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EAST AFRICAN STANDARD

Automatic shut-off flush valves for water closets and urinals — 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 1240:2006, *Automatic shut-off flush valves for water closets and urinals*

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

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SANS 1240:2006

Edition 2.1

Any reference to SABS 1240 is deemed
to be a reference to this standard
(Government Notice No. 1373 of 8 November 2002)

SOUTH AFRICAN NATIONAL STANDARD

Automatic shut-off flush valves for water closets and urinals

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Table of changes

Change No.	Date	Scope
Amdt 1	2006	Amended to update referenced standards, to change the requirement for stainless steel, and to correct a cross reference.

Foreword

This South African standard was approved by National Committee StanSA TC 5120.12H, *Water and sanitation – Equipment and systems – Plumbing components*, in accordance with procedures of Standards South Africa, in compliance with annex 3 of the WTO/TBT agreement.

This edition cancels and replaces the second edition (SABS 1240:2002).

Annex A forms an integral part of this standard. Annex B is for information only.

Contents

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Automatic shut-off flush valves for water closets and urinals

1 Scope

This standard covers the requirements for automatic shut-off flush valves for water closets and urinals, that are intended for supplying a pre-set amount of water.

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 Standards South Africa.

ASTM A 240, *Standard specification for chromium and chromium-nickel stainless steel plate, sheet, and strip for pressure vessels and for general applications.*

ASTM A 276, *Standard specification for stainless steel bars and shapes.*

ASTM A 314, *Standard specification for stainless steel billets and bars for forging.*

~~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 steel*.~~ **Amdt 1**

EN 10088-3, *Stainless steels – Part 3: Technical delivery conditions for semi-finished products, bars, rods and sections for general purposes.* **Amdt 1**

EN 10090, *Valve steels and alloys for internal combustion engines.*

SANS 135 (SABS ISO 1456), *Metallic coatings – Electrodeposited coatings of nickel plus chromium and of copper plus nickel plus chromium.*

SANS 1109-1, *Pipe threads where pressure-tight joints are made on the threads – Part 1: Dimensions, tolerances and designation.*

SANS 1274, *Coatings applied by the powder-coating process.*

~~SABS 0202, *Colour marking for the identification of wrought steels commonly used in South Africa.*~~ **Amdt 1**

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

3 Definitions

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

3.1
acceptable
acceptable to the authority administering this standard, or to the parties concluding the purchase contract, as relevant

3.2
flush valve
manually or mechanically actuated valve that is designed to deliver a specific volume of water from a pipeline to an appropriate container and to close automatically after this volume of water has been delivered

3.3
nominal size
size, in millimetres, of the pipe connection at the inlet of a flush valve

3.4
operating member
component designed to cause a flush valve to function

3.5
regulating valve
component (of a flush valve) that incorporates a shut-off mechanism (operated by means of a separate tool) that enables the rate of flow of water to the flow chamber of the flush valve to be regulated, or the flow to the flow chamber to be stopped

4 Requirements

4.1 Type, nominal size, and design

4.1.1 Type

A flush valve shall be of one of the following types, as specified (see annex A):

4.1.1.1 Water closet valve

4.1.1.1.1 Water closet valve (high pressure) (WCHP): A flush valve that is designed to operate from a water supply of capacity at least 1,1 L/s and a flow pressure of between 100 kPa and 600 kPa.

4.1.1.1.2 Water closet valve (low pressure) (WCLP): A flush valve that is designed to operate from a water supply of capacity at least 1,2 L/s and a flow pressure of between 30 kPa and 600 kPa.

4.1.1.2 Urinal valve

A valve that is capable of being adjusted to deliver a specific quantity of water of between 1 L and 4 L when operating from a water supply at a flow pressure of between 30 kPa and 600 kPa.

4.1.2 Nominal size

The nominal size of a flush valve shall be as specified (see annex A).

4.1.3 Design

The design of a flush valve shall be such as to facilitate the repair or replacement of component parts without having to remove the valve from the pipe work.

