



DRAFT TANZANIA STANDARDS

Tolerance limits for industrial effluents discharged into inland surface water – Sugar processing industries

FOR STAKEHOLDERS' COMMENTS

0. Foreword

Sugar industry plays an important role in the economy of a country. However, sugar mill have a great environmental impact upon the surrounding environment. The effluents are causing odor nuisance during decomposition. Waste water from sugar mills with its high Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) rapidly deplete available oxygen supply when discharged into water bodies endangering fish and other aquatic life and also creates septic conditions. Other pollutants are high temperature, colour, suspended solids, Total Dissolved Solids, heavy metals e.t.c. The effluents should be treated prior to discharge. In order to check whether the treated effluents are of acceptable limits, you need to have the tolerance limits and the test methods for the effluents. This Tanzania Standard is a good step forward in order to curb environmental pollution.

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

Sri Lanka Standard SLS 652:1984, *Tolerance limits for industrial effluents discharged into inland surface water*

Pollution Prevention Abatement Handbook, World Bank Group Effective July 1998

TZS 860:2019 Municipal and industrial wastewaters — General tolerance limits

Acknowledgement is hereby made for assistance derived from these sources.

1. Scope

This Tanzania Standard lays down the tolerance limits for effluents from sugar processing industries and its byproducts (processed molasses) discharged into water bodies.

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.

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

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

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 processes and operations.

3.5 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 living resources and ecosystems, and impair or interfere with amenities and other legitimate uses of the environment.

3.6 Receiving water

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

3.7 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.

3.8 Waste water

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

3.9 Water pollution

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

4. Requirements

The permissible limits for effluent discharged from sugar industry shall conform to the requirements given in table 1.

Permissible limits

1.1 Physical parameters

Parameter	Limit	Test method
Colour (TCU)	50	ISO 7887
pH	6.5 – 9	TZS 861- 2
Temperature increase °C	< 3 *	Annex
Turbidity (NTU)	300	APHA Standard Methods:2130 B. Nephelometric Method
Odour	No objectionable odour	ISO 7887
Total suspended solids (mg/L)	100	TZS 861-1

*The effluent should result in a temperature increase of no more than 3° C at the edge of the zone where initial mixing and dilution take place. Where the zone is not defined, use 100 metres from the point of discharge.

1.2 Chemical Parameters

Parameter	Limits	Test method
pH	6.5 – 9.0	TZS 861: Part 2 /ISO 10523– Electrometric method
Biochemical Oxygen Demand (BOD ₅) at 20 °C (mg/L)	≤ 30	TZS 861: Part 3 /ISO 5815– Five-day BOD method
Chemical Oxygen Demand (COD) (mg/L)	≤60	TZS 861: Part 4 – Dichromate digestion method
Total organic carbon (TOC) (mg/L)	≤ 25	APHA 5310 B

1.3 Inorganic parameters

Parameter	Limit (mg/l)	Test method
Aluminium (Al)	≤2.0	ISO 12020:1997 Water quality — Determination of aluminium — Atomic absorption spectrometric methods
Arsenic (As)	≤0.01	ISO 11885
Barium (Ba)	≤1.5	APHA 3125 B
Cadmium (Cd)	≤ 0.01	ISO 5961
Chromium VI (Cr VI)	≤ 0.05	ISO/TS 15923-2
Chlorides (Cl ⁻)	≤ 200	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)	≤ 0.01	ISO 8288
Manganese	≤5.0	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
Total residue chlorine (Cl)	1	ISO 7393-2
Zinc (Zn)	≤5.0	ISO 15586

1.4 Organic parameters

Parameter	Maximum Limit (mg/L)	Test method
Oils and grease	5	ISO 9377-2
Organochlorine Pesticides	0	ISO 6468
Pesticides other than organochlorines	0.01	ISO 6468
Phenolic compounds	1	ISO 14402

1.5 Microbiological parameters

Total coliform organisms	10,000 counts/100ml	ISO 6222:1999
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5.0 Sampling

Representative samples of the effluent shall be collected as prescribed in TZO 861-10

Annex A

Summary of special sampling or handling requirements

S/N	Determinant	Container	Minimum sample size (ml)	Method of preservation	Maximum storage time recommended
1	Total suspended solids	P, G	-	Refrigerate	7 days
2	BOD	P, G	1000	Refrigerate	6 hours
3	Residual chlorine	P, G	500	Measure immediately	0.5 hours
4	Cyanides total	P, G	500	Add NaOH to pH>12, refrigerate in dark	24 hours
5	Sulphide	P, G	100	Add 4 drops 2 N zinc acetate 100 ml, refrigerate	28 days
6	Fluorides	P	300	Not required	28 days
7	Metals: a) General b) Mercury	P(A), G(A) P(A), G(A)	- 500	For dissolved metal filter immediately add HNO ₃ to pH<2 Add HNO ₃ to pH<2	6 months 28 days
8	Organic compounds: Pesticides	G(S)++TFE lined cap		Refrigerate: add 100mg Na ₂ S ₂ O ₃ /l if residual chloride is present	7 days
9	Oils and grease	G, wide mouth, calibrated	1000	Add H ₂ SO ₄ to pH<2; refrigerate	24 hours
10	Radioactive material	P,G	-	Add HNO ₃ to pH<2	16 hours
11	COD	P,G	100	Analyse as soon as possible or add H ₂ SO ₄ to pH<2	7 days

Key P:

Plastic (Polyethylene or equivalent);

G: Glass

P (A) or G (A): Rinsed with 1 + 1 HNO₃

++G (S): Glass, rinsed with organic solvents

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