



CD/K/015-2:2009  
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## **EAST AFRICAN STANDARD**

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**Valves for water supply — Fitness for purpose requirements and appropriate verification tests — Part 2: Isolating valves**

**EAST AFRICAN COMMUNITY**

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## 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:

BS EN 1074-2:2000, *Valves for water supply — Fitness for purpose requirements and appropriate verification tests — Part 2: Isolating valves*

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

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## Valves for water supply — Fitness for purpose requirements and appropriate verification tests — Part 2: Isolating valves

### 1 Scope

This East African Standard defines the minimum fitness for purpose requirements for isolating valves to be used in, or connected to, water supply pipe systems, above or below ground (see CD-K-004-2009), carrying water intended for human consumption.

This standard specifies the design requirements, the performance requirements, and the conformity assessment method for isolating valves, whatever their type and materials.

This standard applies in priority to any other product or test standard: the requirements from other standards apply only when this standard refers to them.

This part of the standard deals with the requirements applicable to isolating valves up to DN 2 000 and PFA 6 bar to PFA 25 bar.

### 2 Normative references

This East African Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to the East African Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

ISO 4633, *Rubber seals — Joint rings for water supply, drainage and sewerage pipelines -- Specification for materials*

ISO 9631, *Rubber seals — Joint rings for pipelines for hot-water supply up to 110 degrees C — Specification for the material*

ISO 7268, *Pipe components — Definition of nominal pressure*

CD/K/004:2009, *Water supply — Requirements for systems and components outside buildings*

ISO 6708, *Pipework components — Definition and selection of DN (nominal size)*

CD/K/015-1:2009, *Valves for water supply — Fitness for purpose requirements and appropriate verification tests — Part 1: General requirements*

ISO 7005-1, *Metallic flanges — Part 1: Steel flanges for industrial and general service piping systems*

ISO 7005-2, *Metallic flanges — Part 2: Cast iron flanges*

ISO 7005-3, *Metallic flanges — Part 3: Copper alloy and composite flanges*

ISO 5208:2008, *Industrial valves — Pressure testing of metallic valves*

ISO 5209:1977, *General purpose industrial valves — Marking*

ISO 5752, *Metal valves for use in flanged pipe systems — Face-to-face and centre-to-face dimensions*

ISO 10497:2010, *Testing of valves — Fire type-testing requirements*

## CD/K/015-2:2009

ISO 15848-1:2006, *Industrial valves — Measurement, test and qualification procedures for fugitive emissions — Part 1: Classification system and qualification procedures for type testing of valves*

ISO 15848-2:2006, *Industrial valves — Measurement, test and qualification procedures for fugitive emissions — Part 2: Production acceptance test of valves*

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

### 3 Definitions

For the purpose of this standard, the definitions of CD/K/015-1:2009 apply, together with the following definitions:

#### 3.1

##### **flow coefficient $K_v$**

Coefficient equal to the flow rate, in cubic metres per hour, of water at a temperature between 5 °C and 40 °C, passing through the valve and causing a loss of static head of 1 bar

#### 3.2

##### **isolating valve**

Valve intended for use only in the closed or fully open position

#### 3.3

##### **full bore valve**

Valve with a seat diameter not less than 90 % of the internal nominal diameter of the body end port

#### 3.4

##### **clear way valve**

Valve designed to have an unobstructed flow way which allows the passage of a theoretical sphere with a diameter which is not less than the nominal inside diameter of the body end port

### 4 Design requirements

Isolating valves shall be designed in accordance with the requirements given in Clause 4 of CD/K/015-1:2009.

### 5 Performance requirements

#### 5.1 Mechanical strength

##### 5.1.1 Resistance to internal pressure of the shell and of all pressure containing components

Requirement and test shall be in accordance with 5.1.1 of CD/K/015-1:2009.

##### 5.1.2 Resistance of the obturator to differential pressure

Requirement and test shall be in accordance with 5.1.2 of CD/K/015-1:2009.