4.2 Materials

4.2.1 Plastics materials

The type and quality of the material of a plastics component part shall be such as to ensure

a) the acceptable performance and durability of the component under normal operating conditions, and

b) that, when a component is subjected to a temperature of 150 °C ± 5 °C in an air-circulating oven for 60 min ± 5 min, there is no sign of blistering of the material or weld-line splitting of the component. Any damage around the injection point shall not have penetrated to a depth of more than 50 % of the thickness of the material at that point.

4.2.2 Metallic materials

Metallic materials that are intended to come into contact with water during operation shall be

a) a copper alloy that, when tested in accordance with 5.8, shows no individual penetration reading that exceeds 250 µm, two samples being taken from each cast component (one from the thinnest part and the other from the thickest part) and one sample from every other component, or

b) a stainless steel that complies with any of the following:

1) a type, X5CrNi18-10, X12Cr13, X20Cr13/X30Cr13 or X17CrNi16-2, as relevant of EN 10088-3;

2) of grade 303S21, 304S12, 310S24, 316S12, 316S16, 321S12 or 430S15, as relevant, that complies with the requirements of EN 10090;

3) a type 316 Ti stainless steel that complies with the provisions of ASTM A 240, ASTM A 276 or ASTM A 314; or

4) a type 3174 stainless steel that complies with the provisions of ASTM A 240. **Amdt 1**

4.3 Construction

4.3.1 Metal castings

Metal castings shall be sound, dense, and free from cold shuts, blowholes, and pitting, and both external and internal surfaces shall be smooth, clean and free from sand.

Castings shall be neatly dressed, and no casting shall have been burned, plugged, stopped or patched.

4.3.2 Non-metallic mouldings and rubber components

Non-metallic mouldings and rubber components shall be sound and free from flash, porosity and surface moulding marks.

4.3.3 Screw threads

Screw threads on the inlet and outlet of a flush valve shall comply with the requirements of SANS 1109-1.

4.3.4 Cut-off control

A flush valve shall deliver a pre-set amount of water, and shall be provided with a device that terminates the water flow if the operating member is held in the open position after being actuated.

4.3.5 Regulating valve

Each flush valve shall be equipped on the inlet side with a regulating valve that is located in the body of the valve or in a separate housing that is connected to the body of the valve.

4.3.6 Provision for resistance to back siphonage

A flush valve shall incorporate a device that prevents back siphoning to such an extent that, when the valve is tested in accordance with 5.4, the vacuum created does not exceed 3 kPa. **Amdt 1**

4.3.7 Provision for adjustment of alignment

A flush valve in which the axis of the part of the valve between the inlet and the chamber is other than straight shall be provided with means for the lateral adjustment, by at least 20 mm of the distance between the axis of the inlet and that of the outlet of the valve.

4.3.8 Finish

External metallic surfaces shall be coated or uncoated, as specified (see annex A). When coated, the coating shall be

a) a nickel and chromium coating that complies with the requirements for service condition 2 of SANS 135, or

b) a powder coating in accordance with type 4 in SANS 1274, or

c) any other paint coating, the dry finish of which shall have corrosion-resistant and wear-resistant properties not less than those required for (b) above.

4.4 Performance

4.4.1 Endurance

When a flush valve is tested in accordance with 5.3,

a) the components shall operate smoothly throughout the test;

b) at the end of the test, while the flush valve is still under pressure and the cut-off control on its seat, there shall be no sign of leakage down the flush pipe; and

c) after the test no component shall show any sign of damage or deformation.

4.4.2 Resistance to hydraulic pressure

When a flush valve is tested in accordance with 5.4, no leakage or deformation of any component shall occur.

4.4.3 Resistance to back pressure

When a flush valve is tested in accordance with 5.5, there shall not, during any of the tests, be any sign of leakage at the operating member or at the anti-siphonage device.

4.4.4 Flushing performance

4.4.4.1 Water closet flush valves

A water closet flush valve shall be such that, when it is tested in accordance with 5.5 at flow pressures in the appropriate of the ranges given in (a) and (b) below, the quantity of water delivered and the duration of delivery shall be as given in table 1:

a) type WCHP valves: 100 kPa to 600 kPa; and

b) type WCLP valves: 30 kPa to 600 kPa.

