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EAST AFRICAN STANDARD

Cast iron gate valves for general purposes — Specification

EAST AFRICAN COMMUNITY

First Edition 2010

Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in East Africa. It is envisaged that through harmonized standardization, trade barriers which are encountered when goods and services are exchanged within the Community will be removed.

In order to meet the above objectives, the EAC Partner States have enacted an East African Standardization, Quality Assurance, Metrology and Test Act, 2006 (EAC SQMT Act, 2006) to make provisions for ensuring standardization, quality assurance, metrology and testing of products produced or originating in a third country and traded in the Community in order to facilitate industrial development and trade as well as helping to protect the health and safety of society and the environment in the Community.

East African Standards are formulated in accordance with the procedures established by the East African Standards Committee. The East African Standards Committee is established under the provisions of Article 4 of the EAC SQMT Act, 2006. The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the procedures of the Community.

Article 15(1) of the EAC SQMT Act, 2006 provides that "Within six months of the declaration of an East African Standard, the Partner States shall adopt, without deviation from the approved text of the standard, the East African Standard as a national standard and withdraw any existing national standard with similar scope and purpose".

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

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Introduction

In the preparation of this East African Standard, the following source was consulted extensively:

SANS 665:2000, *Cast iron gate valves for general purposes — Specification*

Assistance derived from this source and others inadvertently not mentioned is hereby acknowledged.

ICS 23.060.30

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665*

This standard references other standards
Edition 4.1
2000

SOUTH AFRICAN STANDARD

Specification

Cast iron gate valves for general purposes

SABS 665

Consolidated edition incorporating technical corrigendum 1 :14 November 2000

Published by
THE SOUTH AFRICAN BUREAU OF STANDARDS

Gr 11

SABS 665
Ed. 4.1

Amendments incorporated since the publication of SABS 665:1999

Amdt No.	Date	Scope
Technical corrigendum 1	2000-11-14	Has been amended to delete the second paragraph of the preface, which was incorrectly added.

ICS 23.060.30

SABS 665
Ed. 4.1

SOUTH AFRICAN BUREAU OF STANDARDS

SPECIFICATION

CAST IRON GATE VALVES FOR GENERAL PURPOSES

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SABS 665
Ed. 4.1

Notice

This standard was approved in accordance with SABS procedures on 12 November 1999. Technical corrigendum No. 1 was approved in accordance with SABS procedures on 14 November 2000.

Manufacturers producing cast iron gate valves (for general purposes) to this specification may, under a permit issued by the SABS, apply the certification mark as illustrated above to the commodity as evidence to the purchaser that the commodity is being made in accordance with the standard and that compliance with its requirements is ensured by tests and inspections carried out by the SABS.

NOTES

1 In terms of the Standards Act, 1993 (Act 29 of 1993), it is a punishable offence for any person other than a mark permit holder to apply a certification mark to a commodity or to refer to the SABS or any of its standards in a manner likely to create the impression that the commodity has been approved by the SABS. Furthermore, no person shall claim or declare that he or any other person complied with an SABS standard unless

a) such claim or declaration is true and accurate in all material respects, and

b) the identity of the person on whose authority such claim or declaration is made, is clear.

2 It is recommended that authorities who wish to incorporate any part of this standard into any legislation in the manner intended by section 31 of the Act consult the SABS regarding the implications.

This standard will be revised when necessary in order to keep abreast of progress. Comment will be welcome and will be considered when the standard is revised.

Foreword

Edition 4.1 cancels and replaces all previous editions.

A vertical line in the margin shows where the text has been modified by technical corrigendum No. 1.

Annexes A, C, D and E form a normative part of this standard. Annexes B and F are for information only.

Attention is drawn to the normative references given in clause 2 of this standard. These references are indispensable for the application of this standard.

ISBN 0-626-12789-0

NOTES

1 Requirements that must be specified by the purchaser and those that must be agreed upon between the manufacturer and the purchaser are given in annex A.

2 Information regarding the verification of the quality of cast iron gate valves for general purposes is given in annex B.

3 Information on materials suitable for use in the manufacture of cast iron gate valves for general purposes is given in annex C.

4 Information on special requirements for valves that have flanges that comply with the requirements of ASME B16.1 is given in annex D.

5 Information on cast iron gate valves with end connections other than flanged is given in annex E.

Preface

There is a common belief among users that a valve that does not leak at high pressures will also be leak-free at low pressures, or vice versa. In the case of a wedge gate valve this is a misconception, because the valve has a tendency to "breathe" or expand at high pressures and consequently the bedding of the gate and body rings is different for high-pressure applications and for low-pressure applications. Therefore, if a valve is tested during manufacture for drop-tightness at a specific pressure but is eventually used at a different pressure (either higher or lower), it will generally leak. Although the rate of leakage may be minimal, the fact remains that, under these conditions, the valve will probably not be drop-tight. Under normal manufacturing procedures a valve will be tested for drop-tightness at the design working pressure. It is therefore recommended that, if the actual working pressure of a particular valve differs from the design working pressure and if drop-tightness is required at the actual working pressure, the manufacturer be advised of the fact when the order is placed.

Paragraph deleted by technical corrigendum No. 1.

Contents

SABS 665
Ed. 4.1

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*) This committee was responsible for the 1999 edition of the standard.

SPECIFICATION **SABS 665**
Edition 4.1

Cast iron gate valves for general purposes

1 Scope

This standard specifies the material and constructional requirements for cast iron gate valves of four classes and of either the rising stem or the non-rising stem type. It covers valves of 17 sizes in the range 50 mm to 1 000 mm, intended for the control of a variety of fluids in general-purpose applications.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. All standards are subject to revision and, since any reference to a standard is deemed to be a reference to the latest edition of that standard, parties to agreements based on this standard are encouraged to take steps to ensure the use of the most recent editions of the standards indicated below. Information on currently valid national and international standards can be obtained from the South African Bureau of Standards.

