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
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 miligrams 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>
<thead>
<tr>
<th>S/N</th>
<th>Properties</th>
<th>Grade 2 (Furnace Oil)</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>IDO</td>
<td>Subgrade MV2</td>
</tr>
<tr>
<td>i.</td>
<td>Specific gravity at 20°C, max.</td>
<td>0.991</td>
<td>0.991</td>
</tr>
<tr>
<td>ii.</td>
<td>Kinematic Viscosity at 50 °C (50 °C) cst, max.</td>
<td>80</td>
<td>125</td>
</tr>
<tr>
<td>iii.</td>
<td>Calorific value MJ/Kg (gross), min.</td>
<td>42</td>
<td>42</td>
</tr>
<tr>
<td>iv.</td>
<td>Sulphur content % wt, max.</td>
<td>1.5</td>
<td>2.5</td>
</tr>
<tr>
<td>v.</td>
<td>Carbon – residue – Conradson wt %, max.</td>
<td>0.45</td>
<td>Report</td>
</tr>
<tr>
<td>vi.</td>
<td>Water % wt, max.</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>vii.</td>
<td>Sediments % wt, max.</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>viii.</td>
<td>Ash % wt, max.</td>
<td>0.02</td>
<td>0.1</td>
</tr>
<tr>
<td>ix.</td>
<td>Asphaltenes % wt, max.</td>
<td>0.5</td>
<td>report</td>
</tr>
<tr>
<td>x.</td>
<td>Flash point °C Pensky martens M(closed), min</td>
<td>66</td>
<td>66</td>
</tr>
<tr>
<td>xi.</td>
<td>Total acid number mg/KOH/g, max.</td>
<td>0.1</td>
<td>report</td>
</tr>
<tr>
<td>xii.</td>
<td>Pour point °C, max.</td>
<td>4.5</td>
<td>+18</td>
</tr>
<tr>
<td>xiii.</td>
<td>Diesel Index, min. calc</td>
<td>45</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Trace Metals**

| 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. | Silicon, ppm (max) | report | 30 | 30 | 30 | IP 470 |
| xxi. | Aluminium + Silicon, 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.