Except for valves to be used for a single flow direction, the test shall be performed successively in each flow direction.

##### 5.1.3 Resistance of the valve to bending

Requirement and test shall be in accordance with 5.1.3 of CD/K/015-1:2009, for sizes DN 50 up to and including DN 500.

The bending moments  $M$  to be applied during the test are given in Table 1 as a function of DN.

Table 1 — Bending moments

DN	M Nm
50	1 050
65	1 400
80	1 500
100	2200
125	3200
150	4800
200	7200
250	11 000
300	15000
350	19000
400	24000
450	28000
500	33000

#### 5.1.4 Resistance of valves to operating loads

Requirement shall be in accordance with 5.1.4 of CD/K/015-1:2009.

When, in order to verify this requirement, a valve in its delivery state has been subjected to a test in accordance with annex A, with the application of a closing torque and an opening torque equal to mST, it shall pass the operating tests in accordance with 5.2.3 and the seat tightness tests in accordance with 5.2.2.1 and 5.2.2.2.

The minimum strength torque mST shall be equal to twice the maximum operating torque (MOT) given in 5.2.3. In the case of gate valves in accordance with 5.2.3 c), the torque mST to be applied in the test in accordance with annex A shall be equal to 5 times MOT. In the case of valves in accordance with 5.2.3 d), the test is only applicable when there is an additional manual operating element.

## 5.2 Leak-tightness

### 5.2.1 Leak-tightness of the shell and of all pressure containing components

#### 5.2.1.1 Leak-tightness to internal pressure

Requirement and test shall be in accordance with 5.2.1.1 of CD/K/015-1:2009.

#### 5.2.1.2 Leak-tightness to external pressure

Requirement and test shall be in accordance with 5.2.1.2 of CD/K/015-1:2009.

### 5.2.2 Seat tightness

#### 5.2.2.1 Seat tightness at high differential pressure

Requirement and test shall be in accordance with 5.2.2.1 of CD/K/015-1:2009.

After closing the valve by application of MOT (see 5.2.3), the leakage rate shall be rate A for resilient seated valves and shall not exceed rate B for metallic seated valves. For a type test, the test duration shall be not less than 10 min.

Except for valves to be used in a single flow direction, the test shall be performed successively in each flow direction.

#### 5.2.2.2 Seat tightness at low differential pressure

## CD/K/015-2:2009

Requirement and test shall be in accordance with 5.2.2.2 of CD/K/015-1:2009, with the torque, the leakage rate and the test duration given in 5.2.2.1.

Except for valves to be used in a single flow direction, the test shall be performed successively in each flow direction.

### 5.2.3 Maximum operating torque (MOT) for operation and leak-tightness

Requirement shall be in accordance with 5.2.3 of CD/K/015-1:2009.

When, in order to verify this requirement, an isolating valve in its delivery state is subjected to a test according to Annex C, the measured torque shall not exceed the maximum operating torque MOT as defined below:

- a) for valves delivered with their operating element:
  - $MOT = 0.5 \times F \times D$  in newton metres, in the case of a handwheel, where:
    - $F$  is the maximum operating manual force ( $F$  for operating the valve,  $F_{max}$  for seating and unseating the valve), in newtons;
    - $D$  is the diameter of the handwheel, in metres.
  - $MOT = F \times L$  in newton metres, in the case of a lever, where:
    - $F$  is the maximum operating manual force ( $F$  for operating the valve,  $F_{max}$  for seating and unseating the valve), in newtons;
    - $L$  is the length of the lever, in metres.
- b) for valves delivered without an operating element and intended to be operated by a T shaped key:
  - for butterfly valves:  $MOT = 125 \text{ Nm}$ ;
  - for gate valves:  $MOT = 1 \times DN \text{ Nm}$ ;
  - for other types of valves:  $MOT = \text{value given by the manufacturer}$ .
- c) for gate valves delivered without an operating element and intended to be operated by a ring key and bar, see annex B.
- d) for valves to be operated electrically, hydraulically or pneumatically:
  - $MOT = \text{value given by the manufacturer}$ .