ASME B16.1, *Cast iron pipe flanges and flanged fittings, class 25, 125, 250, and 800.*

BS 970-1, *Specification for wrought steels for mechanical and allied engineering purposes – Part 1: General inspection and testing procedures and specific requirements for carbon, carbon manganese, alloy and stainless steels.*

BS 970-4, *Specification for wrought steels for mechanical and allied engineering purposes – Part 4: Valve steels.*

BS 1400, *Specification for copper alloy ingots and copper alloy and high conductivity copper castings.*

BS 1452, *Specification for flake graphite cast iron.*

BS 2872, *Specification for copper and copper alloy forging stock and forgings.*

BS 2874, *Specification for copper and copper alloy rods and sections (other than forging stock).*

BS EN 1563, *Founding. Spheroidal graphite cast iron.*

BS EN 1564, *Founding. Austempered ductile cast irons.*

SABS 723, *Wash primer (metal etch primer).*

SABS 815, *Shouldered-end pipes and fittings, and couplings.*

SABS 936, *Spheroidal graphite iron castings.*

SABS 966, *Components of unplasticized polyvinyl chloride (uPVC) pressure pipe systems.*

SABS 1034, *Grey iron castings.*

SABS 1123, *Pipe flanges.*

SABS 1190, *Malleable iron castings.*

SABS 1345, *One-pack metal etch primer.*

SABS 1700-5-1, *Fasteners – Part 5: General requirements and mechanical properties: Section 1: Bolts, screws and studs.*

SABS ISO 6509, *Corrosion of metals and alloys – Determination of dezincification resistance of brass.*

3 Definitions

NOTE – Figures 1 and 2 show cross-sections of typical gate valves and give details of the components.

For the purposes of this standard, the following definitions apply:

3.1 body seat faces (of a wedge gate valve): Machined faces in the body of a valve, with which the gate seat faces make contact when the valve is closed.

3.2 bonnet: The part of a valve that closes the top of the body and supports the operating mechanism.

3.3 face-to-face dimension: The distance, expressed in millimetres, between two planes perpendicular to the valve axis and located at the extremities of the body end ports.

3.4 footpiece: The part of an outside screw valve that secures the stem in the gate pocket.

3.5 gate: The component of a valve that is raised and lowered to open and close the passage through the body.

3.6 gate seat faces (of a wedge gate valve): Faces that are machined either directly on the gate or on the seat rings fitted to the gate and that make contact with the body seat faces when a valve is closed.

3.7 gland: The part of a valve that confines the gland packing within the stuffing box and forms a means of compressing the packing around the stem.

3.8 gland packing: Material inserted into the stuffing box of a valve, to prevent leakage of the fluid passing through the valve.

3.9 handwheel: A component, in the form of a wheel, by means of which a valve is manually operated.

3.10 inside screw (non-rising stem) valve: A valve in which the stem, during operation, remains within the body of the valve and in which the mating threads for actuation of the gate are situated at the bottom of the stem and inside the gate.

3.11 outside screw (rising stem) valve: A valve in which the stem, during operation, is withdrawn (partially) from the body of the valve and in which the mating threads for actuation of the gate are situated at the top of the stem and in the yoke nut.

3.12 stem: The component of a valve on which the actuating thread is formed and by which control of the gate is effected.

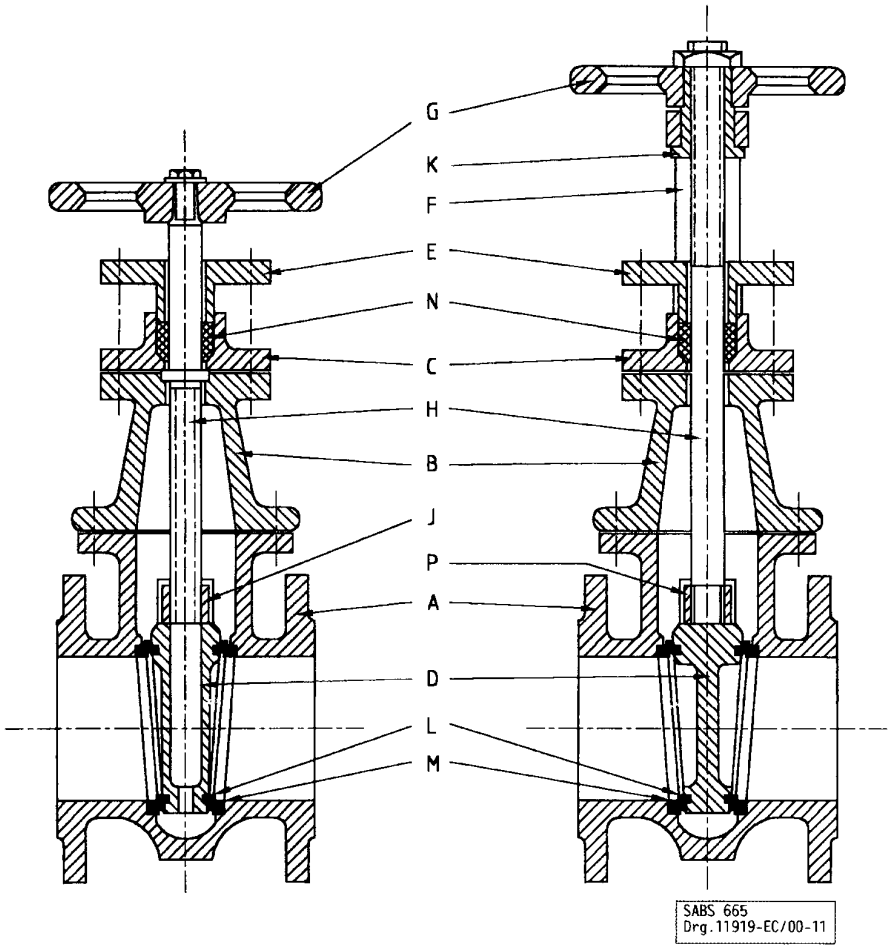
3.13 stem nut: The part of a valve that is located in the gate of an inside screw valve and that engages the actuating thread of the stem.

3.14 stuffing box: A part of the bonnet, or a part attached to the bonnet, that provides an annular space around the stem and that is intended to contain the gland packing.

3.15 trim: Those internal metallic wearing components or parts of components (normally corrosion resistant, and excluding the body, bonnet and gate) of the valve that come into contact with the fluid that passes through the valve.

3.16 yoke: An exterior part of an outside screw valve that holds the yoke nut and that is integral with, or attached to, the bonnet.

3.17 yoke nut: The part of a valve that is located in the yoke of an outside screw valve, and that engages the actuating thread of the stem (and causes the actuation of the stem).

