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DRAFT EAST AFRICAN STANDARD

Industrial and municipal effluents discharged into public sewers and water bodies — Maximum permissible limits

EAST AFRICAN COMMUNITY

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Foreword

Development of the East African Standards for Industrial and Municipal Effluents 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 achieve this objective, the Partner States in the Community through their National Bureaux of Standards, have established an East African Standards Committee. 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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It is important that users of East African Standards ascertain that they are in possession of the latest amendments or latest editions.

The following table will assist the user to update the standard.

AMENDMENTS

Clause	Amendment No	Date of issue	Text affected

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Introduction

Water bodies in this standard refer to rivers and streams (including those liable to seasonal drying), lakes, wetlands, impounded reservoirs, irrigation channels and groundwater.

This standard is applicable to effluents discharged into public sewers and water bodies by industries and municipalities.

The characteristics of these effluents, before discharge to public sewers and water bodies shall meet the requirements of this standard.

For ease of monitoring, maximum permitted limits for this standard are expressed largely in concentration terms. It should be noted that dilution of effluents to achieve permitted values is unacceptable.

This standard is expected to play a vital role in environmental protection.

Industrial and municipal effluents discharged into public sewers and water bodies — Maximum permissible limits.**1.0 Scope**

This East African Standard prescribes maximum permissible limits and test methods for Industrial and municipal effluents discharged into public sewers and water bodies.

2.0 Normative references

This East African Standard incorporates dated or undated references and provisions from other publications.

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

APHA (American Public Health Association) 1989 Standard Methods for the Examination of Water and waste water, 17th Edition.

EMDC 1 (1173): Municipal and Industrial Wastewaters Test Methods.

EMDC 1 (1179): Municipal and Industrial Wastewaters Sampling methods.

ISO 10304-1: Water quality — Determination of dissolved anions by liquid chromatography of ions -- Part 1: Determination of bromide, chloride, fluoride, nitrate, nitrite, phosphate and sulphate.

ISO 10304-2: Water quality — Determination of dissolved anions by liquid chromatography of ions. Part 2: Determination of bromide, chloride, nitrate, nitrite, orthophosphate and sulfate in waste water.

ISO 10523: Water quality — Determination of pH.

ISO 10566: Water quality — Determination of aluminium -- Spectrometric method using pyrocatechol violet.

ISO 11083: Water quality — Determination of chromium (VI) — Spectrometric method using 1,5-diphenylcarbazide.

ISO 11885: Water quality — Determination of 33 elements by inductively coupled plasma atomic emission spectroscopy.

ISO 11905-1: Water quality — Determination of nitrogen Part 1: Method using oxidative digestion with peroxodisulfate.

ISO 11923: Water quality — Determination of suspended solids by filtration through glass-fibre filters.

ISO 12020: Water quality — Determination of aluminium -- Atomic absorption spectrometric methods.

ISO 14402: Water quality — Determination of phenol index by flow analysis (FIA and CFA).

ISO 14911: Water quality — Determination of dissolved Li^+ , Na^+ , NH_4^+ , K^+ , Mn^{2+} , Ca^{2+} , Mg^{2+} , Sr^{2+} and Ba^{2+} using ion chromatography -- Method for water and waste water.

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ISO 15705: Water quality — Determination of the chemical oxygen demand index (ST-COD) — Small-scale sealed-tube method.

ISO 5663: Water quality — Determination of Kjeldahl nitrogen -- Method after mineralization with selenium.

ISO 5666: Water quality — Determination of mercury.

ISO 5667-1: Water quality — Sampling Part 1: Guidance on the design of sampling programmes.

ISO 5667-10: Water quality — Sampling Part 10: Guidance on sampling of waste waters.

ISO 5667-17: Water quality — Sampling Part 17: Guidance on sampling of suspended sediments.

ISO 5667-6: Water quality — Sampling Part 6: Guidance on sampling of rivers and streams.

ISO 5815-1: Water quality — Determination of biochemical oxygen demand after n days (BOD_n) Part 1: Dilution and seeding method with allylthiourea addition.

ISO 5815-2: Water quality — Determination of biochemical oxygen demand after n days (BOD_n) Part 2: Method for undiluted samples.

