



## **TANZANIA STANDARD**

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### **Transmission and Drive Train Oil (TDTO) — Specification**

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**TANZANIA BUREAU OF STANDARDS**

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## Foreword

This Tanzania Standard was published under the authority of the Board of Director of Tanzania Bureau of Standards.

Tanzania Bureau of Standards (TBS) is the statutory national standards body for Tanzania established by the Standards Act Cap. 130.

Tanzania Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. The Technical Committees work under the supervision of Divisional (sectoral) Committees. The Standards are developed in accordance with the Guide and Procedure for Development of Tanzania Standards and TZS 0, *Guide for presentation of Tanzania Standards*.

Tanzania Standards are subject to review, to keep pace with science and technological advances. Users of the Tanzania Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

This Tanzania Standard was developed under the supervision of the Chemical and Healthcare Divisional Standards Committee, CHDC. The Technical Committee responsible for the standard is CHDC 17, *Lubricant and Oils Products*.

The reporting of the results of a test or analysis made in accordance with this Tanzania Standard, if the final value, observed or calculated is to be rounded off, shall be done in accordance with TZS 4.



## Transmission and Drive Train Oil (TDTO) — Specification

### 1 Scope

This draft Tanzania specifies requirements, sampling, and test methods for Transmission and Drive Train Oils (TDTO), it covers the off-road equipment. This document applies for heavy duty automatic transmissions having clutch plate, power shift, hydraulic systems suitable for stationary engines and final drives operating wet brakes or not, used in construction, agricultural, and mining.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ASTM D92, *Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester*

ASTM D97, *Standard Test Method for Pour Point of Petroleum Products*

ASTM D130, *Standard Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test*

ASTM D445, *Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)*

ASTM D892, *Standard Test Method for Foaming Characteristics of Lubricating Oils*

ASTM D1298, *Standard Test Method for Density, Relative Density, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method*

ASTM D2270, *Standard Practice for Calculating Viscosity Index from Kinematic Viscosity at 40 °C and 100 °C*

ASTM D2896, *Standard Test Method for Base Number of Petroleum Products by Potentiometric Perchloric Acid Titration*

ASTM D4052, *Standard Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter*

ASTM D4057, *Standard Practice for Manual Sampling of Petroleum and Petroleum Products*

ASTM D4177, *Standard Practice for Automatic Sampling of Petroleum and Petroleum Products*

ISO 24153, *Random sampling and randomization procedures*

TZS 4, *Rounding off numerical values*

TZS 668, *Petroleum industry — Terminology*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in TZS 668 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online Browsing Platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <https://www.electropedia.org/>

#### 3.1 Transmission Oil and Drive Train Oil (TDTO)

A specialized lubricant formulated specifically for heavy equipment compartments requiring friction and anti-wear characteristics to optimize clutch life and gear protection in power-shift drives, that meet requirement for Caterpillar TO-4, Komatsu KES 07.868.1, or equivalent.

#### 3.2 Power-Shift Transmission

A gearbox utilizing hydraulically actuated clutch packs to change gear ratios under load, requiring controlled dynamic and static friction properties to eliminate clutch slippage and wear

### 4 Performance Levels

Transmission Oil and Drive Train Oil shall meet or demonstrate performance equivalence to the following key industry and OEM specifications:

4.1 Gear performance API GL 4

4.2 Primary Transmission / Clutch Standard: Caterpillar TO-4 specification requirements.

4.3 Secondary OEM Specifications such as: -

- i. Komatsu KES 07.868.1
- ii. Allison C-4 (for SAE 10W and SAE 30 grades)
- iii. Vickers 35VQ25 (for hydraulic applications using SAE 10W)

### 5 Requirements

#### 5.1 General requirements

5.1.1 The Transmission Oil and Drive Train Oil shall consist of refined mineral base stocks or synthetic base fluids blended with advanced additive packages containing anti-wear, extreme pressure (EP), oxidation inhibitors, rust inhibitors, and specialized friction control agents.

5.1.2 The Transmission Oil and Drive Train Oil shall be homogeneous, clear, and free from suspended matter, grit, water, or visible impurities.

5.1.3 Transmission Oil and Drive Train Oil shall not contain friction modifiers that promote clutch slippage or reduce static friction performance.

#### 5.2 Specific requirements

Transmission oils shall conform to the physical and chemical limits specified in Table 1 when tested in accordance with the methods prescribed therein.

**Table 1 — Specific Technical Requirements for Transmission Oil and Drive Train Oil (TDTO)**

| S/N   | Property / Characteristic                        | SAE 10W   | SAE 30       | SAE 50        | SAE 60      | Test Method              |
|-------|--------------------------------------------------|-----------|--------------|---------------|-------------|--------------------------|
| i.    | Kinematic Viscosity @ 100 °C, mm <sup>2</sup> /s | min. 4.1  | 9.3.0 – 12.5 | 16.3.0 – 21.9 | 21.9 - 26.1 | ASTM D445                |
| ii.   | Kinematic Viscosity @ 40 °C, mm <sup>2</sup> /s  | report    | report       | report        | report      | ASTM D445                |
| iii.  | Viscosity Index, in                              | <b>95</b> | <b>95</b>    | <b>95</b>     | 95          | ASTM D2270               |
| iv.   | Flash Point (COC), °C, min.                      | 200       | 210          | 220           | 220         | ASTM D92                 |
| v.    | Pour Point, °C, max.                             | -27       | -18          | -12           | -9          | ASTM D97                 |
| vi.   |                                                  |           |              |               |             |                          |
| vii.  | Copper Strip Corrosion (3 h @ 100 °C), max.      | Class 1b  | Class 1b     | Class 1b      |             | ASTM D130                |
| viii. | Density @ 15 °C, g/cm <sup>3</sup>               | Report    | Report       | Report        |             | ASTM D4052<br>ASTM D1298 |

## 6 Packaging, marking and labelling

### 6.1 Packaging

**6.1.1** Transmission oils and Drive Train Oil shall be packaged in clean, dry, sound, and securely sealed containers constructed of materials that do not react with or affect the product quality.

**6.1.2** The containers shall protect the fluid against physical damage, atmospheric moisture ingress, oxidation, and contamination during transportation, handling, and storage.

### 6.2 Marking and labelling

Each container shall be legibly and indelibly marked in English and/or Kiswahili with the following minimum information:

- Product name as “**Transmission Oil and Drive Train Oil (TDTO)**”
- Viscosity Grade (e.g., SAE 10W, SAE 30, SAE 50, SAE 60);
- Commercial brand name or trade mark;
- Name and physical address of the manufacturer, blender, or packer;
- Net content by volume (in liters, L) or mass (in kilograms, kg);

- f) Performance Level (e.g., Caterpillar TO-4, Komatsu KES 07.868.1, Allison C-4 and API GL 4)
- g) Batch or lot identification number;
- h) expiration or recommended shelf-life period;
- i) Country of origin.

## 7 Sampling

Sampling of TDTO for testing and compliance inspection shall be carried out in accordance with **ASTM D4057** (manual sampling) or **ASTM D4177** (automatic sampling).