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**MMDC 3 (1469) CD 3: *Practice for tonnage calculation of coal  
in a stockpile***

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**TANZANIA BUREAU OF STANDARDS**

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# DRAFT TANZANIA STANDARD

## 0. Foreword

This draft Tanzania Standard is being prepared by Solid Mineral Fuels and Products Technical Committee (MMDC 3) under the supervision of the Mining and Minerals Standards Divisional Committee (MMDC).

In preparation of this draft Tanzania Standard assistance was derived from **ASTM D6542 – 05** Standard *Practice for tonnage calculation of coal in a stockpile*.

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# DRAFT TANZANIA STANDARD

## 1. Scope

1.1 This practice is used to calculate the mass (commonly expressed in tons) of coal in a storage pile using the volume of the stockpile by Test Method MMDC 3 (1504) and the density of the coal determined by Test Method MMDC 3 (1808).

1.2 This practice is applicable to all ranks of coal.

1.3 The user of this standard determines when the density values provided by the survey require an adjustment for moisture.

## 2. Referenced Documents

TZS 1934-1:2016/ ISO 1213 -1:1993 Solid mineral fuels - Vocabulary - Part 1: Terms relating to coal preparation.

TZS 1962 - 2:2017(ISO 5069 - 2:1983) Brown coals and lignites - Principles of sampling – Part2: Sample preparation for determination of moisture content and for general analysis.

TZS 2138:2018/ISO 687:2010. Solid mineral fuels — Coke — Determination of moisture in the general analysis test sample.

TZS 2089:2017(ISO 589:2008) Hard coal – Determination of total moisture.

MMDC 3 (1504) Test Method for Determining the Volume of Bulk Materials Using Contours or Cross Sections Created by Direct Operator Compilation Using Photogrammetric Procedures.

MMDC 3 (1808) NWI: Standard Test Method for Determination of Bulk Density of Coal Using Nuclear Backscatter Depth Density Methods.

## 3. Terminology

3.1 Definitions—There are no terms in this practice that require new or other than dictionary definitions. Many terms in this practice may be found in Terminology TZS 1934-1:2016/ ISO 1213 - 1:1993.

## 4. Significance and Use

4.1 The physical inventory of tons of coal in a stockpile, as calculated by this practice, may be used for accounting and tax purposes.

4.2 The inventory results may be compared to other estimates of the inventory, such as: -

4.2.1 Tons from a previous inventory less tons shipped or consumed.

4.2.2 Tons estimated to have been received (from conveyor, rail, or truck weights) less tons shipped or consumed.

## 5. Procedure

5.1 Determine if the reported tonnage should be on an as-determined basis, or some other moisture adjusted basis. If the moisture content was determined on the density measurement samples (see



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Test Method MMDC 3 (1808)), then the density data (and the tonnage) can be calculated to a dry basis or to another moisture-containing basis.

5.1.1 Use Eq 1 or Eq 2 to adjust the as-determined density to a different moisture basis. The percent moisture determined in accordance with Test Methods TZS 2138:2018/ISO 687:2010, TZS 2089:2017(ISO 589:2008), or TZS 1962 - 2:2017(ISO 5069 - 2:1983) in the samples collected according Test Method MMDC 3 (1808) is used in Eq 1 or Eq 2.

5.1.2 Use Eq 1 to adjust the average density values to a dry basis:

$$D_{dry} = D_{det} \times \left(1 - \frac{M_{det}}{100}\right) \quad (1)$$

where:

$D_{dry}$  = density in lb/ft<sup>3</sup> (kg/m<sup>3</sup>) on a dry basis,

$D_{det}$  = density in lb/ft<sup>3</sup> (kg/m<sup>3</sup>) on an as-determined moisture basis, and

$M_{det}$  = % moisture, as determined on the density sample.

5.1.3 Use **Eq 2** to adjust the as-determined density values to some other moisture basis such as as-received, as-shipped, as-stockpiled, etc.

$$D_{adj} = D_{det} \times \left(\frac{100 - M_{adj}}{100 - M_{det}}\right) \quad (2)$$

where:

$D_{adj}$  = density in lb/ft<sup>3</sup> (kg/m<sup>3</sup>) on a desired moisture basis,

$D_{det}$  = density in lb/ft<sup>3</sup> (kg/m<sup>3</sup>) on an as-determined moisture basis, and

$M_{adj}$  = % moisture, at the desired moisture basis, and

$M_{det}$  = % moisture, as determined on the density sample.

5.2 Calculate the tons of coal in the stockpile using **Eq 3**:

$$T = \frac{\bar{D} * V}{t} \quad (3)$$

where:

T = total stockpile tons,

$\bar{D}$  = mean of density samples in lb/ft<sup>3</sup> (kg/m<sup>3</sup>) (from Test Method MMDC 3 (1808)),

V = total volume of stockpile in ft<sup>3</sup> (m<sup>3</sup>) (from Test Method MMDC 3 (1504)), and

t = 2000 lb/t (short ton) (1000 kg/Mg) (metric ton).



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### 6. Confidence Interval Calculation

6.1 A measurement is stated as a quantity, plus or minus some confidence interval, at some level of significance. In the case of volume, this translates to total volume (ft<sup>3</sup>), plus or minus some tolerance factor (stated as percent of total volume), calculated at a significance level consistent with Annex A5 of Test Method MMDC 3 (1808), MMDC 3 (1504).

6.2 The tolerance for the inventory results combines the tolerances, in %, of the density survey data and the volumetric data according to **Eq 4**:

$$C = \sqrt{D^2 + A^2} \quad (4)$$

where:

**C** = combined tolerances of density and volume in %,

**D** = tolerance of density test in percent (from Test Method MMDC 3 (1808)), and

**A** = tolerance of volumetric survey in percent (from Test Method MMDC 3 (1504)).

### 7. Report

7.1 The minimum information to be reported is as follows:

7.1.1 The owner(s) and location of the stockpile.

7.1.2 The dates when the density and the volume were determined.

7.1.3 Tons of coal in the stockpile as calculated by **Eq 3**.

7.1.4 The density and volume values used in the calculations.

7.1.5 The moisture defining the basis on which the density was calculated.

7.1.6 The confidence interval in percent.

### 8. Precision and Bias

8.1 Precision —The precision of the result is given by Eq 4.

8.2 Bias — Since there is no acceptable reference method for determining the bias for the procedure for tonnage, bias has not been determined.