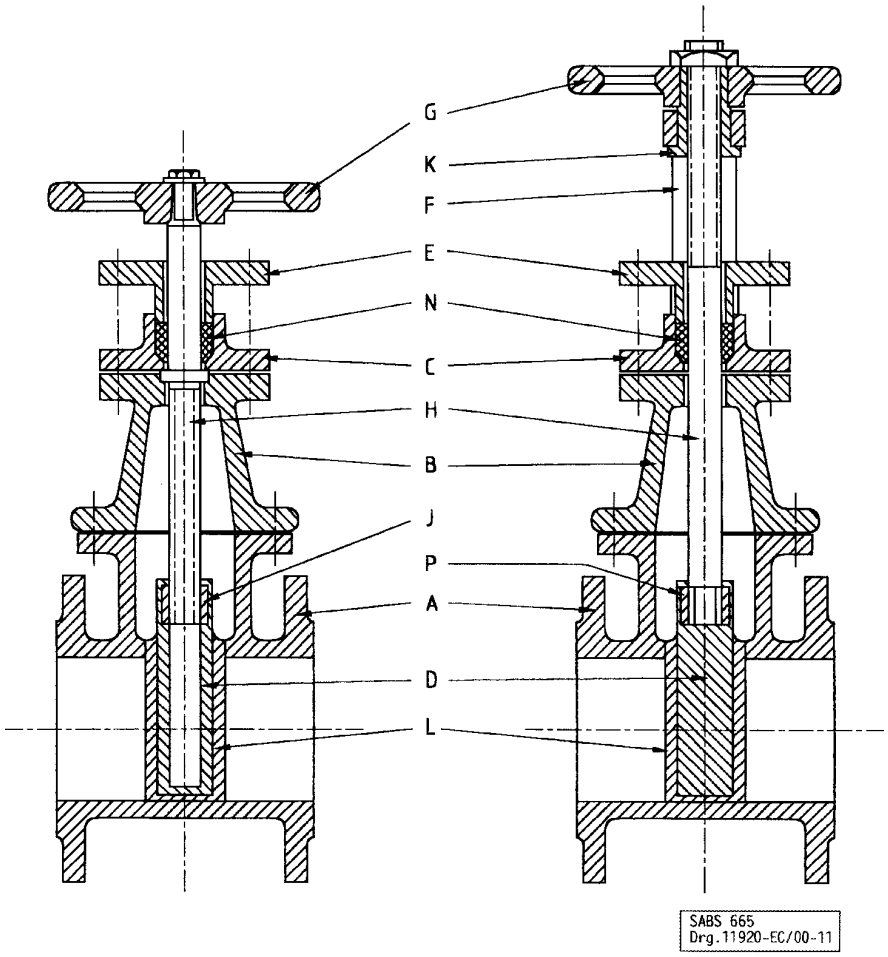


a) Inside screw (non-rising stem) valve

b) Outside screw (rising stem) valve

A Body
B Bonnet
C Stuffing box
D Gate
E Gland
F Yoke
G Handwheel (if required)
H Stem
J Stem nut
K Yoke nut
L Gate seat faces
M Body seat faces
N Gland packing
P Footpiece

Figure 1 — Wedge gate valve — Types and components



a) Inside screw (non-rising stem) valve

b) Outside screw (rising stem) valve

A Body
B Bonnet
C Stuffing box
D Gate
E Gland
F Yoke
G Handwheel (if required)
H Stem
J Stem nut
K Yoke nut
L Resilient seal
N Gland packing
P Footpiece

Figure 2 — Resilient seal valve — Types and components

4 Requirements

4.1 Size, class, valve type, gate type and trim

4.1.1 Size (nominal bore)

4.1.1.1 A flanged valve shall be of one of the sizes given in column 1 of table 1, as required (see clause A.1). Certain sizes (see table 1) are non-preferred in class 6 and class 25.

4.1.1.2 A valve other than a flanged valve shall be of one of the sizes given in column 1 of the appropriate of figure E.1, E.2 and E.3 of annex E.

4.1.2 Class

A valve shall be of one of the following classes, as required (see clause A.1):

a) **Class 6**: For working pressures not exceeding 0,6 MPa;

b) **Class 10**: For working pressures not exceeding 1,0 MPa;

c) **Class 16**: For working pressures not exceeding 1,6 MPa; or

d) **Class 25**: For working pressures not exceeding 2,5 MPa.

4.1.3 Valve type

A valve shall be of one of the following types, as required (see clause A.1):

a) inside screw (non-rising stem) type; or

b) outside screw (rising stem) type.

4.1.4 Gate type

A valve shall have a gate of one of the following types, as required (see clause A.1):

a) resilient seal gate; or

b) wedge gate.

4.1.5 Trim

A valve shall have a trim of

a) copper alloy,

b) stainless steel, or

c) all iron,

as required (see clause A.1).

NOTE – See tables C.1(a) and C.1(b) and C.1(c) of annex C for details of the specific materials to be used for the various components for each type of trim.

4.2 Materials

4.2.1 Metallic materials

Metallic materials used in the manufacture of components of a valve shall comply with at least the relevant requirements given in columns 2, 3 and 4 of table C.1(a), C.1(b), or C.1(c), as relevant, of annex C. Alternatively, when so agreed upon (see clause A.2), a material that complies with at least the relevant requirements given in columns 5, 6 and 7 may be used. When stainless steel is used for seating faces, the Vickers hardness of the material of the body and gate seating faces shall differ by at least 40. Copper alloy components in direct contact with water shall, when tested in accordance with 5.5, exhibit a depth of penetration not exceeding 250 µm.

4.2.2 Non-metallic materials

Non-metallic materials used for flange seals, gland packing and the resilient material of the gate of a resilient seal valve shall

a) be suitable for use at the required operating temperatures (see 4.5),

b) not constitute a toxic hazard, and,

c) not support microbiological growth.

4.3 Design and construction

4.3.1 General

4.3.1.1 Valves shall be designed to operate at the following fluid temperatures:

a) wedge gate valves: -10 °C to 220 °C (see also 4.5)

b) resilient seal valves: 0 °C to 100 °C.

4.3.1.2 The design and construction of the stem nut or footpiece, as relevant, and the pocket in the gate that is intended to accommodate the stem nut or footpiece, shall be such as to ensure

a) a neat and close fit between the engaging surfaces, and

b) the proper alignment of the gate and stem.

4.3.1.3 The design of the valve shall be such that the handwheel can be operated freely and that the hand of the operator cannot become jammed between the handwheel and the yoke.

4.3.1.4 In all cases, to minimize stress concentration, there shall be no sharp corners or uneven contact surfaces and, where appropriate, adequate gussets and fillets shall be provided.

4.3.1.5 In the case of a resilient seal valve, the finish of the surfaces of the body that are intended to come into contact with the gate shall be of such quality that, when the valve is tested in accordance with 5.3, the gate is not damaged.

4.3.2 Method of operation

A valve shall be designed for operation by means of a handwheel or any other means, as required (see clause A.1). In the latter case the method of operation and the strength of the relevant component parts shall be as agreed upon (see clause A.2).