Table 1 — Flushing performance

1	2	3
Type of valve	**Quantity of water** L	**Time** s
WCHP	6,5 ± 1	6 ± 1
WCLP	7,5 ± 1	6 ± 1

4.4.4.2 Urinal flush valves

A urinal flush valve shall be such that, when it is tested in accordance with 5.7, it shall, for any flow pressure between 30 kPa and 600 kPa,

a) be capable of adjustment for delivery of any constant quantity of water of between 1 L and 4 L (subject to a tolerance of ± 0,5 L); or

b) be capable of delivering a fixed and marked (see 6.2(c)) quantity of water (subject to a tolerance of ± 0,5 L) of between 1 L and 4 L.

5 Inspection and methods of test

5.1 Inspection

Inspect each flush valve for compliance with all the relevant requirements of the standard for which tests to assess compliance are not given in 5.3 to 5.7 (inclusive).

5.2 Sequence of testing

Carry out the tests in the order in which they are given.

5.3 Endurance test (all valves)

5.3.1 Equipment

5.3.1.1 Supply of water (at ambient temperature), at a static pressure of 2 000 kPa, capable of supplying water at a rate of 2 L/s and a flow pressure of up to 600 kPa. The water supply shall be fitted, at the delivery end, with an accurately calibrated pressure gauge that has a range of 0 kPa to 2 500 kPa, a control valve, and a second pressure gauge that has the same range and accuracy as the first.

5.3.1.2 Flush pipe, of the same length and internal diameter as that used in normal practice with the flush valve under test.

5.3.1.3 Cycling device, that actuates the operating member at a rate of six cycles per minute ± 0,5 cycles per minute, each cycle consisting of moving the operating member to the fully open position and then releasing it.

5.3.2 Procedure

5.3.2.1 Secure the flush pipe to the outlet of the flush valve as in normal practice.

5.3.2.2 Connect the inlet of the valve to the water supply, open its control valve and the regulating valve of the flush valve and, during a series of short preliminary runs of the cycling device, adjust these valves until the flow rate through the flush valve is 1 L/s at a flow pressure of 600 kPa.

5.3.2.3 When these conditions have been attained, subject the flush valve to 60 000 opening and closing cycles and, during the test, check for signs of sticking, jamming, and any other malfunction of the operating components.

5.3.2.4 Immediately after stopping the cycling device and while the flush valve is still under pressure and the cut-off control is on its seat, examine for signs of leakage down the flush pipe.

5.3.2.5 Disconnect the flush valve and check for compliance with 4.4.1(c).

5.4 Hydraulic pressure test (all valves)

5.4.1 Equipment

As in 5.3.1.1.

5.4.2 Procedure

Connect the valve to the water supply system and by means of its control valve, adjust the water pressure to 2 000 kPa. Maintain this pressure for 5 min and, while still under pressure, inspect the valve for leakage or deformation of components (see 4.4.2).

5.5 Test for flushing performance and resistance to back pressure (water closet flush valves)

5.5.1 Equipment

5.5.1.1 Water supply, as in 5.3.1.1 and fitted, in addition, at the delivery end, with an electrical pressure indicator and recorder.

5.5.1.2 Flush pipe, as in 5.3.1.2.

5.5.1.3 Stopwatch.

5.5.1.4 Container, of capacity at least 10 L and having 0,5 L (or smaller) graduations.

5.5.2 Procedure

5.5.2.1 Secure the flush pipe to the outlet of the flush valve as in normal practice, and so clamp the valve that the flush pipe is vertical and that, during the test, the water can be collected in the container.

5.5.2.2 With the flush valve connected to the water supply system, open the control valve and the regulating valve of the flush valve and, during a series of trial runs, adjust the flow pressure to 30 kPa in the case of a type WCLP valve and to 100 kPa in the case of a type WCHP valve.

5.5.2.3 Actuate the operating member. As soon as water emerges from the flush pipe, start the stopwatch and stop it when the flow of water ceases.

5.5.2.4 During the test, check for compliance with 4.4.3 and, at the end of the test, note the volume of water delivered, and the duration of delivery (see 4.4.4).