ISO 6060: Water quality — Determination of the chemical oxygen demand.

ISO 6222: 1999, Water quality Microbiological methods.

ISO 6439: Water quality — Determination of phenol index — 4-Aminoantipyrine spectrometric methods after distillation.

ISO 7027: Water quality — Determination of turbidity.

ISO 7887: Water quality — Examination and determination of colour.

ISO 9174: Water quality — Determination of chromium — Atomic absorption spectrometric methods.

ISO 9297: Water quality — Determination of chloride — Silver nitrate titration with chromate indicator (Mohr's method).

ISO 9308: Water quality — Detection and enumeration of Escherichia coli and coliform bacteria -- Part 3: Miniaturized method (Most Probable Number) for the detection and enumeration of E. coli in surface and waste water.

ISO 9509: Water quality method for assessing the inhibition of nitrification of activated sludge micro-organisms by chemicals and wastewaters.

3 Terms and definitions

For the purpose of this standard, the following terms and definitions shall apply;

3.1 Biological Oxygen Demand (BOD)

The mass concentration of dissolved oxygen consumed under specified conditions by the biological oxidation of organic and / or inorganic matter in wastewater.

3.2 Chemical Oxygen Demand (COD)

The mass concentration of oxygen equivalent to the amount of dichromate consumed by dissolved and suspended matter when a sample of wastewater is treated with that oxidant under defined conditions.

3.3 Effluent

Water or wastewater discharged from a containing space such as treatment plant, industrial process, lagoon, etc.

3.4 Industrial Effluents:

Liquid wastes from institutional, commercial and industrial process and operations.

3.5 Municipal Effluent

Liquid wastes from domestic processes and operations.

3.6 Wastewater:

Water discharged after being used, or produced by a process, and which is of no further immediate value to that process.

3.7 Treatment Facilities:

An arrangement of devices and structures, excluding septic tanks, constructed for the purpose of treatment of wastewaters for domestic, commercial or industrial sources, or combination thereof. Privately owned wastewater treatment facilities which treat predominantly industrial waste shall be excluded.

4. Requirements

4.1 Effluents, before they are discharged into public sewers, shall comply with the maximum permissible limits specified in Table 1.

Table 1: Industrial effluents discharged into public sewers — Maximum permissible limits

Sl. no.	Parameter	Maximum permissible limits	Test Method or Equivalent
1)	Total Suspended Solids	250 mg/L	ISO 11923
2)	Total Dissolved Solids	2000 mg/L	-
3)	Turbidity	300 NTU	ISO 7027 APHA Standard Methods: 2130 B.
4)	pH	6.0 – 9.0	ISO 10523
5)	Temperature	20 – 35 °C,	
6)	Biochemical Oxygen Demand (BOD) for 5 days at 20 °C	500 mg/L	ISO 5815
7)	Chemical Oxygen Demand (COD)	1000 mg/L	ISO 15705/6060
8)	Total phosphorus	10 mg/L	ISO 6878/15681: Parts 1 & 2;
9)	Sulphides	1 mg/L	APHA Standard Methods: 4110 B. ISO 10530
10)	Sulphates	400 mg/L	APHA Standard Methods: 4110 B. ISO 10304: Part 2
11)	Nitrates	20 mg/L	ISO 7890: Part 3;