4.3.3 Direction of closing

Unless otherwise required, a valve shall be closed by turning the handwheel in a direction that is clockwise when the stem is viewed from above (see clause A.1).

4.3.4 Direct-drive handwheels

4.3.4.1 Marking

Handwheels shall have the words "SHUT/OPEN" and the appropriate directional arrows clearly cast on the upper surface of the rim in a manner that shall not cause injury to the hands of the operator.

4.3.4.2 Manner of attachment

Handwheels shall be designed and fitted in a manner that

a) allows enough space for the gripping of the handwheel without risk of injury to the hands of the operator,

b) allows for removal and replacement of the handwheel, and

c) ensures a close fit between the handwheel and the mating top of the stem or the yoke nut, as relevant.

4.3.4.3 Strength and torque transmittance

4.3.4.3.1 The strength of the handwheel shall be such that, when the valve is tested in accordance with 5.2.2.2.1 and 5.2.2.2.2, there is no leakage or weeping past the gate (see 4.7) and the handwheel, including its connection with the top of the stem or the yoke nut, as relevant, does not fail.

4.3.4.3.2 The diameter of the handwheel shall be such that, when the appropriate of the following forces is applied tangentially to the rim of the handwheel

a) a point load of 1 200 N for valves of size up to and including 300 mm,

b) a double point load of 1 200 N for valves of size exceeding 300 mm and up to and including 600 mm, or

c) for larger valves, a value as specified by the manufacturer,

the developed torque does not exceed the value given in column 2 of table 7, appropriate to the size of the valve as given in column 1.

4.3.5 Gate and body (wedge gate valves)

4.3.5.1 Guides

The body and the sides of the gate of a wedge gate valve shall have mating guides of such design that when the valve is being closed, the guides will, until near the point of closure, prevent the gate seats from touching the body seats.

4.3.5.2 Allowance for wear and maintenance

The initial width of the gate of a wedge gate valve shall be such that, in the closed position, the gate rides high on the body seats to allow for wear and maintenance.

4.3.6 Stems

The stem shall have an actuating thread of trapezoidal form, and shall be of such strength that, when a valve is tested in accordance with 5.4.4.1, the stem does not break or become so distorted as to fail to operate when the appropriate torque given in column 3 of table 8 is applied to the stem.

4.3.7 Stem nut

The stem nut shall be a one-piece, replaceable component which, for valves of size not exceeding 100 mm, may be rigidly fixed in the gate.

4.3.8 Stem sealing

4.3.8.1 A valve shall have means for preventing leakage past the stem.

4.3.8.2 When so required, a valve with a gland seal shall have one of the following facilities to permit the repacking of the gland while the valve is under pressure:

a) an O-ring or other pressure-actuated stem seal; or

b) a back seating surface in the bonnet that makes contact with a mating collar on the stem when the valve is fully open (see clause A.1).

4.3.9 Resilient seals

The resilient material on the gate of a resilient seal valve shall be

a) applied in a manner that provides a thickness of at least 4 mm on all areas where sealing contact has to be ensured, and

b) so firmly bonded or otherwise attached that, when the valve is tested in accordance with 5.3 or 5.4, the resilient material does not become torn, loose or detached, and there is no leakage past the gate.

4.3.10 End connections

4.3.10.1 General

A valve shall have one of the following types of end connections, as required (see clause A.1):

a) flanges that comply with the requirements of SABS 1123;

b) flanges that comply with the requirements of ASME B16.1 (see also annex D);

c) shouldered ends;

d) spigot ends; or

e) socket ends.

NOTE – Additional requirements for shouldered ends and spigot and socket ends are given in annex E.

4.3.10.2 Flanges

4.3.10.2.1 Flange faces

The front faces of flanges shall (except where raised faces are required) be fully machined, parallel (to within 30') to one another, and normal (to within 30') to the centre-line of the bore of the valve. When so required, the back of each flange shall be spot-faced (coaxially with each bolt hole) over an area large enough to freely accommodate the washer and the nut (see clause A.1).

4.3.10.2.2 Drilling

Unless flanges without bolt holes are required (see clause A.1), the flanges shall be drilled or tapped as required to comply with the relevant of the specifications given in 4.3.10.1(a) or (b). Unless otherwise required, the holes shall be off-centre (see clause A.1). The axis of each bolt hole shall be normal to the front face of the flange.

4.3.11 Bolting

Unless otherwise required, hexagon-head bolts and nuts used in the assembly of a valve shall comply with the relevant requirements of SABS 1700-5-1 (see clause A.1).

4.4 Dimensions

4.4.1 Face-to-face dimensions

4.4.1.1 The face-to-face dimensions of a flanged valve shall conform to the values given in table 1, appropriate to the size and class of the valve and subject to the appropriate tolerance given in table 2.

4.4.1.2 The face-to-face dimensions of valves other than flanged valves shall comply with the relevant requirements of annex E.

Table 1 — Face-to-face dimensions for flanged valves

Dimensions in millimetres

1	2	3	4
Size of valve	**Face-to-face dimension**		
	Class 6	**Classes 10 and 16**	**Class 25**
50 65 80	150 150 180	178 190 203	216 241 283
100 150 200	190 210 230	229 267 292	305 403 419
250 300 350	250 270 290	330 356 381	457 502 572
400 450 500	310 330 350	406 432 457	610 660 711
600 700 800	* * *	508 610 660	787 * *
900 1 000	* *	711 811	* *
*This size and class of valve are non-preferred for flanged valves but, where such valves are required, the face-to-face dimensions shall be as agreed upon (see clause A.2).			

Table 2 — Tolerances for face-to-face dimensions

Dimensions in millimetres

1	2
Face-to-face dimension	**Tolerance**
Up to and including 200	± 1
Over 200 up to and including 400	± 2
Over 400 up to and including 600	± 3
Over 600 up to and including 800	± 4
Over 800	± 5

4.4.2 Seat bore

The bore of a valve at the seat shall be circular and of diameter at least equal to that given in column 2, 3 or 4 of table 3, appropriate to the class and to the size of the valve. The lugs required to facilitate the fitting of screwed-in seat rings may intrude into the bore by a maximum of 10 mm.

Table 3 — Diameters of seat bores

Dimensions in millimetres

1	2	3	4
Size of valve	**Minimum bore diameter**		
	Classes 6 and 10	**Class 16**	**Class 25**
50 65 80	50 65 80	50 65 80	50 65 80
100 150 200	100 150 200	100 150 200	100 150 200
250 300 350	250 300 350	250 300 335	250 300 335
400 450 500	400 450 500	385 440 490	385 430 485
600 700 800	*600 *700 *800	590 690 792	585 - -
900 1 000	*900 *1 000	891 989	- -
* For class 6, this is a non-preferred size of valve.			