### 5.2.4 Leak-tightness of gearboxes to external pressure

Requirement and test shall be in accordance with 5.2.4 of CD/K/015-1:2009.

## 5.3 Hydraulic characteristics

Requirement shall be in accordance with 5.3 of CD/K/015-1:2009; the characteristic given by the manufacturer shall be the flow coefficient  $K_v$ .

When measured in accordance with the test method defined in ISO 5208, the flow coefficient  $K_v$  shall be greater than 0.9 times the value indicated by the manufacturer. Testing is not required for full bore gate valves or clear way valves.

## 5.4 Resistance to disinfection products

Requirement and test shall be in accordance with 5.4 of CD/K/015-1:2009.

## 5.5 Endurance

The endurance of isolating valves shall be evaluated as follows:

- an isolating valve in its delivery state shall be subjected to an endurance test in accordance with annex D at a differential pressure equal to the PFA across the obturator;
- it shall be tested in accordance with 5.2.1, 5.2.2 and 5.2.3, with the application of a torque not exceeding either 1.2 times MOT (with the same leakage rate) or MOT (with leakage allowed to increase by one rate).

The number of opening/closing cycles to be applied during the endurance test shall be as follows:

- manually operated valves: 250 cycles;
- electrically, hydraulically or pneumatically operated valves: 2500 cycles. This test shall be applied to isolating valves of sizes DN 50 up to and including DN 500.

## 6 Conformity assessment

### 6.1 General

Requirement shall be in accordance with 6.1 of CD/K/015-1:2009.

### 6.2 Type tests

Requirement shall be in accordance with 6.2 of CD/K/015-1:2009; the type tests to be performed shall be those given in Table 2.

### 6.3 Control of production process and quality system

Requirement shall be in accordance with 6.3 of CD/K/015-1:2009; the production control tests in Table 2 are informative.

## 7 Marking

Requirement shall be in accordance with clause 7 of CD/K/015-1:2009.

## 8 Packaging

Requirement shall be in accordance with clause 8 of CD/K/015-1:2009.

Table 2 — Requirements and tests

Sub-clause <sup>a</sup>	Requirement <sup>a</sup>	Type tests	Production tests (informative)
4.1	Materials	see drawings and part lists	—
4.2	DN	see drawings	—
4.3	Pressures	see technical documentation	—
4.4	Temperatures	see materials	—
4.5	Design of the shell and obturator	see test report or calculation report	—
4.6	End types and interchangeability	see drawings and marking	—
4.7	Operating direction	see drawings	—
4.8	Maximum water velocity	see clause 4	—
4.9	All materials, including lubricants, in contact with water intended for human consumption	see test reports in accordance with national regulations	—
4.10	Internal corrosion and ageing resistance	see drawings, part lists and technical documentation	visual inspection of coatings
4.11	External corrosion and ageing resistance	see drawings, part lists and technical documentation	visual inspection of coatings
5.1.1	Resistance to internal pressure of the shell and of all pressure containing components	see 5.1.1	see 5.1.1
5.1.2	Resistance of the obturator to differential pressure	see 5.1.2	—
5.1.3	Resistance of valves to bending	see 5.1.3	—
5.1.4	Resistance of valves to operating loads	see 5.1.4	—
5.2.1.1	Leak-tightness to internal pressure	see 5.2.1.1	see 5.2.1.1
5.2.1.2	Leak-tightness to external pressure	see 5.2.1.2	—
5.2.2.1	Seat tightness at high differential pressure	see 5.2.2.1 and 5.2.3	see 5.2.2.1 and 5.2.3
5.2.2.2	Seat tightness at low differential pressure	see 5.2.2.2 and 5.2.3	—
5.2.3	Maximum operating torque (MOT)	see 5.2.2.1, 5.2.2.2 and 5.2.3	see 5.2.2.1
5.2.4	Leak-tightness of gearboxes to external pressure	see 5.2.4	—
5.3	Hydraulic or airflow characteristics	see 5.3	—
5.4	Resistance to disinfection products	see 5.4	—
5.5	Endurance	see 5.5	—

<sup>a</sup> The sub-clauses and requirements shown above, are those given in CD/K/015-1:2009

**Annex A**  
(normative)**Test method for the resistance of valves to operating loads**  
(see 5.1.4)**A.1 General**

The test shall be performed at ambient temperature on a valve in its delivery state. The test shall begin with the obturator fully or partially open.

