



DRAFT TANZANIA STANDARD

Faecal sludge management – permissible limits for use and disposal

FOR STAKEHOLDERS' COMMENTS

0. Foreword

The Tanzania Bureau of Standards is the statutory national standards body for Tanzania, established under the Act.No.3 of 1975, amended by Act.No.2 of 2009.

This draft Tanzania standard is being prepared by Wastewater National Technical Committee, under the supervision of the Environmental Management Divisional Standards Committee (EMDC).

TBS has considered it necessary to implement its mandate to develop a faecal sludge management standard as part of sanitation services so as to ensure protection of human health and the environment.

In the preparation of this draft Tanzania Standard, considerable information was drawn from the following:

Consultancy services for development of onsite Sanitation and faecal Sludge Management-guidelines for water supply and sanitation Authorities (EWURA study report, 2020)

Guidelines on Sanitation and Health (WHO, 2018)

Guidelines and Regulations for Fecal Sludge Management from On-site Sanitation Facilities (RESOURCE RECOVERY & REUSE SERIES 14)

Guidelines for the Application of Small-Scale, Decentralized Wastewater Treatment Systems-A Code of Practice for Decision Makers (United Republic of Tanzania, Ministry of Water, 2018)

Guidelines for Faecal Sludge Management (Rwanda Utilities Regulatory Authority, 2020)

1. Scope

This draft Tanzania Standard sets permissible limits for use and disposal of faecal sludge

2. Normative References

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

AOAC 2006.03 – Association of Analytical Chemists

APHA Standard Methods: 2130 B. Nephelometric Method

ISO 7887 Water quality — Examination and determination of colour

ISO 11885 Water quality — Determination of selected elements by inductively coupled plasma optical emission spectrometry (ICP-OES)

ISO 8288 Water quality — Determination of cobalt, nickel, copper, zinc, cadmium and lead — Flame atomic absorption spectrometric methods

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

ISO/TS 17379-2 Water quality — Determination of selenium — Part 2- Method using hydride generation atomic absorption spectrometry (HG-AAS)

ISO 15586 Water quality — Determination of trace elements using atomic absorption spectrometry with graphite furnace

ISO 10530 Water quality — Determination of dissolved sulfide — Photometric method using methylene blue

ISO 7393-2 Water quality — Determination of free chlorine and total chlorine — Part 2 - Colorimetric method using N, N-dialkyl-1,4-phenylenediamine, for routine control purposes

ISO 9377-2 Water quality — Determination of hydrocarbon oil index — Part 2 - Method using solvent extraction and gas chromatography

ISO 6468 Water quality — Determination of certain organochlorine insecticides, polychlorinated biphenyls and chlorobenzenes — Gas chromatographic method after liquid-liquid extraction

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

ISO 5961 Water quality — Determination of cadmium by atomic absorption spectrometry

ISO 6222 Water quality — Enumeration of culturable micro-organisms — Colony count by inoculation in a nutrient agar culture medium

ISO 10359 -1 Water quality — Determination of fluoride — Part 1 - Electrochemical probe method for potable and lightly polluted water

ISO/TS 15923-2 Water quality — Determination of selected parameters by discrete analysis systems — Part 2 – Chromium (VI), fluoride, total alkalinity, total hardness, calcium, magnesium, iron, iron(II), manganese and aluminum with photometric detection

TZS 861-2/ ISO 10301 Water quality – Determination of highly volatile halogenated hydrocarbons – Gas chromatographic methods

TZS 861-1 Water quality – Determination of suspended solids by filtration through glass- Part 1 - fibre filters

TZS 861-10 – Water quality – Sampling – Part 10 - Guidance on sampling of waste waters

ISO 5667-13 Water quality — sampling — Part 13: Guidance on sampling of sludges

3. Terms and definitions

For the purpose of this Tanzania Standard, and the normative references, unless the context specifically indicates otherwise, the following terms and phrases shall have the meanings respectively ascribed to them by this section.

3.1 Biochemical 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

wastewater discharged from a containing space such as treatment plant, industrial process, lagoon, institutional, commercial, operations etc.

3.5 Faecal Sludge

the general term given to undigested or partially digested slurry or solids resulting from storage or treatment of blackwater or excreta

3.6 Faecal Sludge Management

a chain including emptying, transportation, treatment, and use or disposal of fecal sludge from an on-site sanitation technology (like a pit latrine or septic tank).

3.7 Pollution

the introduction by man, directly or indirectly, of substances or energy into the environment resulting in deleterious effects of such a nature as to endanger human health, harm ecosystems, and impair or interfere with amenities and other legitimate uses of the environment.

3.8 Receiving water body

a perennial body of water, stream or watercourse receiving the discharged effluent

3.9 Sludge

the thick, viscous layer of materials that settles to the bottom of septic tanks, ponds and other sewage systems. sludge comprises mainly organics but also sand, grit, metals, and various chemical compounds.

3.10 Suspended solids

solids that either float on the surface of, or in suspension in water, sewage or other liquids and which are removable by laboratory filtering or centrifuging under specified conditions.

3.11 Wastewater

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

3.12 Water pollution

the impairment of the suitability of water from some considered purpose.

