DRAFT KENYA STANDARD **DKS 2912: 2020**

ICS

Solid biofuel —Sustainable Charcoal and carbonized briquettes for household and commercial use — Specification

First Edition 2020

TECHNICAL COMMITTEE REPRESENTATION

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Clean Cooking Association of Kenya (CCAK)
Fine Aroma (FA)
University of Nairobi
Kenya Industrial Research and Development Institute (KIRDI)
Eco-charcoal Ltd
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Kenya Revenue Authority
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)
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Kenya Bureau of Standard- Secretariat.

REVISION OF KENYA STANDARDS

In order to keep abreast of progress in industry, Kenya Standards shall be regularly reviewed. Suggestions for improvements to published standards, addressed to the Managing Director, Kenya Bureau of Standards, are welcome.

DRAFT KENYA STANDARD

DKS 2912: 2020

ICS23.040.20

Solid biofuel — Sustainable Charcoal and carbonized briquettes for household and commercial use — Specification

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Foreword

This Kenya Standard was prepared by the Appropriate Technical Committee under the guidance of the Standards Projects Committee, and it is in accordance with the procedures of the Kenya Bureau of Standards.

The use of wood residues for charcoal provides an effective means of improving the utilization of timber. Wood charcoal can be produced by a wide variety of methods, ranging from simple earth- covered kilns to the beehive kiln and modern retorts for continuous carbonization.

With the increase in the use of sustainable charcoal for household purposes, the need has arisen for an updated specification that establishes a standard for comparison and testing.

Because of the possibility of its being unsuitably stored or transported, charcoal marked in accordance with clause 6 of this standard cannot be assumed to comply with all the relevant requirements at any time other than the time of dispatch from the factory where it was produced.

During the preparation of this standard, reference was made to the following document:

SANS 1399:2008, South African Standard, Wood charcoal and carbonized briquettes for household use

Acknowledgement is hereby made for the assistance derived from this source.

Solid biofuel — sustainable Charcoal and carbonized briquettes for household and commercial use — Specification

1 Scope

This standard specifies requirements for sustainably produced charcoal and carbonized briquettes that are derived from forest, plantation, sustainably harvested wood and other forest products, by–products and residues from wood processing industry, chemically untreated wood, herbaceous biomass, fruit biomass, aquatic biomass, agro-industrial residues (e.g. sugarcane bagasse, rice husks etc.), treated faecal sludge and organic market wastes, in lump and briquette form that is intended for household and commercial use.

2 Normative reference

The following standard contains provisions, which, through reference in this text, constitute provisions of this standard. All standards are subject to revision and, since any reference to a standard is deemed to be a reference to the latest edition of that standard, parties to agreements based on this standard are encouraged to ensure the use of the most recent edition of the standard indicated below.

ISO 3310-2, Test sieves – Technical requirements and testing – Part 2: Test sieves of perforated metal plate.

3 Terms and Definitions

For the purposes of this standard, the following terms and definitions apply:

3.1 Acceptable
In compliance with the provision of this standard, acceptable to the authority administering this standard, or to the parties concluding the purchase contract as relevant.

3.2 Ash content
The residue when charcoal or carbonized briquettes are incinerated in air under standardized conditions.

3.3 Binder
An organic material that, when added to biochar (see 3.3.1) and compacted, holds the granules together in a solid mass (such as but not limited to starch, gum arabic, molasses, vegetable oil, lignin)

3.3.1 Biochar
Carbonised organic material

3.4 Charcoal
Lump carbonaceous residue material from incomplete combustion or pyrolysis of organic materials

3.5 Sustainable charcoal
charcoal produced from sustainable feedstock with efficient carbonization technology

3.6 Sustainable feedstock
Natural resources that are established and managed to ensure long-term provision of raw materials with no negative impact to the environment and the people.

3.7 Efficient carbonization technology
Efficient carbonization is a process by which solid materials with increasing content of the element carbon are formed from organic material usually by pyrolysis in proficient technology that do not harm the environment and minimize material and energy losses.

3.8 Carbonized briquette
A briquette produced by compressing, compacting, densification and rolling biochar with a suitable binder.

3.9 Fixed carbon content

The carbon content that remains after the removal of the ash content and volatile matter content from dry charcoal or carbonised briquettes under standardised conditions.

