostatically pressure tested in the closed end mode i.e. with both ends of the valve restrained to prevent the longitudinal expansion of the body due to the water pressure. Typical closed end installations are, a flanged valve rigidly held in the pipework or a valve having a flexible joint upstream and a flanged connection to an anchored pipe downstream.

However, valves are often required for open end installation i.e. with the downstream end unrestrained allowing the valve to expand longitudinally. Typical open end installations are, a washout valve or a valve with a flanged connection to an anchored pipe upstream and a flexible joint downstream. For such installations, open end testing of the valve should be specified.

Particularly for valves DN150 and above the effects of deflection due to open end installation become noticeable. It should be noted that a metal faced gate valve tested in the open end mode may only be leaktight at the test pressure and may leak if operated at a lower line pressure. Similarly, a valve specifically designed for droptight closure under open end conditions may not be droptight in a closed end installation. Hence it is important that the mode of pressure testing is specified, plus for open end testing, the line pressure at which the valve is to operate should also be specified.

The test requirements for butterfly valves are specified in BS 5155. Due to their design, the significance of open or closed end installation does not apply. However it is important that the manufacturer is given details of the type of valve required i.e. tight shut-off, low leakage or regulating as this determines the leakage rate permissible when the valve is tested.

## 9. OPERATION

Gate valves should be operated within the functional torque constraints detailed in BS 5163 by using the correct type of valve key or where gearing is fitted, ensuring that the gearing does not exert excessive torque on the valve. With the trend towards performance specification in BS 5163, the provision of torque limiting devices or portable valve actuators should be considered.

Typical malpractices are the use of extension pipes or bars to achieve a greater mechanical advantage and the use of a ring key and bar on Type A gate valves. This should be avoided except where a valve is stuck and there is no alternative. However, the effects of possible resultant damage to the valve and the implications to the operation of the pipeline, should first be assessed.

It is essential that the correct size of operating key is used since the use of too large a key will round off the corners of the valve cap and is against safe working practice. It should be noted that for gate valves to BS 5163 between DN 50 and DN 300, the square of the cap is 35mm, and between DN 350 and DN 600, the square of the cap is 48mm. If the valve cap is missing or damaged, the valve should not be operated with the key acting directly on the valve spindle.

The widely used practice of exerting a closing "snatch" on a valve should be discouraged particularly for resilient gate valves as this does not increase the watertightness of the valve and may result in damaging the valve. Leakage from a metal faced gate valve may be reduced or eliminated by working the gate up and down above the "home" position whereas the application of brute force may only result in damage to the valve rather than reducing the leakage.

The direction of closure and the position of the gate should be determined before a valve is operated. Gate valves should be left with the gate either fully shut or fully open, failure to achieve this may result in the erosion of the valve gate as discussed in clause 10. Provided the size of the valve is known, this may be checked for Type B gate valves by counting the number of turns of the key.

Valves should be opened or closed at a rate that will not cause surge particularly when approaching the closed position or at the point of opening.

Before opening larger valves equipped with integral bypass valves, the pressure on either side of the main valve should be equalised to reduce the unbalanced head on each side of the gate.

## 10. SUITABILITY OF VALVES FOR CONTROLLING FLOW

Gate valves are not suitable for controlling flow except for short duration emergencies. Only the last 10 – 15% travel of the gate towards closure has any substantial effect on the flow rate. The resultant high water velocity will cause rapid erosion of the valve gate, guides and seating due to cavitation. In addition, under these conditions the valve is operating in an unstable mode as any small change in the position of the gate or variation in the water pressure will cause a large change in the flow rate.

Resilient seated butterfly valves may be used for controlling flow as these also have tight shut off capability should it be required. There are butterfly valves specifically designed for flow control but they may not have tight shut off capability as there may be a gap between the disc and valve body in the closed position.

When specifying a valve for controlling flow, it is essential that the valve manufacturer is given details of the hydraulic conditions in the system. This should include details of the range of flow conditions expected. Since the leading and trailing edges of the discs in butterfly valves are prone to erosion, turbulent flow within the valve should be avoided, however turbulent flow may be created by equipment or fittings upstream of the valve. If this cannot be eliminated, the valve manufacturer should be consulted to arrive at a suitable material specification for the disc.

A butterfly valve for flow control should be sized such that the flow through the valve is approximately 5m/second enabling the valve to have a significant effect on the flow between the fully open and 15° off the fully open position.

There are other types of valve specifically designed for flow control, these however are outside the scope of this Guidance Note.

## 11. REFERENCES

Publications referred to in this Information and Guidance Note:

WAA SEWERS AND WATER MAINS COMMITTEE. Information and Guidance Note No. 4-40-01 Selection, properties, storage and installation requirements for rubber sealing rings.

UK WATER FITTINGS BYELAWS SCHEME. Information and Guidance Note No. 5-01-02 Requirements for the testing of non-metallic materials for use in contact with potable water.

UK WATER FITTINGS BYELAWS SCHEME. Information and Guidance Note No. 5-01-03 Requirements for the testing of metallic materials for use in contact with potable water.

- BS 2494 Specification for elastomeric joint rings for pipework and pipelines.
- BS 3574 Recommendations for the storage of vulcanised rubber.
- BS 5155 Cast iron and carbon steel butterfly valves for general purposes.
- BS 5163 Specification for predominantly key operated cast iron gate valves for waterworks purposes.
- BS 5834 Surface boxes and guards for underground stopvalves for gas and waterworks purposes.
- BS 6374 Lining of equipment with polymeric materials for the process industries.  
Part 2 Specification for lining with non-sheet applied thermoplastics.
- BS 6683 Guide to installation and use of valves.

NATIONAL WATER COUNCIL STANDING TECHNICAL COMMITTEE. Report No. 25 Sewer and Water Main Records.

WRc Engineering Report No. ER 173E. Guidelines on the design of water distribution systems for small and medium sized developments. (Published by WRc on behalf of the Pipeline Selection Manual Working Group of the WAA Sewers and Water Mains Committee).

DEPARTMENT OF TRANSPORT. Specification for road and bridge works. HMSO.

## APPENDIX A – COMPARISON BETWEEN TYPE A AND TYPE B GATE VALVES

	TYPE A	TYPE B
<b>Operation by</b> – T-key key/bar handwheel actuator	Common	
	No	Yes
	Common	Common
Size range (DN)	Common	
Pressure range (PN)	Common	
Materials of construction	Common	
Overall dimensions	Common	
Minimum stem diameter specified	No	Yes
Stem thread lead specified	No	Yes
Dead turns for resilient seated valves	Max 2 turns	Max 1 turn
<b>Type testing</b> – pressure	Common	
	Yes	Yes More rigorous
	– maximum functional test torque Yes	Yes More rigorous
<b>Production testing</b> – pressure	Common	

