



EDICT



OF GOVERNMENT

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EAS 123 (1999) (English): Distilled
water -Specification



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EAS 123:1999

ICS 71.100

EAST AFRICAN STANDARD

Distilled water – Specification

EAST AFRICAN COMMUNITY

EAS 123:1999

Foreword

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

In order to achieve this objective, the Community established an East African Standards Committee mandated to develop and issue East African Standards.

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.

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

Though the material covered in this standard need strictly be 'distilled water', it should be as good as that. Proposals to call this material as 'pure water', 'purified water', 'water' and 'distilled water' has become almost sacrosanct with chemists and also since that material may not always be distilled water, it has been decided to call it 'water distilled quality'.

In view of the many references of such water in many standards it has been felt necessary to prepare specification for such water.

In reporting the result of a test or analysis made in accordance with this standard the final value, observed or calculated is to be rounded off, it shall be done in accordance with EAS 124:1999 *Rounding off numerical values*,

Distilled water – Specification

1 Scope

This East African Standard prescribes the requirements and methods of test for water, distilled quality, intended for general laboratory use, photograph washings, etc.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 3978:1966, *Water for laboratory use*

IS 1070:1960, *Specification for water, distilled quality*, (1976 version)

3 Sampling

Representative samples of the material shall be drawn as agreed between the purchaser and the vendor. For bulk supply, the sampling procedure described in Annex A is recommended.

4 Requirements

4.1 The material shall be the water purified by thermal distillation or any other suitable means, such as ion exchange. It shall be clear, colourless, odourless and tasteless.

4.2 The material, when tested according to the methods prescribed in Annex B, shall also comply with the requirements given in Table 1. Reference to relevant clauses of Annex B is given in the table.

Table 1 — Requirements for water, distilled quality

No	Characteristics	Requirements	Method of test (ref. Clause No of Annex B)
1	Non-volatile residue at 105 °C, mg/kg max.	10	B.2
2	pH	6,5 – 7,5	B.3
3	Chlorides	Less than 1 mg/kg	B.4
4	Sulfate	Less than 2 mg/kg	B.5
5	Calcium	Less than 5 mg/kg	B.6
6	Magnesium	Less than 1 mg/kg	B.7
7	Heavy metals	Less than 1 mg/kg	B.8
8	Ammonia	Less than 1 mg/kg	B.9
9	Carbon dioxide	To pass test	8.10
10	Oxidizable matter	To pass test	B.11
11	Iron	Less than 1 mg/kg	B.7 TZ 75:1980
12	Specific conductivity per cm at 27 °C max.	0.2 µohm	B.9 TZS 75:1980

5 Packing and marking

5.1 The material shall be packed in suitable containers that will ensure the purity of the distilled water.

5.2 The containers shall be securely closed and legibly marked with the name of manufacturer, quantity of material in the container, and trademark if any.

5.2.1 The containers shall be marked with identification in code or otherwise to enable the date and lot of manufacturer to be traced back from records.

5.2.2 The containers may also be marked with the certification mark for the respective country and also an indication of the purity specification of the distilled water.

NOTE The Certification Mark may be used by manufacturers, only under license from the respective country's Bureau of Standards. Particulars of conditions under which the licenses are granted, may be obtained from the respective country's Bureau of Standards.

ANNEX A (normative)

Sampling of bulk supplies of water, distilled quality

A.1 General requirements of sampling

A.1.1 In drawing, preparing, storing and handling samples, the following precautions and directions shall be observed.

A.1.2 Samples shall not be taken in an exposed place.

A.1.3 The sampling instrument shall be clean. Before use, these shall be washed several times with the material to be sampled.

A.1.4 Precautions shall be taken to protect the samples, the material being sampled, the sampling instruments and the containers for samples from adventitious contamination.

A.1.5 To draw a representative sample, the contents of each container selected for sampling shall be mixed thoroughly as possible by suitable means.

A.1.6 The samples shall be placed in clean airtight glass bottles or other suitable containers on which the material has no action and which have previously been washed several times with the material to be sampled.

A.1.7 The sample containers shall be of such a size that they are filled by the sample leaving an ullage of 10 %.

A.1.8 Each sample container shall be sealed airtight after filling, and marked with full details of sampling, the date of sampling and the year of manufacture of the material.