3.10 Moisture content
The water contained by charcoal or carbonized briquettes and that will be removed by heating at 105 °C

3.11 Untreated wood
Wood that has, since felling, not been in contact with a pesticide or a wood preservative

3.12 Volatile matter content
The gasses other than water vapours lost when charcoal or carbonized briquette are heated under standardized conditions (see 5.8)

3.13
Foreign matter
Any material other than the prescribed ingredients of the sustainable charcoal and carbonized briquettes that compromises the product integrity e.g. sand, sticks, paper stones etc.

3.14
Additives
Acceptable materials used to aid production, delivery or combustion (e.g. pressing aids, staging inhibitors or any other additives like starch, gum Arabic, molasses, vegetable oil, and lignin).

3.15
Defective
Sustainable charcoal or carbonized briquettes that fail, in one or more respects, to comply with the relevant requirements of this standard

3.16
Calorific Value
Energy contained in a fuel determined by the heat energy released by the complete combustion of specified quantity fuel material expressed in MJ/Kg.

3.17
Density
Mass per unit volume (Kg/m^3)

4 Requirements

4.1 Type of raw material

The biomass material used to produce sustainable charcoal and carbonized briquettes shall be such as to be acceptable.

4.2 Foreign matter and additives

4.2.1 Sustainable charcoal and carbonized briquette shall be free from foreign matter.

4.2.1 Additives materials shall be such as to be acceptable.

4.2.3 A binder used shall be such as to be acceptable.

4.3 Physical requirements

4.4 General

The organic material used to produce sustainable charcoal or carbonised briquettes shall be such as to be acceptable.

4.4.1 General

The shape and size of sustainable charcoal or carbonised briquettes shall be such as to be acceptable.

4.4.2 Sieve analysis

4.4.2.1Charcoal

When lump sustainable charcoal are tested in accordance with 5.2, not more that 5 % (by mass) shall be retained on a test sieve of aperture size 106 mm, and the quantity that passes through a test sieve of aperture size 15.0 mm shall not exceed 5 % (by mass).

4.4.2.2 Carbonized briquettes

When carbonized briquettes are tested in accordance with 5.3, the amount that passes through a test sieve of aperture size 15.0 mm shall not exceed 2.5 % (by mass).

4.4.3 Resistance to dropping

4.3.3.1 When an unopened container of carbonized briquettes is tested in accordance with 5.4, the proportion of the contents that passes through a test sieve of aperture size 9.5 mm shall not exceed 5 % (by mass).

4.3.3.2 When an unopened container of sustainable charcoal is tested in accordance with 5.4, the proportion of the contents that passes through a test sieve of aperture size 9.5 mm shall not exceed 7.5 % (by mass).

4.5 Chemical requirements

4.5.1 Moisture content

When determined in accordance with 5.6, the moisture content of sustainable charcoal and carbonized briquettes shall not exceed 10 %.

4.5.2 Volatile matter content

When determined in accordance with 5.8, the volatile matter content shall not exceed 205 % in the case of sustainable charcoal, and in the case of carbonized briquettes shall not exceed 25%

4.5.3 Ash content

When determined in accordance with 5.9, the ash content of sustainable charcoal shall not exceed 5 % in the case of charcoal, and in the case of carbonized briquettes shall not exceed 27%

4.5.4 Fixed carbon content

When determined in accordance with 5.10, the fixed carbon content of sustainable charcoal shall not be less than 75 % in the case of charcoal, and44% in the case of carbonized briquettes.

5 Inspection and methods of test

5.1 Inspection

Visually inspect each container in the sample drawn in accordance with A.2.2.1 (see Annex A) for compliance with those requirements of the standard for which tests to assess compliance are not given in 5.2 to 5.10 (inclusive).

5.2 Sieve analysis for sustainable charcoal

5.2.1 Apparatus

5.2.1.1 Two balances, of suitable capacity, that have scale divisions at intervals not exceeding 1 g and 20 g, respectively.

5.2.1.2 Two round test sieves, that comply with the requirements of KSISO 3310-2, each equipped with a cover and a receiver, and that have square apertures of nominal size 106 mm and9,5 mm, respectively.

5.2.2 Test specimens

Take, at random, two containers from the sample under test (see A.2.2.2 of Annex A).