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Sl. no.	Parameter	Maximum permissible limits	Test Method or Equivalent
			APHA Standard Methods: 4110 B.
12)	Nitrites	2 mg/L	ISO 6777
13)	Ammonium nitrogen	5 mg/L	ISO 11905: Part 1/5664
14)	Total nitrogen	30 mg/L	ISO 5663
15)	Colour	300 TCU	ISO 7887
16)	Odour	No offensive odour	
17)	Cyanides	0.2 mg/L	ISO 6703
18)	Chloride	600 mg/L	ISO 10304-1 APHA Standard Methods: 4110 B
19)	Total residual Chlorine	1 mg/L	ISO 7393-2
20)	Fluorides	8 mg/L	APHA Standard Methods: 4110 B. ISO 10304: Part 1
21)	Iron	3.5 mg/L	ISO 6232
22)	Arsenic	0.2 mg/L	ISO 11885/11969/6595
23)	Cadmium	0.1 mg/L	ISO 5961/8288
24)	Total Chromium	2 mg/L	ISO 9174/11083
25)	Copper	1 mg/L	ISO 8288/11885
26)	Aluminum	2.0 mg/L	ISO 10566/12020
27)	Lead	0.05 mg/L	ISO 8288/11885
28)	Barium	1.5 mg/L	ISO 14911
29)	Total mercury	0.002 mg/L	ISO 5666
30)	Nickel	1 mg/L	ISO 8288/11885
31)	Selenium	0.1 mg/L	ISO 9965/11885
32)	Zinc	5 mg/L	ISO 8288/11885
33)	Silver	0.1 mg/L	ISO 15586: 2003 ISO 11885
34)	Organochlorine pesticides	0 mg/L	ISO 6468: 1996
35)	Oils and grease	5 mg/L	APHA Standard methods 5520 ISO 9377: Part 1 - 3
36)	Phenols	2 mg/L	ISO 6468/ISO 14402 / 6439
37)	Benzene	0 mg/L	ISO 6468: 1996
38)	Dichloromethane	0.2 mg/L	ISO 10301: 1997

4.2 Effluents, before they are discharged into water bodies, shall comply with the tolerance limits specified in Table 2.

**Table 2: Industrial and municipal effluents discharged into water bodies —
Maximum permissible limits**

Sl. No.	Parameter	Maximum permissible limit	Test Method
1)	Total suspended solids	100 mg/L	ISO 11923
2)	Turbidity	30 NTU	ISO 7027 APHA Standard Methods: 2130 B.
3)	pH	6.0 – 9.0	ISO 10523
4)	Temperature change	± 3 °C	
5)	Biochemical Oxygen Demand (BOD) for 5 days at 20 °C	30 mg/L	ISO 5815
6)	Chemical Oxygen Demand (COD)	60 mg/L	ISO 15705/6060
7)	Total phosphorus	5 mg/L	ISO 15681: Parts 1 & 2
8)	Sulphides	1 mg/L	ISO 10530
9)	Sulphates	50 mg/L	ISO 10304: Part 2 APHA Standard Methods: 4110 B.
10)	Nitrates	5 mg/L	ISO 7890 PART 3 APHA Standard Methods: 4110 B.
11)	Nitrites	1 mg/L	ISO 6777
12)	Total Nitrogen	10 mg/L	ISO 5663
13)	Ammonium nitrogen	5 mg/L	ISO 11905 part 1 / 5664
14)	Colour	50 TCU	ISO 7887
15)	Odour	No offensive odour	
16)	Cyanides	0.05 mg/L	ISO 6703
17)	Total residual Chlorine	0.2 mg/L	ISO 7393-2
18)	Fluoride	2 mg/L	ISO 10304
19)	Arsenic	0.01 mg/L	ISO 11885/11969/6595
20)	Cadmium	0.01 mg/L	ISO 5961/8288
21)	Hexavalent Chromium	0.05 mg/L	ISO 9174
22)	Total Chromium	1 mg/L	ISO 9174/11083
23)	Copper	0.5 mg/L	ISO 8288/11885
24)	Lead	0.01 mg/L	ISO 8288/11885
25)	Total mercury	0.001 mg/L	ISO 5993/5666
26)	Nickel	0.5 mg/L	ISO 8288/11885

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Sl. No.	Parameter	Maximum permissible limit	Test Method
27)	Selenium	0.02 mg/L	ISO 9965
28)	Zinc	5 mg/L	ISO 8288/11885
29)	Silver	0.1 mg/L	ISO 11885
30)	Aluminium	2 mg/L	ISO 10566/12020
31)	Organo-chlorine pesticides	0 mg/L	ISO 6468
32)	Oils and grease	5 mg/L	ISO 9377 Parts 1-3
33)	Phenols	0.002 mg/L	ISO 14402/6439
34)	PCB's	0.003 mg/L	ISO 6468
35)	Benzene	0 mg/L	ISO 7875: Parts 1 & 2
36)	Faecal coliform	400 in 100 ml of water	ISO 9308 Part 3/ ISO 6222
37)	Total Dissolved Solids	1200 mg/L	-

5 Sampling

Sampling shall be carried out in accordance with ISO 5667-10.