**A.2 Test procedure**

Place the valve on the testing equipment.

Apply a torque at the entrance point of the mechanical energy (see CD/K/015-1:2009) in order to close the obturator. In the specific case of valves to be operated by means of a ring key and bar (see annex B), apply simultaneously the torque and the bending moment.

Increase the closing torque until it reaches mST.

Maintain the torque mST for at least 10 min.

Open the obturator until it reaches the fully open position.

Increase the opening torque until it reaches mST.

Maintain the torque mST for at least 10 min.

Check the operation ability in accordance with 5.2.3 and the seat tightness in accordance with 5.2.2.

**Annex B**  
(normative)

**Torque requirements for gate valves to be operated by ring key and bar  
(see 5.2.3 and annex A)**

Where gate valves are operated by means of a ring key and bar, they are therefore required to have higher minimum strength torques (mST); they shall comply with the torque requirements given in table B.1.

**Table B.1 — Torque requirements**

MOT	mST
Nm	Nm
DN + 60	5 MOT <sup>a</sup>
<sup>a</sup> Applied simultaneously with a bending moment 500 Nm on the operating mechanism	

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**Annex C**  
(normative)

**Test method for the operation of valves**  
(see 5.2.3)

**C.1 General**

The test shall be performed at ambient temperature on a valve in its delivery state.

The test shall begin with the obturator in the fully open position.

**C.2 Test procedure**

Fit a blanking plate containing a vent valve to the outlet flange, and the inlet to a hydrostatic pressure source.

Partially open the obturator and the vent valve.

Fully fill the body with water and vent all the air from the valve.

Close the obturator and apply a torque equal to MOT.

Raise the pressure until it reaches PFA and maintain it for at least one minute.

Check for seat tightness.

Open the valve. During opening the running torque should not exceed MOT.

NOTE A large volume of water is evacuated from the vent valve.

Close the valve. During closing the running torque should not exceed MOT.

Note the maximum torque required during the test and check that it does not exceed MOT.

Re-start the test on the other side.

**Annex D**  
(normative)

**Test method for the endurance of valves**  
(see 5.5)

**D.1 General**

The test shall be carried out at ambient temperature on a valve in its delivery state. The test assembly should be designed to minimize water consumption and cycle time.

**D.2 Test procedure**

Fix the valve on a test rig, with the obturator fully open. Blank off one end of the valve and provide a means of:

- venting air from the valve;
- pressurizing the closed end with water;
- measuring the pressure. Bring the obturator to the fully closed position as follows:
  - for a valve with an actuator, close the obturator by means of the actuator using the source of energy at the maximum level specified by the manufacturer;
  - for a manually operated valve, close the obturator and apply a torque equal to MOT. Fill with water the space between the obturator and the blank flange, and vent the air. Increase the water pressure until it reaches a minimum of PFA and maintain the pressure for at least 5 s. Open the obturator fully.

Repeat the cycle closing/pressurizing/opening for the specified number of cycles. Check the leak-tightness of the shell and of all the pressure containing components in accordance with 5.2.1.

Check the seat tightness in accordance with 5.2.2.: apply a closing torque equal to MOT and check that the leakage rate does not exceed the value given in 5.2.2 increased by one rate; if it is exceeded, increase the applied torque to 1.2 times MOT and check that the leakage rate does not exceed the value given in 5.2.2.

Check that the operating torque does not exceed MOT according to 5.2.3.

Record the test conditions and test results, noting the calibration status of all measuring devices.

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