3.13 Treated sludge

sludge having undergone “biological, chemical or physical treatment, long-term storage or any other appropriate process so as significantly to reduce its fermentability and the health hazards resulting from its use

3.14 Faecal Sludge Treatment Facility

treatment facility that treats faecal sludge derived from human excreta e.g sludge digester

4. Requirements

The permissible limits for sludge management shall conform to the requirements given in table below.

4.1 Faecal Sludge Treatment Facility

4.1.1 Effluent from faecal sludge treatment facility permissible limits – general tolerance discharged into receiving water body

Table 1.0 Physical parameters

Parameter	Limit	Test method
Colour (TCU)	200	ISO 7887
pH	5-9	ISO 10523
Temperature increase °C	3	Thermometer
Turbidity (NTU)	300	APHA Standard methods: 2130 B
Odour	All efforts should be made to remove unpleasant odour as far as practicable	No objectionable odour
Total suspended solids (mg/L)	200	ISO 11923

Note - Effluent temperature should not change the receiving water body temperature by 3 °C

Table 2.0 Chemical Parameters

Parameter	Limit (mg/L)	Test method
Biochemical Oxygen Demand (BOD ₅) at 20 °C (mg/L)	50	ISO 5815-2
Chemical Oxygen Demand (COD) (mg/L)	150	ISO 6060
Nitrates (mg/L)	45	ISO 5663
Total Nitrogen(mg/L)	30	ISO 11905
Total organic carbon (TOC) (mg/L)	25	APHA 5310 B
Aluminium (Al)	5	ISO 12020:1997 Water quality — Determination of aluminum — Atomic absorption spectrometric methods

Arsenic (As)	0.1	ISO 11885
Barium (Ba)	1.5	APHA 3125 B
Cadmium (Cd)	0.01	ISO 5961
Chromium VI (Cr VI)	0.1	ISO/TS 15923-2
Chlorides (Cl ⁻)	300	ISO 15682:2000 Water quality — Determination of chloride by flow analysis (CFA and FIA) and photometric or potentiometric detection
Cobalt (Co)	1.0	ISO 8288– Flame atomic absorption spectrometry
Copper (Cu)	0.5	ISO 8288
Fluorides (F ⁻)	4	ISO 10359-1
Iron	5.0	ISO 6332:1988 Water quality — Determination of iron — Spectrometric method using 1,10-phenanthroline
Lead (Pb)	0.5	ISO 8288
Manganese	0.2	ISO 6333:1986 Water quality — Determination of manganese — Formaldoxime spectrometric method
Mercury (Hg)	0.001	TZS 861-10
Nickel (Ni)	0.5	ISO 8288
Ammonium nitrogen(N-NH ₃)	5	ISO 11905-1
Phosphorus Total (as P)	5	ISO 10304-1
Selenium (Se)	0.05	ISO/TS 17379-2
Silver (Ag)	0.1	ISO 15586
Sulphate (SO ₄ ²⁻)	500	ISO 10304-1
Sulphides (S ⁻)	1	ISO 10530
Zinc (Zn)	5.0	ISO 15586

Table 3.0 Organic parameters

Parameter	Maximum Limit (mg/L)	Test method
Oils and grease	10	ISO 9377-2
Organochlorine Pesticides	Not detectable	ASTM D8025-6
Pesticides other than organochlorines	0.01	ASTM D8025-6
Phenolic compounds	0.002	ISO 14402

Table 4.0 Microbiological parameters

Total coliform organisms (counts/100L)	10,000	ISO 6222:1999
<i>E coli</i> (CFU/100L)	100	ISO 6222:1999
Fecal Coliform (CFU/100L)	1,000	ISO 6222:1999
Nematodes (Helminth viable eggs) (egg/L)	1	Annex I

Table 5.0 Effluent from Faecal Sludge Treatment Facility permissible limits – general tolerance for use in irrigation

Parameter	Unit	Cooked vegetables, parking areas, playgrounds, side of roads and inside cities	Field crops, industrial crops and forestry
BOD ₅	mg/L	30	300
COD	mg/L	100	500
TSS	mg/L	50	150
PH	unit	6-9	6-9
Turbidity	NTU	300	Not Determined
NO ₃	mg/L	45	45

T-N	mg/L	45	70
E. coli	cfu/g	100	Not Determined
Nematodes (Helminth viable eggs)	egg/L	1	Annex I

Note: Dissolved Oxygen (DO) shall be less than 2mg/L when Effluent used in cooked vegetables, parking areas, playgrounds, side of roads and inside cities.

4.2 Dried faecal sludge

Table 6.0 Dried Faecal Sludge disposal to the environment permissible limits

Parameter	Limit	Test methods
Arsenic (mg/kg)	10	AOAC 2006.03
Cadmium (mg/kg)	5	
Mercury (mg/kg)	0.1	
Chromium (mg/kg)	50	
Lead (mg/kg)	30	
Dry matter content (solid), (% by weight)	75	TZS 990

Table 7.0 Microbiological requirements

Microorganisms	Limit	Test Method
E. coli cfu/g,	0	TZS 731
Salmonella spp in 25 g dried mass	0	TZS 122
Faecal streptococci cfu/g	0	TZS 119
Total coliforms cfu/g	0	TZS 119

Note – solid wastes recovered from screening of faecal sludge shall be pre-treated and disposed as per their nature

5.0 Sampling

Representative samples of the sludge shall be collected as prescribed in ISO 5667-13

Water quality — sampling — Part 13: Guidance on sampling of sludges