4.5 Operating conditions for wedge gate valves

4.5.1 A wedge gate valve shall be suitable for continuous operation at the working pressure given in column 2 of table 4, appropriate to the class of valve given in column 1, and at temperatures within the range -10 °C to 120 °C.

4.5.2 When so required, a wedge gate valve shall be suitable for continuous operation at a maximum temperature higher than 120 °C (but not exceeding 220 °C) (see clause A.1) and at a working pressure as given in columns 3 to 6 of table 4, appropriate to the class of valve given in column 1.

Table 4 — Pressure/temperature ratings for wedge gate valves

1	2	3	4	5	6
Class of valve	**Operating temperature** °C				
	Maximum permissible working pressure MPa				
	-10 to 120	150	180	200	220
6	0,6	0,55	0,50	-	-
10	1,0	0,92	0,85	-	-
16	1,6	1,48	1,39	1,3	-
25	2,5	2,3	2,12	2,0	1,9
NOTE – Intermediate values are obtained by interpolation.					

4.6 Body and torque strength

4.6.1 Body strength

When a valve is tested in accordance with 5.2.2.1, it shall not fail or sweat or leak at permanent joints.

4.6.2 Torque strength

When a valve is tested in accordance with 5.4, it shall not show any sign of breakage or such distortion of any component part as would prevent the valve from being operated.

4.7 Gate leakage and gate efficiency

When a valve is tested in accordance with 5.2.2.2.2 at a pressure equal to the maximum permissible working pressure given in 4.1.2 or such other working pressure (within the rating of the valve) as required (see clause A.1), there shall be no sign of leakage past the gate or, when so agreed upon (see clause A.2), leakage may occur but in such case the rate of leakage shall not exceed the value given in column 2 of table 5 appropriate to the size of valve given in column 1.

NOTE – The gate efficiency is affected by a variety of conditions and in this regard the attention of the user is drawn to the preface to this standard.

Table 5 — Permissible seat leakage

1	2
Size of valve mm	**Maximum leakage rate** mL/min
50	0,03
65	0,04
80	0,05
100	0,06
125	0,08
150	0,09
200	0,12
225	0,14
250	0,15
300	0,18
350	0,21
375	0,23
400	0,24
450	0,27
500	0,30
525	0,32
600	0,36
700	0,42
800	0,48
900	0,54
1 000	0,60

4.8 Position indicators

When so required, a position indicator of agreed design, quality, and method of mounting and attachment (see clause A.2) and showing both the OPEN and SHUT positions, shall be attached to each valve (see clause A.1).

4.9 Finish

Valves shall be finished as follows:

a) All parts shall have a neat finish and shall be free from fins and burrs.

b) All exposed internal and external surfaces (other than the seal surfaces) shall, after they have been cleaned in a manner appropriate to the type of primer used, be coated with a primer that complies with the requirements of SABS 723 or SABS 1345 and that has a dry-film thickness of 10 µm to 25 µm, or a primer as agreed upon (see clause A.2).

c) All external surfaces shall be finished in a manner as agreed upon (see clause A.2), with the provision that the final coat be applied only after the valve has been tested and the parts thoroughly cleaned and dried.

4.10 Test certificate

When so required, each lot of valves shall be accompanied by a test certificate certifying that all the valves in the lot comply with the requirements of the standard. The certificate shall state the pressures and hydraulic medium used in the hydraulic tests and the result of each test (see clause A.1).

4.11 Witnessing of tests

When so required, the purchaser or his nominated representative shall be allowed to witness the final inspection and the testing of the valves in each lot (see clause A.1).

5 Inspection and methods of test

5.1 Inspection

Visually examine and check the dimensions of each valve (or an agreed representative sample of the lot (see clause A.2)) for compliance with the requirements of clause 4 for which tests to assess compliance are not given in 5.2 to 5.5, inclusive.

5.2 Body strength, gate leakage and gate efficiency tests

5.2.1 Apparatus

Hydraulic pump capable of producing the required test pressure.

5.2.2 Procedure

5.2.2.1 Body strength test

5.2.2.1.1 Connect one side of the valve to the hydraulic pump and blank off the other side of the valve. Open the gate fully and, using water at ambient temperature as the hydraulic medium, fill the valve with water, ensuring that no air is entrapped.

5.2.2.1.2 Apply the appropriate of the following pressures for the period shown in column 2 of table 6:

a) Class 6 valves: 0,9 MPa;

b) Class 10 valves: 1,5 MPa;

c) Class 16 valves: 2,4 MPa; or

d) Class 25 valves: 3,8 MPa.

5.2.2.1.3 Examine the valve for compliance with 4.6.1.

Table 6 — Test duration

1	2
Size of valve mm	**Test duration** min
50; 65; 80; 100; 150 200; 250 300; 350; 400; 450 Exceeding 450	1 2 3 5

5.2.2.2 Gate leakage test

5.2.2.2.1 Remove the blanking-off cover and close the gate by either

a) in the case of valves supplied without handwheels, applying to the main stem an evenly applied (non-shock) closing torque of value as given in column 2 of table 7; or

b) in the case of valves supplied with handwheels, applying tangentially to the rim of the handwheel a force in accordance with 4.3.4.3.2.

Then dry the open part of the valve thoroughly.

5.2.2.2.2 Apply a hydraulic pressure equal to the maximum permissible working pressure of the valve or the required pressure (see 4.7) for the appropriate period given in column 2 of table 6, and examine the gate and seat for compliance with 4.7 and the handwheel, including its connection with the top of the stem or the yoke nut, as relevant, for compliance with 4.3.4.3.1.

5.2.2.2.3 Reduce (in steps) the pressure applied to the valve to three other values within the rating of the valve and check each time for compliance with 4.7.

5.2.2.2.4 Repeat the procedure described in 5.2.2.2.2 and 5.2.2.2.3 above, but with the hydraulic pressure applied to the other side of the gate.

Table 7 — Closing torque

1	2
Size of valve mm	**Closing torque** N.m, ± 10 N.m
50	150
65	150
80	150
100	150
150	225
200	300
250	375
300	450
350	450
400	450
450	600
500	600
600	600
700	750
800	750
900	750
1 000	750

5.3 Performance test (resilient seal valves)

5.3.1 Apparatus

5.3.1.1 Device that is capable of fully opening and closing the valve in cycles by operating the stem at a rate of at least

a) 3 r/min in the case of a rotating device, or

b) 3 m/min in the case of a reciprocating device,

and capable of applying a constant closing torque or force. The device shall also be capable of recording the number of completed cycles, each cycle consisting of a closing operation, a holding period of approximately 15 min at the closing force, and then an opening operation.