A.2 Scale of sampling

A.2.1 All containers in a single consignment of the material drawn from a single batch of manufacture shall constitute a lot. If a consignment is declared or known to consist of different batches of manufacture, the batches shall be marked separately and the groups of containers in each batch constitute a separate lot.

A.2.2 For ascertaining conformity of material in a lot to the requirement of this standard, samples shall be tested for each lot separately. The number of containers to be selected at random from lots of different sizes shall be in accordance with Table 2.

Table 2 — Number of containers to be selected from lots of different sizes.

Lot size, N	Sample size, n
3 to 15	3
16 to 40	4
41 to 65	5
66 to 110	7
111 and above	9

In order to ensure randomness of selection, the following procedure shall be adopted. Arrange all the containers in a lot in a systematic manner and starting from anyone, count them as 1,2,3,... up to r

where

r is an integral part of N/n (N and n being the lot size and sample size respectively). Every r th container thus counted shall be withdrawn to constitute the test sample.

A.3 Preparation of test samples

A.3.1 From each of the containers select according to A.2.2 equal portions of the material shall be taken out so that the total quantity collected from all the containers is about 18 L. This shall be the composite sample.

A.3.2 The composite sample shall be divided into three test samples not less than 2 L each. These test samples shall be transferred immediately to thoroughly washed bottles which are sealed airtight with glass stoppers and marked with the particulars of sampling as given in A.1.8. One test sample shall be sent to the purchaser and one to the vendor. The third test sample bearing the seals of the purchaser and the vendor shall constitute the referee sample, to be used in case of dispute.

ANNEX B (normative)

Analysis of water, distilled quality

B.1 Quality of reagents

Unless specified otherwise, analytical grade chemicals and distilled water complying to TZS 59: 1980 shall be used in tests.

B.2 Determination of non-volatile residue at 105 °C ± 2 °C

B.2.1 Procedure

Evaporate to dryness 500 ml of the sample in a weighed container, adding the sample in installments, if necessary.

B.2.2 Calculation

Non-volatile residue at 105 °C, mg/kg = 2 m

where

m mass in mg of the dried residue.

B.3 Determination of pH

B.3.1 Methods

The determination shall be carried out either by the electrometric method or by the indicator method. In case of dispute the electrometric method shall be adopted.

B.3.2 Test temperature

The determination shall be made at room temperature and the sample shall be collected and tested in an atmosphere reasonably free from carbon dioxide.

B.3.3 Electrometric method

The determination shall be made by using a pH meter with glass electrode.

EAS 123:1999

B.3.3 Indicator method

B.3.3.1 Reagents

B.3.3.1.1 Bromocresol purple, pH range 5,2 to 6,8 and colour change yellow to blue violet.

B.3.3.1.2 Bromothymol blue, pH range 6,0 to 7,6 and colour change yellow to blue.

B.3.3.2 Procedure

Take 10 ml of the sample in two hard glass test tubes and add 0,5 ml of the two indicators, one to each tube. Compare the colour produced with a series of buffer tubes of known pH in the range 6,0 to 7,0. Report as pH, the pH of the buffer solution, which gives the closest match with the colour, produced by the sample.

B.3.4 Apparatus

Standard calibrated glass discs may also be used for determination of pH.

B.4 Test for chloride

B.4.1 Apparatus

Nessler tubes, 100 ml capacity.

B.4.2 Reagents

B.4.2.1 Dilute nitric acid, approximately 5 mol.

B.4.2.2 Silver nitrate, approximately 0.5 mol.

B.4.2.3 Standard chloride solution. Dissolve 0.164 9 g of sodium chloride in water and make up to 1 000 ml. One millilitre of this solution is equivalent to 0.1 mg of chloride (as Cl).

B.4.3 Procedure

Transfer 100 ml of the sample into a Nessler tube. Add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. Carry out a control test in another Nessler tube using 100 ml of water (which does not give any opalescence with dilute nitric acid and silver nitrate), 0.1 ml of standard chloride solution, one ml of dilute nitric acid and 1 ml of silver nitrate solution. Mix both the solutions and observe after 3 min.

The sample shall be taken to have passed the test if any opalescence produced in the test with the sample is not greater than that produced in the control test.

B.5 Test for sulfate

B.5.1 Apparatus

Nessler tube, 100 ml capacity.

B.5.2 Reagents

B.5.2.1 Dilute hydrochloric acid, approximately 1 mol.