5.2.3 Procedure

Determine the mass of the contents of one container to the nearest 20 g. Using a horizontal to and fro movement, sieve the contents of the container on the 106 mm test sieve (see 5.2.1.2) in such increments as to ensure that, on completion of the sieving of each increment, each piece in the increment has been in direct contact with the sieve plate. Then turn each piece of sustainable charcoal retained on the sieve to determine whether it passes, in any position (without applying force), through the sieve. Before the next increment is sieved, remove all the pieces retained on the sieve and keep them for the determination of their mass.

Using the 9,5 mm test sieve, sieve, as above, the charcoal that passed through the 106 mm test sieve, but do not turn each piece retained on the sieve. Retain the charcoal that passed through the 9,5 mm test sieve. Determine the mass of this quantity and the pieces retained on the 106 mm test sieve separately to the nearest 1 g.

Repeat the test on the second container. After completion, retain all the fractions from each container (see 5.6.3 and 5.7).

5.2.4 Expression of results

5.2.4.1 For each container calculate, to the nearest 0.1 %, the retention on the 106 mm test sieve, as follows:

$$\frac{M1}{M2} x100$$

Where;

m1 = mass of the pieces retained on the 106 mm test sieve, in grams; and

m2 = mass of the total contents of the container before sieving, in grams.

Record the mean of the two results.

5.2.4.2 For each container calculate, to the nearest 0.1 %, the quantity that passed through the 9.5 mm test sieve, as follows:

$$\frac{M3}{M2} x100$$

Where;

m2 is the mass of the total contents of the container before sieving, in grams; and

m3 is the mass of the quantity that passed through the 9,5 mm test sieve, in grams.

Record the mean of the two results.

5.2.4.3 Check for compliance with 4.4.2.

5.3 Sieve analysis for carbonized briquettes

5.3.1 Apparatus

5.3.1.1 Balances, as in 5.2.1.1.

5.3.1.2 Round test sieve, that complies with the requirements of KS ISO 3310-2, that is equipped with a cover and a receiver, and that has square apertures of nominal size 9,5 mm.

5.3.2 Test specimens

Take, at random, two containers from the sample under test (see A.2.2.2 of Annex A).

5.3.3 Procedure

Determine the mass of the contents of one container to the nearest 20 g. Separate all the unbroken briquettes from the broken briquettes and fines. Using a horizontal to and fro movement, sieve the broken briquettes and fines on the test sieve in such increments as to ensure that, on the completion of the sieving of each increment, each piece in the increment has been in direct contact with the sieve plate. Determine the mass of the quantity that passed through the test sieve to the nearest 1 g.

Repeat the test on the second container. Retain all the unbroken briquettes from each container (see 5.6.3 and 5.7).

5.3.4 Expression of results

5.3.4.1 For each container calculate, to the nearest 0.1 %, the quantity that passed through the test sieve, as follows:

$$\frac{M4}{M5} x100$$

Where;

m4 is the mass of the quantity that passed through the 15.0 mm test sieve, in grams; and

m5 is the mass of the total contents of the container, in grams.

Record the mean of the two results.

5.3.4.2 Check for compliance with 4.4.2.

5.4 Drop resistance of container content

5.4.1 Apparatus

5.4.1.1 Dropping device, comprising a divided table (or single-leaf device), fitted with a release mechanism, that is so spring-operated as to produce, from a height of 750 mm, free fall of the container without rotational or sideways motion of the container.

5.4.1.2 Impact surface, comprising a rigid and level concrete surface (or a steel plate embedded in concrete) of sufficient strength and rigidity to withstand repeated impacts of test material without significant deflection or movement.

5.4.2 Test specimens

Take, at random, two of the remaining containers from the sample under test (see A.2.2.2 of Annex A).

5.4.3 Procedure

So position one of the containers upright that, when released, it will fall on its base. Operate the release mechanism and drop the container. Unless the container has failed, invert it, gently distribute the contents as symmetrically as possible and repeat the drop. Repeat this procedure with the container positioned on its right-hand side and on its left-hand side.

Repeat the test on the second container. If a container fails, take a new container from the remainder of the sample under test (see A.2.2.2 of Annex A), and repeat the procedure.

For each container determine, as in5.2 or 5.3 (as relevant), the percentage (by mass) of the contents that passed through a 9.5 mm test sieve.

5.6 Moisture content

5.6.1 Principle

A test specimen is heated to a constant mass in an air-oven at a temperature of 105 °C and the percentage moisture content is calculated from the loss in mass of the test specimen.