5.5.2.5 Repeat the procedures given in 5.5.2.1 to 5.5.2.4 at each of the following flow pressures: **Amdt 1**

a) type WCHP valves: 300 kPa and 600 kPa; and

b) type WCLP valves: 100 kPa, 300 kPa, and 600 kPa.

5.6 Test for resistance to back siphonage (water closet flush valves)

5.6.1 Equipment

5.6.1.1 Air exhauster, of capacity at least 100 L/min and fitted with a control vacuum gauge.

5.6.1.2 Airflow meter, of adequate capacity.

5.6.1.3 Flush pipe, as in 5.3.1.2, to which a test vacuum gauge is fitted at a position that will be just below the valve outlet.

5.6.2 Procedure

5.6.2.1 Connect the inlet of the valve, the air exhauster, and the airflow meter in series, and secure the flush pipe to the outlet of the valve as in normal practice.

5.6.2.2 So clamp the valve that the flush pipe is vertical and that its lower end is submerged in water.

5.6.2.3 Start the air exhauster, and

a) in the case of a valve without a non-return device, adjust the air exhauster to provide an air inflow rate of 100 L/min;

b) in the case of a valve with a non-return device, adjust the air exhauster so that the control vacuum gauge registers 70 kPa.

5.6.2.4 Note the maximum vacuum registered on the test vacuum gauge, and check for compliance with the requirements of 4.3.6.

5.7 Flushing performance for urinal valves

5.7.1 Equipment

5.7.1.1 Water supply, as in 5.3.1.1.

5.7.1.2 Stopwatch.

5.7.1.3 Container, suitable, and of capacity at least 10 L and having 0,5 L (or smaller) graduations.

5.7.2 Procedure

5.7.2.1 Mount the valve as in normal practice (and, when relevant, in line with a control valve) so that the delivered water can be collected in the container.

5.7.2.2 With the valve connected to the water supply, open the control valve and, during a series of trial runs, adjust the flow pressure to 30 kPa.

5.7.2.3 Actuate the operating member and measure the quantity of water delivered in the container. In the case of fixed-rate valves, check for compliance with the requirements of 4.4.4.2(b). In the case of adjustable valves, adjust the quantity of discharge to 1 L (see 4.4.4.2(a).

5.7.2.4 Repeat the procedure in 5.7.2.3 for adjusted quantities of 2 L, 3 L and 4 L.

5.7.2.5 Change the flow pressure to 100 kPa and then increase it, in steps of 100 kPa, to 600 kPa, ensuring that for fixed-rate valves, the delivered quantity is within the given tolerance and for adjustable valves, the valve can be adjusted for 1 L, 2 L, 3 L and 4 L at each step.

5.7.2.6 Check for compliance with the requirements of 4.4.4.2.

5.8 Test for dezincification resistance

Subject copper alloy components that are intended to be in direct contact with water to the test given in SANS 6509 and check for compliance with the requirements of 4.2.2(a).

6 Packing and marking

6.1 Packing

Each flush valve shall be packed individually, together with written instructions, giving details of the methods of installation and servicing. The valves shall be so packed that they will not be damaged during normal transportation and handling, and that the entry of foreign matter to their interiors is not possible. Only flush valves of the same type, nominal size, and design shall be packed together in a bulk container.

6.2 Marking

The following information shall be stamped or embossed on the body of each flush valve:

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

b) the letters "WCHP" on a type WCHP flush valve and the letters "WCLP" on a type WCLP flush valve; and

c) the quantity of water (see 4.4.4.2(b)).

Annex A
(normative)

Notes to purchasers

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

a) the type (see 4.1.1);

b) the nominal size (see 4.1.2); and

c) whether the external metallic surfaces shall be coated or uncoated (see 4.3.8).

Annex B
(informative)

Quality verification of automatic shut-off flush valves for water closets and urinals

When a purchaser requires ongoing verification of the quality of automatic shut-off flush 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 SANS 9001 covers the provisions of an integrated quality system. **Amdt 1**

Bibliography

SANS 9001/ISO 9001, *Quality management systems – Requirements.*