5.3.1.2 A water supply at a variable pressure.

5.3.2 Procedure

5.3.2.1 Close the valve lightly and connect the water supply, with the water at negligible pressure, to one end of the valve.

5.3.2.2 Slowly increase the water pressure until water leaks past the gate.

5.3.2.3 Increase the torque or force applied to the valve stem until the water leakage just ceases.

5.3.2.4 Repeat the procedure in 5.3.2.2 and 5.3.2.3 above until the specified maximum working pressure of the valve is reached and note the final load applied to the stem.

5.3.2.5 Disconnect the water supply. Attach the device and allow it to operate the valve for 3 000 cycles, the valve being closed in each case to the final load determined in 5.3.2.4 above.

5.3.2.6 Stop the device with the valve in the fully closed position. Connect the water supply, increase the water pressure to the maximum permissible working pressure of the valve, check for leakage past the gate and, if necessary, adjust the load on the stem to stop the leakage, but do not exceed the appropriate torque given in column 2 of table 7.

5.3.2.7 Remove the gate and inspect the resilient material and the gate for compliance with 4.3.1.5 and 4.3.9.

5.4 Torque test

5.4.1 Apparatus

Torque wrench accurate to within 2 %.

5.4.2 Test sample

Use separate valves of the same size, model and type for each of the three parts of the test described in 5.4.4.

5.4.3 Mounting

So secure the body of the valve that it will not move during the test.

5.4.4 Procedure

5.4.4.1 Torque test in open position

5.4.4.1.1 Open the gate fully and apply to the valve stem an opening torque of value equal to that given in column 2 of table 8, appropriate to the size of valve given in column 1. Maintain the torque for 1 min.

5.4.4.1.2 Release the torque and apply to the valve stem a closing torque of value equal to that given in column 3 of table 8, appropriate to the size of valve given in column 1.

5.4.4.1.3 Check for compliance with 4.3.6 and 4.6.2.

5.4.4.2 Torque test in intermediate position

5.4.4.2.1 Open the valve approximately half-way and lock the gate in this position.

5.4.4.2.2 Repeat the procedure given in 5.4.4.1.1 and 5.4.4.1.2, and check for compliance with 4.3.6 or 4.3.9(b), as appropriate, and 4.6.2.

5.4.4.3 Torque test in closed position

5.4.4.3.1 Blank off one end of the valve with a blanking-off device that has a connection through which a hydraulic pressure can be applied to the inside of the valve.

5.4.4.3.2 Fully close the valve and apply to the valve stem a closing torque equal to the value given in column 2 of table 8, appropriate to the size of valve given in column 1.

5.4.4.3.3 Fill the blanked-off end of the valve with water, ensuring that no air is entrapped. Apply, through the hydraulic connection (see 5.4.4.3.1 above), a hydraulic pressure equal to the maximum working pressure of the valve. Maintain the pressure for 1 min and then release the pressure.

5.4.4.3.4 Repeat the procedure given in 5.4.4.1.2, but with the torque applied in the opening direction.

5.4.4.3.5 Check for compliance with 4.6.2.

Table 8 — Test torques

1	2	3
Size of valve mm	**Minimum strength torque** N.m	**Maximum functional torque** N.m
50	300	100
65	300	100
80	300	100
100	300	100
150	450	150
200	600	200
250	750	250
300	900	300
350	900	300
400	900	300
450	1 200	300
500	1 200	300
600	1 200	300
700	1 800	300
800	1 800	300
900	1 800	300
1 000	1 800	300

5.5 Test for dezincification resistance

Subject copper alloy components that are intended to be in direct contact with water to the test given in SABS ISO 6509 and check for compliance with 4.2.1.

6 Packing and marking

6.1 Packing

Each valve shall be so protected as to minimize the possibility of damage during transit and storage. Gates of wedge gate valves shall be locked in the closed position and, when so required, body ends shall be sealed to prevent the entry of foreign matter (see clause A.1). To prevent the seal material from setting or sticking, resilient seal valves shall not be fully closed.

6.2 Marking

6.2.1 Body marking

The following information shall be legibly and indelibly cast or embossed on each valve body:

a) the manufacturer's name or trade name or trade mark;

b) the size of the valve;

c) the class of the valve; and

d) the charge identification of the casting.

6.2.2 Identification plate marking

6.2.2.1 When so required (see clause A.1), a metal identification plate shall be permanently fixed to each valve in a position and manner as agreed upon (see clause A.2). The plate shall bear the following information in legible and indelible marking:

a) the body material designation (see 6.2.2.2 below);

b) the material designation for the trim of the valve (see 6.2.2.2 and 6.2.2.3 below); and

c) any limiting temperature.

6.2.2.2 The following symbols shall be used for body and trim material designations:

Cast iron:	CI
Spheroidal graphite iron:	SG
Malleable iron:	MI
Gun metal:	GM
Brass:	BR
Aluminium bronze:	AB
Carbon steel:	CS or STEEL
Stainless steel:	SS
Resilient material:	RS

6.2.2.3 Material designations shall be given in the following sequence:

Body, stem, gate, seat, stem nut/yoke nut.

Alternatively, the trim material designation shall be preceded by the words "body", "stem", "gate", "seat", "stem nut" or "yoke nut", as appropriate.

Annex A
(normative)

Notes to purchasers

A.1 The following requirements shall be specified in tender invitations and in each order or contract:

a) The size, class, valve type and gate type (see 4.1.1 to 4.1.4).

b) The type of trim (see 4.1.5).

c) If not by means of a handwheel, the method of operation of the valve (see 4.3.2).

d) When required, that the valve shall be closed by turning the stem anti-clockwise (see 4.3.3).

e) Whether the valve is to be provided with means for repacking the gland while the valve is under pressure (see 4.3.8.2).

f) The type of end connection and, when relevant, the applicable specification (see 4.3.10.1).

g) Whether raised flange faces are required and, when relevant, whether the back of the flange is to be spot-faced (see 4.3.10.2.1).

h) Whether flanges without bolt holes are required (see 4.3.10.2.2). If bolt holes are required, whether the bolt holes are to be drilled or tapped and whether the drilling is not to be off-centre (see 4.3.10.2.2).

i) Whether hexagon-head bolts and nuts are to comply with requirements other than those of SABS 1700-5-1 (see 4.3.11).

j) The maximum operating temperature if higher than 120 °C (see 4.5.2).

k) When relevant, the working pressure (see 4.7).

l) Whether a position indicator is to be provided (see 4.8).

m) Whether a test certificate is to be provided (see 4.10).

n) Whether the final inspection and the tests are to be witnessed (see 4.11).

o) Whether the body ends are to be sealed during transit and storage (see 6.1).

p) Whether an identification plate is required (see 6.2.2.1).