5.6.2 Apparatus

5.6.2.1 Air oven, capable of maintaining a substantially uniform temperature of 105 °C, and such that the rate of atmosphere change is sufficiently rapid for the test.

5.6.2.2 Balance, accurate to 1.0 g.

5.6.2.3 Tray, of area approximately 0.1 m^2 and of depth 25 mm, made of non-corrodible material such as stainless steel, tinned steel or aluminium. The tray shall be clean, dry and accurately tared.

5.6.3 Test specimen

Approximately 500gms in triplicates of charcoal or carbonized briquettes. For the test on briquettes, take at random a similar number of unbroken briquettes from each container retained in terms of 5.3.3 until approximately 500g is obtained and, for the test on charcoal, take a test mass of 250 g from the contents of each container retained in terms of 5.2.3.

5.6.4 Procedure

Determine the mass m1 of the dry empty tray. Transfer the specimen as completely as possible to the tray and spread the specimen evenly. Determine the initial mass m2 of the tray and contents. Place the charged tray in the oven, preheated to 105 °C, until constant mass is obtained. Determine the mass m3 of the heated tray and contents while they are still hot, to avoid absorption of moisture during cooling.

5.6.5 Expression of results

5.6.5.1 The moisture content M of the charcoal, expressed as a percentage (by mass), is given by the equation

$$M=\frac{M2-M3}{M2-M1}x100$$

Where;

m1 =mass of the empty tray, in grams;

m2 =initial mass of the tray plus the test specimen, in grams;

m3 =mass of the tray plus the test specimen after heating, in grams.

Report the result (preferably the mean of duplicate determinations) to the nearest 0,1 % (by mass).

5.6.5.2 Check for compliance with 4.5.1.

5.6.6 Precision of results

The results of triplicate determinations shall not differ by more than the appropriate of the values given in table 1.

Table 1 — Precision of results

1	2
Moisture content (by mass) %	**Same laboratory, repeatability**
< 5	0,5 % absolute
≥ 5	0,5 % absolute
NOTE Limits for reproducibility (different laboratories) have not yet been established because results obtained in different laboratories depend on the humidity conditions, which can vary from laboratory to laboratory.	

5.7 Preparation of test material for volatile matter content and ash content

Take, at random, eight of the unbroken briquettes (four from each container) retained in terms of5.3.3 or, in the case of charcoal, a specimen of mass at least 200 g from the contents of each container retained in terms of 5.2.3. Quickly (to avoid heat build-up) pulverize or grind the specimen such that it passes through a 250 µm sieve, mix well, and store in an airtight container.

5.8 Volatile matter content

5.8.1 Principle

A test specimen from which the moisture content has been extracted, is heated for 7 min at 900 °C out of contact with air. The percentage of the volatile matter is calculated from the loss in mass of the test specimen.

5.8.2 Apparatus

5.8.2.1 Muffle furnace, heated by electricity, in which a zone of adequate size is maintained at a constant and uniform temperature of 900 °C ± 10 °C. The furnace may be of the stop-ended type, or fitted at the back with a flue of diameter approximately 25 mm and of length approximately 150 mm.

The heat capacity of the furnace is such that, with an initial temperature of 900 °C, a minimum temperature of 885 °C is regained within 4 min (and preferably within 3 min) of the insertion of a cold stand and its crucible(s), the temperature being measured with the unsheathed thermocouple (see 5.8.2.2) by inserting its thermojunction midway between the floor of the furnace and the base of the crucible in its stand. If the stand holds more than one crucible, the temperature under each crucible is checked in the same manner.

Normally, the furnace will have been designed specifically for receiving either one crucible and its stand or a number of crucibles in one stand.

NOTE 1 The position of the crucible stand is chosen within the zone of uniform temperature and this position is used for all determinations.

NOTE 2 The temperature of 900 °C is attained as closely as possible and the tolerance of ± 10 °C is specified to compensate for inherent errors in the temperature measurement and lack of uniformity in the temperature distribution.

5.8.2.2 Where applicable, pyrometer, with an unsheathed thermocouple, of wire of diameter not exceeding 1 mm, for checking the temperature characteristics of the muffle furnace.

