

## Fuel oils — Specification

### 0 Foreword

This Tanzania Standard was prepared under the direction of Petroleum and Petroleum Products Technical committee, which falls under the supervision of the Chemicals Divisional Standards Committee.

For the purpose of deciding whether a particular requirement of this Tanzania Standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with TZS 4 (see clause 3).

In the preparation of this Tanzania Standard, assistance was derived from

MS122, *Specification for fuel oils for use in engines and burning equipment*, published by Department of Standards Malaysia.

IS 1593, *Specification for fuel oils*, published by Bureau of Indian Standards.  
Local companies applied by industries

### 1 Scope

This Tanzania Standard specifies requirements, sampling and test methods for fuel oils, especially residual in character, for industrial and marine uses. These fuel oils are primarily intended for oil fired furnaces. The low viscosity grade oil is suitable for use as diluent for creosote.

### 2 Grades

There shall be two grades of fuel oils as follows:

Grade 1, referred as the light fuel oil or Industrial Diesel Oil - IDO

Grade 2, referred as the Furnace Oil (FO) or Industrial Fuel Oil (IFO). The Furnace Oil is subdivided into four sub grades of four sub grades:

- i.) Subgrade LV, is low viscosity,
- ii.) MV2 is medium viscosity, and
- iii.) HV is High viscosity

### 3 Normative references

This Tanzania Standard makes reference to the following publications:

ASTM D 93, *Test method for flash point by Pensky Martens closed tester*

ASTM D 95, *Test method for water in petroleum products and bituminous materials by distillation*

ASTM D 97, *Test method for pour point petroleum products*

## **TZS 673: 2014**

ASTM D 129, *Test method for sulphur in petroleum products (general bomb method)*

ASTM D 189, *Test method for Conradson carbon residue of petroleum products*

ASTM D 240, *Test method for heat of combustion of liquid hydrocarbon fuel by Bomb calorimeter*

ASTM 445, *Test method for kinematic viscosity of transparent and opaque liquids (and the calculation of dynamic viscosity)*

ASTM D 473, *Test method for sediment in crude oils and fuel oils by the extraction method*

ASTM D 482, *Test method for ash from petroleum products*

P 21, *Diesel index Test method*

P 143, *Test method for asphaltenes*

ZS 644: 2000/ISO 3170, *Manual sampling — Petroleum products*

ZS 668: 2001/ISO 1998, *Petroleum industry —Terminology*

TZS 4: 2009, *Rounding off numerical values*

### **4 Terms and definitions**

For the purpose of this Tanzania Standard the definition given in TZS 668 /ISO1998 and the following shall apply:

#### **4.1 acid number**

Quantity of base, expressed in milligrams of KOH per gram that is required to titrate oil acidic constituents present in 1g of sample when titrated under specified conditions.

#### **4.2 dynamic viscosity**

The ratio between the applied shear stress and the velocity gradient

#### **4.3 flash point**

Minimum temperature to which a product must be heated for the vapours emitted to ignite momentarily in the presence of a flame when operating under standardization condition.

#### **4.4 kinematic viscosity**

The ratio between the dynamic viscosity and density of the liquid of the temperature of the viscosity measured. It is a measure of the resistance to flow of a liquid under gravity.

#### **4.5 pour point**

Lowest temperature at which an oil will continue to flow where it is cooled under standardized methods.

## 5 Requirements

**5.1** The fuel oils shall consist of liquid hydrocarbons oil derived from petroleum. This however, shall not preclude the incorporation of small amounts of additives of hydrocarbons or non-hydrocarbons origin intended to improve ignition, combustion or other characteristics.

**5.2** The material shall be free from inorganic acids, excessive amounts of solid and fibrous foreign matter, and shall remain uniform in normal storage and not separated.

**5.3** The material shall be hydrocarbon oils derived from petroleum or shale. This, however, shall not preclude the incorporation of small amounts of additives of hydrocarbon or non-hydrocarbon origin intended to improve ignition, combustion or other characteristics.

**5.4** The material shall also comply with requirements given in table 1.

**Table 1 — Properties of fuel oils**

S/N	Properties	Grade 2 (Furnace Oil)				Test Method
		IDO	Subgrade MV2	Subgrade HV	Subgrade LV	
i.	Specific gravity at 20 <sup>o</sup> C , <i>max.</i>	0.991	0.991	0.991	0.991	D 1298/D4052
ii.	Kinematic Viscosity at 50 °C (50°C) cst, <i>max.</i>	80	125	180	380	D 445/D7042
iii.	Calorific value MJ/Kg (gross), <i>min.</i>	42	42	42	42	D 240/4868
iv.	Sulphur content % wt, <i>max.</i>	1.5	2.5	2.5	2.5	D 129/1552/D4294
v.	Carbon – residue – Conradson wt %, <i>max.</i>	0.45	Report	11	16	D 189
vi.	Water % wt, <i>max.</i>	0.4	0.4	0.4	0.4	D 95
vii.	Sediments % wt, <i>max.</i>	0.1	0.1	0.1	0.1	D 473
viii.	Ash % wt, <i>max.</i>	0.02	0.1	0.1	0.1	D 482
ix.	Asphaltenes % wt, <i>max.</i>	0.5	report	report	report	IP 143
x.	Flash point °C Pensky martens M(closed), <i>min</i>	66	66	66	66	D 93

xi.	Total acid number mg/KOH/g, <i>max.</i>	0.1	report	report	report	Ap1/D664
xii.	Pour point °C, <i>max.</i>	4.5	+18	+18	+18	D 97
xiii.	Diesel Index, <i>min.</i> calc	45	N/A	N/A	N/A	IP 21
<b>Trace Metals</b>						
xiv.	Vanadium, ppm (max)	report	100	100	100	D3605/D5863
xv.	Sodium, ppm (max)	report	25	25	25	D1318/D5863
xvi.	Zinc, ppm (max)	report	10	10	10	D 6481
xvii.	Calcium, ppm (max)	report	5	5	5	D 6481
xviii.	Phosphorus, ppm (max)	report	15	15	15	D 6481
xix.	Aluminium, ppm (max)	report	30	30	30	D 6481
xx.	Silcon, ppm (max)	report	30	30	30	IP 470
xxi.	Aluminium + Silcon, ppm (max)	report	30	30	30	Calculation

#### NOTE

GRADE 1: Stands for Industrial Diesel Oil (IDO)  
 GRADE 2: Stands for Industrial fuel oil (IFO)

## 6 Packaging and marking

### 6.1 Packing

The products shall be delivered in road tankers, rail wagon, barges, ocean tankers, pipelines or other means as agreed upon between the purchaser and the supplier in accordance with the appropriate legal requirements.

### 6.2 Marking

The containers shall be legibly and indelibly marked with the following:

- a) name of the material;
- b) grade of the material/fuel oils;
- c) trade mark if any;
- d) the word fuel oil;
- e) the volume;
- f) the supplier's name or brand name of fuel if any and
- g) the word "FLAMMABLE MATERIALS".

## **7 Sampling**

Sampling of the material shall be carried out in accordance with the procedure described in TZS 644 (see clause 3).

## **8 Compliance with this Tanzania Standard**

The lot/batch shall be deemed to comply with the relevant requirements of this Tanzania Standard if, on inspection of the containers or tankers in the lot/batch, and on testing of the sample taken (clause 7), it conforms to table 1.

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