A.2 The following requirements shall, when relevant, be agreed upon in writing between the manufacturer and the purchaser:

a) Whether alternative materials may be used (see 4.2.1).

b) If the method of operation is not by handwheel, the strength of the relevant component part (see 4.3.2).

c) In the case of a valve of a non-preferred size, the face-to-face dimensions (see footnote to table 1).

d) When relevant, that seat leakage is permitted (see 4.7).

e) When required, the design, quality and method of mounting and attachment of the position indicator (see 4.8).

f) When relevant, the alternative primer to be applied (see 4.9(b)).

g) The finish to be applied to the external surfaces (see 4.9(c)).

h) When required, the sample to be taken from the lot for inspection and testing (see 5.1).

i) When required, the position and manner in which the identification plate is to be fixed (see 6.2.2.1).

j) If not for direct grouting into concrete, how the feet of a valve with socket ends shall be designed (see clause E.3.5).

Annex B
(informative)

Quality verification of cast iron gate valves for general purposes

When a purchaser requires ongoing verification of the quality of gate valves, it is suggested that, instead of concentrating solely on evaluation of the final product, he also direct his attention to the manufacturer's quality system. In this connection it should be noted that SABS ISO 9001, SABS ISO 9002 and SABS ISO 9003 cover the provision of an integrated quality system.

Annex C
(normative)

Materials

Table C.1(a) — Materials for valves with copper alloy trim

1	2	3	4	5	6	7
Component	**Material (see 4.2.1)**	**Specification**	**Grade or alloy designation**	**Alternative material (see 4.2.1)**	**Specification**	**Grade or alloy designation**
Materials other than trim materials						
Body Bonnet Stuffing box Gate	Cast iron	BS 1452	220	Spheroidal graphite iron	BS EN 1563 and BS EN 1564	600/3 500/7 420/12
		SABS 1034	250		SABS 936	SG 38
Gland Yoke Handwheel	Cast iron	BS 1452	220	Spheroidal graphite iron	BS EN 1563 and BS EN 1564	600/3 500/7 420/12
		SABS 1034	250	Malleable iron	SABS 1190	B290
Yoke nut	Gun metal	BS 1400	LG2	Brass	BS 2872 BS 2874	CZ114 CZ116 CZ121 CZ122
				Aluminium bronze	BS 1400	AB1 AB2
Bolting	Carbon steel: tensile strength 390 MPa, min.	–	–	–	–	–
Trim materials						
Body and gate seat rings for wedge gate valves	Gun metal	BS 1400	LG2	Aluminium bronze	BS 1400	AB1 AB2
Body and gate sealing material for resilient seal valves	Rubber		–	–	–	–
Stem and footpiece	Brass	BS 2872	CZ114	Aluminium bronze	BS 2872	CA103 CA104 CA106
				Brass	BS 2874	CZ121
				Stainless steel	BS 970: Part 4	316S15 410S21 302S25 431S29
Stem nut	Gun metal	BS 1400	LG2	Brass	BS 2872 BS 2874	CZ114 CZ116 CZ121 CZ122
				Aluminium bronze	BS 1400	AB1 AB2
Back seal bush	Integral with bonnet	–	–	Stainless steel	BS 970: Part 4	316S15
				Gun metal	BS 1400	LG2
				Aluminium bronze	BS 1400	AB1 AB2

Table C.1(b) — Materials for valves with stainless steel trim

1	2	3	4	5	6	7
Component	**Material (see 4.2.1)**	**Specification**	**Grade or alloy designation**	**Alternative material (see 4.2.1)**	**Specification**	**Grade or alloy designation**
Materials other than trim materials						
Body Bonnet Stuffing box Gate	Cast iron	BS 1452	220	Spheroidal graphite iron	BS EN 1563 and BS EN 1564	600/3 500/7 420/12
		SABS 1034	250		SABS 936	SG 38
Gland Yoke Handwheel	Cast iron	BS 1452	220	Spheroidal graphite iron	BS EN 1563 and BS EN 1564	600/3 500/7 420/12
		SABS 1034	250	Malleable iron	SABS 1190	B290
Yoke nut	Brass	BS 2872	CZ114	Malleable iron	SABS 1190	B290
				Spheroidal graphite iron	BS EN 1563 and BS EN 1564	500/7 420/12
				Gun metal	BS 1400	LG2
Bolting	Carbon steel: tensile strength 390 MPa, min.	–	–	–	–	–
Trim materials						
Body and gate seat rings for wedge gate valves	Stainless steel	BS 970: Part 4	304S15	–	–	316S15 410S21 302S25 431S29
Body and gate sealing material for resilient seal valves	Rubber		–	–	–	–
Stem and footpiece	Stainless steel	BS 970: Part 4	304S15	Stainless steel	BS 970: Part 4	316S15 410S21 302S25 431S29
Stem nut	Stainless steel	BS 970: Part 4	304S15	Gun metal	BS 1400	LG2
Back seal bush	Integral with bonnet	–	–	Stainless steel	BS 970: Part 4	316S15 410S21 302S25 431S29

Table C.1(c) — Materials for valves with all iron trim

1	2	3	4	5	6	7
Component	**Material (see 4.2.1)**	**Specification**	**Grade or alloy designation**	**Alternative material (see 4.2.1)**	**Specification**	**Grade or alloy designation**
Materials other than trim materials						
Body Bonnet Stuffing box Gate	Cast iron	BS 1452	220	Spheroidal graphite iron	BS EN 1563 and BS EN 1564	600/3 500/7 420/12
		SABS 1034	250		SABS 936	SG 38
Gland Yoke Handwheel	Cast iron	BS 1452	220	Spheroidal graphite iron	BS EN 1563 and BS EN 1564	600/3 500/7 420/12
		SABS 1034	250	Malleable iron	SABS 1190	B290
Yoke nut	Brass	BS 2872	CZ114	Malleable iron	SABS 1190	B290
				Spheroidal graphite iron	BS EN 1563 and BS EN 1564	500/7 420/12
				Gun metal	BS 1400	LG2
Bolting	Carbon steel: tensile strength 390 MPa, min.	–	–	–	–	–
Trim materials						
Gate and body seat rings for wedge gate valves	Integral with body and gate	–	–	Not inferior to body and gate	–	–
Body and gate sealing material for resilient seal valves	Rubber		–	–	–	–
Stem and footpiece	Carbon steel	BS 970: Part 1		Stainless steel	BS 970: Part 4	410S21 316S15 302S25 304S15 431S29
Stem nut	Malleable iron	SABS 1190	B290	Spheroidal graphite iron	BS EN 1563 and BS EN 1564	600/3 500/7
Back seal bush	Integral with body	–	–	Carbon steel	BS 970: Part 1	220M07

Annex D
(normative)

Cast iron gate valves that have ASME class 125 flanges

D.1 Special requirements

When valves that comply with this standard are required for use in a piping system that has flanges that comply with the requirements of ASME B16.1, all the requirements of the standard for valves of class 10 shall apply to such valves.