NOTE 1 A sheathed thermocouple can be permanently installed in the furnace with its thermojunction as close as possible to the centre of the zone of uniform temperature. In this case, its temperature readings are correlated at frequent intervals with those of the unsheathed thermocouple. (Because of the thickness of the sheathed thermocouple, it cannot be inserted under a crucible.)

NOTE 2 The temperature/electromotive force relationship of a thermojunction maintained at elevated temperatures gradually changes with time.

5.8.2.3 Cylindrical crucible, with a well-fitting lid, both made of fused silica. The crucible and lid have a combined mass of between 10 g and 14 g, and their dimensions approximate those shown in figure 1.

The fit of the lid to the crucible is critical for the determination and a lid is so selected to match the crucible that the gap between the lid and the crucible does not exceed 0.5 mm. After selection, the crucible and the lid are ground together to give smooth-fitting surfaces and are thereafter used solely as a matched pair.

NOTE Crucibles of other refractory materials or of platinum may be used, provided that they give, within the prescribed limits of precision (see 5.8.6), the same results as the silica crucibles.

5.8.2.4 Suitable stand, in which to place the crucible(s) in the muffle furnace, and such that the appropriate rate of heating can be achieved.

5.8.2.5 Desiccant, of fresh or freshly regenerated self-indicating gel.

5.8.2.6 Desiccator, of suitable dimensions, that contains the desiccant.

5.8.2.7 Analytical balance, accurate to within 0.1 mg.

5.8.2.8 Stopwatch.

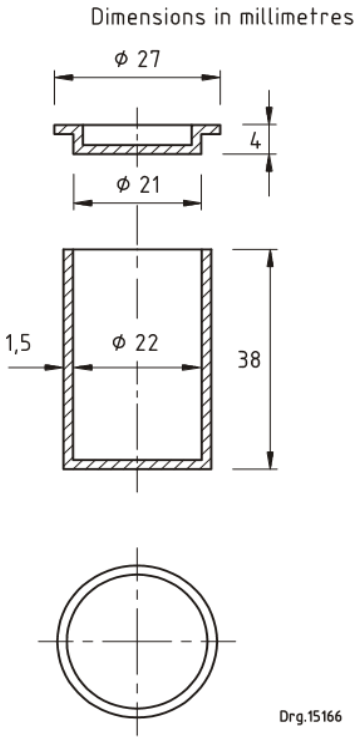

Figure 1 — Silica crucible and lid

Figure 1 — Silica crucible and lid

5.8.3 Test specimen

A test specimen taken from the material prepared in accordance with 5.7. Ensure that the pre-prepared material is thoroughly mixed (preferably by mechanical means) for at least 1 min.

5.8.4 Procedure

Heat the crucible and lid (or the set of crucibles and lids (as relevant)) in the muffle furnace at 900 °C ± 10 °C for 7 min. Remove the crucible(s) from the furnace, allow to cool on a thick metal plate for 10 min and then for 15 min in the desiccator located next to the balance.

When cooled to room temperature, determine (in turn) the mass m1 of each clean empty crucible and lid, to the nearest 0.1 mg, and return the lid to the desiccator. Weigh, to the nearest 0.1 mg, into each crucible, 1.00 g to 1.01 g of the test specimen, and heat the crucible and test specimen, without the lid, in an air oven (see 5.6.2.1) at 105 °C for 1 h. (This initial action is critical, since the result has to be expressed on a dry basis.) Cool the crucible and test specimen in the desiccator for 15 min. Replace the lid and determine, to the nearest 0.1 mg, the initial mass m2 of each crucible plus lid plus dried specimen.

Tap each crucible on a clean, hard surface until the specimen forms a layer of uniform thickness at the bottom of the crucible.

Place the charged crucible(s) in the stand and, in the case of multiple determination, fill the vacant places in the stand with empty crucibles. Place the stand within the zone of uniform temperature in the furnace, preheated to 900 °C, for exactly 7 min, remove the crucible(s), allow to cool on a thick metal plate for 10 min and then in the desiccator for 15 min. When the crucible(s) has (have) cooled to room temperature, determine the mass of each charged crucible to the nearest 0.1 mg and record the final mass m3 of each.

NOTE Precisely similar treatment of a crucible before and after determination minimizes the effect of any film of water absorbed on its surface, and the rapid cooling reduces absorption of moisture by the charcoal residue.