B.5.2.2 Barium chloride, approximately 0.5 mol.

B.5.3 Procedure

Transfer by means of a pipette 100 ml of the sample into the Nessler tube. Add 1 ml of dilute hydrochloric acid and then 1 ml of barium chloride solution to it and mix well.

The sample shall be taken to have passed the test if no turbidity is produced within 12 min.

B.6 Test for calcium

B.6.1 Apparatus

Nessler tube, 100 ml capacity

B.6.2 Reagent

Ammonia oxalate solution, dissolve 3.5 g of ammonium oxalate in 100 ml of water.

B.6.3 Procedure

Transfer by means of a pipette 100 ml of the sample into the Nessler tube. Add 2 ml of ammonium oxalate solution and mix well.

The sample shall be taken to have passed the test if no turbidity is produced within 5 min.

B.7 Test for magnesium

B.7.1 Reagents

B.7.1.1 Titan yellow solution, dissolve 0.1 g of titan yellow (also known as clayton yellow or thiazole yellow) in 100 ml of water.

B.7.1.2 Sodium hydroxide solution, approximately 5 mol.

EAS 123:1999

B.7.2 Procedure

Transfer 10 ml of the sample into it test tube and add 0.2 ml of titan yellow solution and 4 ml of sodium hydroxide solution.

The material shall be taken to have passed the test if no red colour or precipitate is produced.

B.8 Test for heavy metals

B.8.1 Apparatus

Nessler tubes, 100 ml capacity.

B.8.2 Reagents

B.8.2.1 Dilute acetic acid, approximately 1 mol

B.8.2.2 Hydrogen sulfide solution, freshly made and saturated.

B.8.3 Procedure

Transfer 40 ml of the sample into one of the Nessler tubes. Add 1 ml of dilute acetic acid and 10 ml of hydrogen sulfide solution. Carry out a control test in another Nessler tube by taking 40 ml of sample and 1 ml of dilute acetic acid. Compare the colour of the solution in both the tubes after 10 min.

The sample shall be taken to have passed the test if the intensity of colour, if produced, in the Nessler tube containing hydrogen sulfide solution is not deeper than that produced in the control test.

B.9 Test for ammonia

B.9.1 Apparatus

Nessler tubes, 100 ml capacity.

B.9.2 Reagents

B.9.2.1 Nessler reagent

Dissolve 10 g of potassium iodide in 10 ml of ammonia free water and add to it slowly, with stirring, saturated mercury (II) chloride solution until a slight permanent precipitate forms. Add 30 g of potassium hydroxide and when it has dissolved, add 1 ml more of mercury (II) chloride solution. Dilute to 200 ml with water (ammonia-free). Allow to settle overnight, decant the clear solution and keep the solution in the bottle closed with a well-fitting rubber stopper.

B.9.2.2 Standard ammonia chloride solution

Dissolve 3.15 g of ammonium chloride in sufficient water to produce 1000 ml. Dilute 10 ml of this solution with water to 1000 ml.

B.9.3 Procedure

B.9.3.1 Transfer 10 ml of the sample into a Nessler tube and add five drops of Nessler reagent. Carry out a control test in the other Nessler tube using 2 ml of standard ammonium chloride solution, dilute to 100 ml and add 5 drops of Nessler reagent. Shake and compare the colour after 3 min.

The sample shall be taken to have passed the test if the intensity of colour produced with the sample is not greater than that produced in the control test.

B.9.3.2 Alternatively, permanent standard glass colour disc may be used for the determination.

B.10 Test for carbon dioxide

B.10.1 Apparatus

Nessler tube, 50 ml capacity.

B.10.2 Reagents

Calcium hydroxide solution, saturated

B.10.3 Procedure

Transfer 25 ml of the sample into the Nessler tube. Add 25 ml of calcium hydroxide solution and mix well.

The sample shall be considered to have passed the test if no turbidity or precipitate is produced within 5 min.

B.11 Test for oxidizable matter

B.11.1 Reagents

B.11.1.1 Dilute sulfuric acid, 1 mol.

B.11.1.2 Potassium permanganate solution, 0.002 mol.

B.11.2 Procedure

Transfer 100 ml of the sample into a beaker. Add 10 ml of dilute sulfuric acid and 1 ml of potassium permanganate solution. Boil for 10 min.