D.2 Pressure classification

Valves that comply with the requirements of the standard for class 10 valves may in addition be designated as ASME class 125 valves (the number "125" represents the primary service pressure rating of the valve in pounds-force per square inch).

Annex E
(normative)

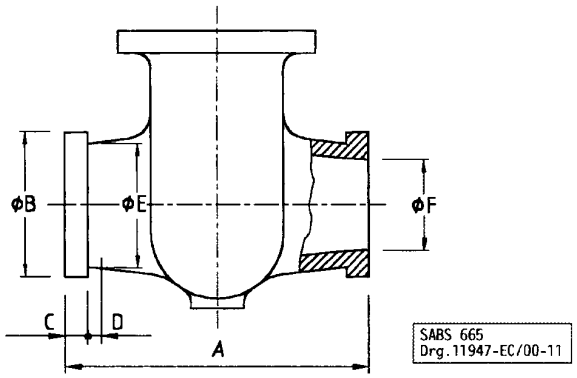
Cast iron gate valves with end connections other than flanged

E.1 Shouldered ends

E.1.1 The dimensions of shouldered ends shall conform to the applicable of the values given in figure E.1, and such ends shall be suitable for use with shouldered-end steel pipes and cast iron pipes (see SABS 815).

E.1.2 End faces of shouldered-end valves shall have a smooth finish and shall be at right angles to the axis of the bore.

E.1.3 Shouldered ends shall be concentric with the bore.



Dimensions in millimetres

1	2	3	4	5	6	7
Size of valve	**Dimensions**					
	*A**	*B* ± 0,5	*C* ± 0,5	*D*	*E* ± 1	*F* ± 0,5
50	197	67	16	10	60	45
80	210	97	16	10	89	70
100	216	122	17	10	114	95
150	241	175	19	12	165	143
200	267	232	21	14	219	190
*The tolerances applicable to the face-to-face dimension are given in table 2.						

Figure E.1 — Dimensions of shouldered ends on valves

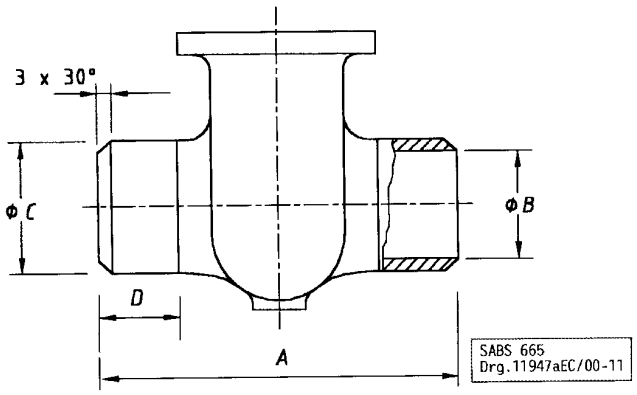
E.2 Spigot ends

E.2.1 The dimensions of spigot ends shall conform to the applicable of those given in figure E.2.

E.2.2 For constant inside diameter pipes, it is recommended that flanged valves be used in conjunction with flanged adaptors.

E.2.3 End faces of spigot end valves shall have a smooth finish and shall be at right angles to the axis of the bore.

E.2.4 Spigot ends shall be concentric with the bore.



Dimensions in millimetres

1	2	3	4	5	6
Size of valve	**Dimensions**				
	*A**	*B**		*C* ± 1	*D*
		Min.	Max.		
50	254	50	51	69	70
80	280	73	76	95	75
100	305	94	102	122	75
150	362	139	152	177	80
200	420	183	203	232	90
250	470	227	254	286	100
300	520	274	305	345	100
450	648	426	457	507	150
600	775	582	610	667	190
*The tolerances applicable to the face-to-face dimension are given in table 2.					

Figure E.2 — Dimensions of spigot ends

E.3 Socket ends

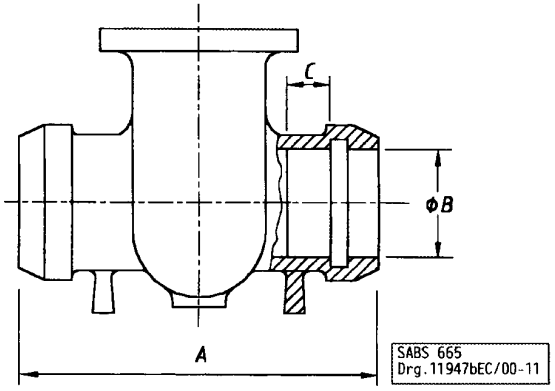
E.3.1 The dimensions of socket ends shall conform to the applicable of those given in figure E.3, and such ends shall be suitable for use with uPVC pipes of class 4, 6, 9 or 12 that comply with SABS 966.

E.3.2 The internal finish of the socket ends shall be smooth and free from any obstructions.

E.3.3 End faces of socket end valves shall have a smooth finish and shall be at right angles to the axis of the bore.

E.3.4 Socket ends shall be concentric with the bore.

E.3.5 The valve body shall have two robust feet, one on either side of the gate part of the body, as shown in figure E.3. The feet shall be designed for direct grouting into concrete, unless otherwise required (see clause A.2).



Dimensions in millimetres

1	2	3	4	5
Size of valve	**Dimensions**			
	Size of socket*	*B* +1 S0	*C*	*A*, tolerance ± 5
50	63	63,4	65	335
65	75	75,4	68	335
80	90	90,4	71	335
100	110	110,4	75	355
150	160	160,5	86	405
200	200	200,5	94	450
*Complies with the requirements of SABS 966.				

Figure E.3 — Dimensions of socket ends

Annex F
(informative)

Bibliography

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