5.8.5 Expression of results

5.8.5.1 The volatile matter content V, expressed as a percentage (by mass), is given by the equation

$$V=\frac{M2-M3}{M2-M1}x100$$

Where;

m1 is the mass of the empty clean crucible plus lid, in grams;

m2 is the mass of the crucible plus lid plus specimen after drying at 105 °C for 1 h, in grams;

m3 is the mass of the crucible plus lid plus residue after heating, in grams.

Report the result (preferably the mean of duplicate determinations), to the nearest 0,1 % (by mass).

5.8.5.2 Check for compliance with 4.5.2.

5.8.6 Precision of result

The results of duplicate determinations shall not differ by more than the appropriate of the values given in table 2.

Table 2 — Precision of results

1	2	3
Volatile matter content (by mass) %	**Same laboratory, repeatability**	**Different laboratories, reproducibility**
< 10	0,3 % absolute	0,5 % absolute
≥ 10	3 % of the mean result	The greater of 0,5 % absolute and 4 % of the mean result

5.9 Ash content

5.9.1 Principle

A test specimen from which the moisture content has been extracted, is heated in air at a specified rate up to a temperature of 710 °C ± 10 °C and maintained at this temperature until constant in mass. The percentage of the ash is calculated from the mass of the residue after incineration.

5.9.2 Apparatus

5.9.2.1 Analytical balance, accurate to within 0.1 mg.

5.9.2.2 Muffle furnace, capable of giving a zone of substantially uniform temperature at the temperature levels required by the procedure and of reaching these levels in the specified times. The ventilation through the muffle furnace should be such as to give more than five air changes per minute.

NOTE The number of air changes per minute can be assessed by measurement of the air flow from the muffle furnace flue, using a pilot-static tube and a sensitive manometer.

5.9.2.3 Dish, of silica, porcelain or platinum, of depth 8 mm to 15 mm. The diameter of the dish is such that the surface (mass) density of the specimen layer does not exceed 0.15 g/cm2.

5.9.2.4 Insulating plate, of silica of thickness 6 mm, or of heat-resistant steel of such size as to be an easy sliding fit into the muffle furnace (see 5.9.2.2).

5.9.2.5 Desiccant, of fresh or freshly regenerated self-indicating gel.

5.9.2.6 Desiccator, of suitable dimensions, that contains the desiccant.

5.9.3 Test specimen

A test specimen taken from the material prepared in accordance with 5.7. Ensure that the prepared material is thoroughly mixed (preferably by mechanical means) for at least 1 min.

5.9.4 Procedure

Heat the dish (see 5.9.2.3) in the muffle furnace to 710 °C ± 10 °C and maintain it at this temperature for 15 min. Remove the dish from the furnace and allow the dish to cool on a thick metal plate for 10 min and then for 15 min in the desiccator located next to the balance. When cool, determine the mass m1 of the dish to the nearest 0,1 mg.

Spread ± 1 g of the test specimen evenly in the dish and heat the dish and test specimen in an air oven (see 5.6.2.1) at 105 °C for 1 h. (This initial action is critical, since the result has to be expressed on a dry basis.) Cool the dish and test specimen in the desiccator for 15 min. Determine the initial mass m2 of the dish plus dried specimen to the nearest 0,1 mg.

Place the dish, plus test specimen, in the cold muffle furnace and raise the temperature to 250 °C within 30 min, then from 250 °C to 500 °C within another 30 min, and finally from 500 °C to 710 °C ± 10 °C within 60 min.

When incineration is complete, remove the dish plus test specimen from the furnace, and allow to cool on a thick metal plate for 10 min and then in a desiccator for 15 min. When the dish and test specimen have cooled, determine the mass m3 of the dish plus incinerated test specimen to the nearest 0,1 mg.

Reheat at 710 °C ± 10 °C for further 15 min periods, allow to cool, and determine the mass until any change in mass does not exceed 1 mg.

5.9.5 Expression of results

5.9.5.1 The ash content A, expressed as a percentage (by mass), is given by the equation

$$A=\frac{M3-M2}{M2-M1}x100$$

Where;

m1 is the mass of the dish, in grams;

m2 is the mass of the dish plus specimen after drying at 105 °C for 1 h, in grams;

m3 is the mass of the dish plus ash after incineration, in grams.

Report the result, as the arithmetic mean of duplicate determinations, to the nearest 0,1 % (by mass).

