EMDC1 (186) DTZS
Rev TZS 1234/2010

DRAFT TANZANIA STANDARDS

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

0. Foreword

Industrial effluents can cause environmental pollution when they are not treated properly prior being released to the receiving bodies, i.e. rivers, lakes, streams e.t.c. Textile industries are major sources of these effluents due to the nature of their operations which requires high volume of water that eventually results in high waste water generation. The principal pollutants in the textile effluent are recalcitrant organics, colour, toxicants and inhibitory compounds, surfactants, soaps, detergents, chlorinated compounds, and salts. These effluents cause overloading of our receiving water bodies. 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.

1. Scope

This Tanzania Standard lays down the tolerance limits for effluents from textile industries discharged into waters bodies.

2. Normative reference

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 6410: Liquid-liquid extraction GC/MS method

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 5961 Water quality — Determination of cadmium by atomic absorption spectrometry

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

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 aluminium with photometric detection

ISO 15682 Water quality — Determination of chloride by flow analysis (CFA and FIA) and photometric or potentiometric detection

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

ISO 6332 Water quality — Determination of iron — Spectrometric method using 1,10-phenanthroline

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

ISO 6333 Water quality — Determination of manganese — Formaldoxime spectrometric method

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 sulfate

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

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

TZS 1929 / ISO 15586 Water quality – Determination of trace elements using atomic absorption spectrometer with graphite furnace

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

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 textile industry shall conform to the requirements given in table 1.

Table 1 — Permissible limits

Table 1 — Physical parameters

Parameter	**Limit**	**Test method**
Colour (TCU)	50	ISO 7887
pH range	6.5 – 8.5	TZS 861- 2
Temperature range(^{o}C)	20 -35	See annex A
Turbidity(NTU)	30	APHA Standard Methods:2130 B
Odour	Odorless	ISO 7887
Total suspended solids (mg/L)	100	TZS 861-1

Table 1.2 — Inorganic parameters

Parameter	Limit (mg/l)	Test method
Aluminium (Al)	≤2.0	ISO 12020
Arsenic (As)	≤ 0.01	ISO 11885
Barium (Ba)	≤1.5	APHA 3125 B
Cadmium (Cd)	≤ 0.01	ISO 5961
Chromium (total) (Cr)	≤1.0	ISO 9174
Chromium VI (Cr VI)	≤ 0.05	ISO/TS 15923-2
Chlorides (Cl^-)	≤ 200	ISO 15682
Cobalt (Co)	≤ 1.0	ISO 8288
Copper (Cu)	≤ 0.5	ISO 8288
Fluorides (F^-)	≤ (4)	ISO 10359-1
Iron	≤5.0	ISO 6332
Lead (Pb)	≤ (0.01)	ISO 8288
Manganese	≤5.0	ISO 6333
Mercury (Hg)	≤ 0.001	TZS 861: Part 10
Nickel (Ni)	≤0.5	ISO 8288
Vanadium	≤0.1	TZS 1929 / ISO 15586
Nitrates (NO3-)	≤20	ISO 10304-1
Phosphorus Total (as P)	≤ 5	ISO 10304-1
Silver (Ag)	≤0.1	ISO 15586
Sulphate (SO_4^{2-})	≤500	ISO 10304-1
Sulphides (S-)	≤1	ISO 10530
Tin (Sn)	≤2.0	ISO 15586

Vanadium (V)	≤1.0	ISO 15586
Zinc (Zn)	≤5.0	ISO 15586

Table 1.3 — Organic parameters

Parameter	Maximum Limit (mg/L)	Test method
1, 1, 2 - Trichloroethane	0.06	TZS 861 Part 2 / GC ECD (ISO 10301
1,1,1 - Trichloroethane	3.0	TZS 861 Part 2 / GC ECD (ISO 10301
1,2 – Dichloroethylene	0.2	TZS 861 Part 2 / GC ECD (ISO 10301
1,2 - Dichloroethane	0.04	TZS 861 Part 2 / GC ECD (ISO 10301
1,3 - Dichloropropene	0.2	TZS 861 Part 2 / GC ECD (ISO 10301
Alkyl benzene sulfonate (ABS)	0	TZS 1407 / ISO 7875 – 1
Aromatic nitrogen containing compounds (e.g., aromatic amines)	0.001	APHA standard methods 6410: Liquid-liquid extraction GC/MS method
cis-1,2 - Dichloroethylene	0.4	TZS 861 Part 2 / GC ECD (ISO 10301)
Dichloromethane	0.2	TZS 861 Part 2 / GC ECD (ISO 10301)
Oil and grease (fatty maters and hydrocarbons)	5	APHA standard methods 5520
Organochlorine pesticides (Cl)	0	TZS 1403:2016 **/** GC ECD (ISO 6468)
Other aromatic and/or aliphatic hydrocarbons not used as pesticides	0.05	TZS 1403:2016 **/** GC ECD (ISO 6468)

Parameter	Maximum Limit (mg/L)	Test method
Pesticides other than organochlorines	0.01	TZS 1403:2016 **/** GC ECD (ISO 6468)
Phenols	0.002	TZS 1403:2016 **/** GC ECD (ISO 6468)
Tetrachloroethylene	0.1	TZS 861 Part 2 / GC ECD (ISO 10301)
Tetrachloromethane	0.02	TZS 861 Part 2 / GC ECD (ISO 10301)
Trichloroethylene	0.3	TZS 861 Part 2 / GC ECD (ISO 10301)
PCBs	0.003	TZS 1403:2016 **/** ISO 6468

Table 1.4 – Microbiological parameters

Parameter	Maximum Limit	Test method
BOD_5 at 20^0C (mg/L)	30	TZS 1930:2016/ ISO 5815-2
COD(mg/L)	60	TZS 1932:2016/ ISO 15705
Total coliform organisms (counts/100ml)	10,000	ISO 6222

5. Sampling

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

Annex A

Depth temperature measurement

Depth temperature required for limnological studies may be measured with a reversing thermometer, thermophone, or themistor. The thermistor is most convenient and accurate; however, higher cost may preclude its use. Calibrate any temperature measurement devices with TBS–certified thermometer before field use. Make readings with the thermometer or device immersed in water long enough to permit complete equilibration. Report results to the nearest 0.1 or 1.0 ˚C, depending on need.

The thermometer commonly used for depth measurements is of the reversing type. It often is mounted on the sample collection apparatus so that a water sample may be obtained simultaneously. Correct readings of reversing thermometers for changes due to differences between temperature at reversal and temperature at time of reading. Calculate as follows:

$$\Delta T = \left[\frac{(T' - t)(T' - V_0)}{K}\right] \times \left[1 + \frac{(T' - t)(T' + V_0)}{K}\right] + L$$

Where:

$\Delta T'$ = correction to be added algebraically to uncorrected reading

T' = uncorrected reading at reversal

t = temperature at which thermometer is read,

V_0 = volume, of small bulb end of capillary up to 0ºC graduation

K = constant depending on relative thermal expansion of mercury and glass (usual value of *K* = 6100), and

L = calibration correction of thermometer depending on *T'*

If series observations are made it is convenient to prepare graphs for a thermometer to obtain ΔT from any values of *T'* and *t*.