5.9.5.2 Check for compliance with 4.5.3.

5.9.6 Precision of results

The results of duplicate determinations shall not differ by more than the appropriate of the values given in table 3.

Table 3 — Precision of results

1	2	3
Ash content (by mass) %	**Same laboratory, repeatability**	**Different laboratories, reproducibility**
< 10 ≥ 10	0,2 % absolute 2 % of the mean	0,3 % absolute 3 % of the mean

5.10 Fixed carbon content

5.10.1 Principle

The fixed carbon is the carbon that remains after the removal of the volatile matter content and the ash content in accordance with 5.8 and 5.9 respectively.

5.10.2 Expression of results

5.10.2.1 The fixed carbon content FC, expressed as a percentage (by mass), is given by the equation

$FC=100-(A+V+Mc)$

Where;

A is the ash content determined in accordance with 5.9, as a percentage (by mass);

V is the volatile matter content determined in accordance with 5.8, as a percentage (by mass),

Mc is the moisture content determined in accordance with 5.6, as a percentage (by mass).

5.10.2.2 Check for compliance with 4.5.4.

5.11 Test report

The test report shall contain the following particulars:

a) the identification of the product or sample tested;
b) a reference to this standard;
c) the test results;
d) any deviations from the test methods in this standard;
e) any unusual features noted during the determinations; and
f) the date(s) of the tests.

6 Packing and marking

6.1 Packing

Sustainable Charcoal and briquettes shall be packed and sealed in;

a) multi-wall bags, corrugated board containers or any suitable packaging material such as to be acceptable to maintain product integrity.

b) units of 1 kg to **50 kg** as required.

6.2 Marking

Each container shall be legibly and indelibly marked with the following information:

a) the manufacturer’s name or trade name or trade mark;

b) the description of the contents of the container, i.e. "Carbonized briquettes";

c) the batch identification or the date of packing (which may be in code);

d) the net mass of the contents;

e) Country of origin;

e) raw material used e.g. char dust; and source

f) handling and storage information

g) Information on usage specifying that it should be used under a well-ventilated environment; and

f) any additional information, as required (see A.1(d) of annex A).

Annex A
(normative)
Quality verification of charcoal and carbonized briquettes

A.1 Quality verification

A.1.1 When a purchaser requires on-going verification of the quality of sustainable charcoal and carbonized briquettes produced to this standard, it is suggested that instead of concentrating solely on the evaluation of the final product, he also direct his attention to the manufacturer's quality system. In this connection it should be noted that KS ISO9001 covers the provision of an integrated quality system.

A.1.2 If no information about the implementation of quality control or testing during manufacture is available to help in assessing the quality of a lot, and a purchaser wishes to establish, by inspection and testing of samples of the final product, whether a lot (see A.2.1.2) of the product complies with this standard, use the sampling plan given in A.2.2.

NOTE 1 The sampling plan applies to the final product only.

NOTE 2 A lot that in terms of the sampling plan is deemed to comply with the standard, could contain defective charcoal and carbonized briquettes.

In cases of dispute, the lot shall be available for inspection by the Kenya Bureau of Standards.

A.2 Assessment of compliance

A.2.1 Definitions

A.2.1.1 defective
Charcoal that fails or carbonized briquettes that fail, in one or more respects, to comply with the relevant requirements of this standard

A.2.1.2 lot
The quantity of charcoal or carbonized briquettes of the same form, packed in containers of the same type and size, and bearing the same batch identification or date of packing, from one manufacturer, and submitted at any one time for inspection and testing

A.2.2 Sampling

The following sampling procedure shall be used to determine whether a lot complies with the requirements of this standard. The sample so taken shall be deemed to represent the lot for the respective properties.

A.2.2.1 Sample for inspection

From the lot, draw at random the greater of the following numbers of containers:

Twelve containers or the number of containers calculated (to the nearest whole number) by the following:

$$\sqrt{\frac{A}{2}}$$

Where;

A is the number of containers in the lot.

A.2.2.2 Sample for testing

After inspection of the sample taken in accordance with A.2.2.1, take from it, at random,10 containers.

A.3 Criteria of compliance

The lot shall be deemed to comply with the relevant requirements of the standard if, after inspection and testing of the sample taken in accordance with A.2.2, defect does not exceed 1 container of sample.

