

DRAFT TANZANIA STANDARD

Food dryer — Methods of Test

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Foreword

This Draft Tanzania Standard has been prepared under Clean Cooking Stoves and Clean Cooking Solutions (MEDC 12) Technical Committee, under supervision of Mechanical Engineering Standards Divisional committee.

Access to drying oven has been identified as an important area of intervention to fisheries and food products drying. Majority of actors in fisheries and livestock in our country are relying on local drying mechanisms. The resultant vicious cycle of poverty and inefficiency drying mechanism can be broken by promoting Food dryer.

Food dryer is a recently identified drying option, which promises significant environmental, productivity and health benefits.

This standard, therefore will facilitate the testing of Food dryers.

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

PNS/PAES 248, Agricultural machinery – Fruit Dryer – Specifications PNS/PAES 249, Agricultural machinery – Fruit Dryer – Methods of Test

1 Scope

This Standard specifies the methods of test for food dryer. Specifically, this document shall be used to:

- a) Verify food dryer parameters against the list of specifications submitted by the manufacturer;
- b) Determine the performance of the food dryer;
- c) Evaluate the ease of handling and safety features; and
- d) Report the results of the tests.

2 Normative References

No normative references cited.

3 Terms and Definitions

For the purpose of this Standard, the terms and definitions stipulated in TZS ### (Food dryer – Specifications) and the following apply:

3.1

airflow rate

volume of air delivered to the mass of commodities per unit time, expressed in m^3/s

3.2

drying air temperature

mean temperature of the air to be used for drying the commodity, measured at a number of points as distributed along the drying chamber, expressed in °C.

3.3

drying rate

amount of water removed per unit time, expressed in kg/h

3.4

drying system efficiency

ratio of the total heat utilized for drying to the heat available in the heat source, expressed in %; also known as overallthermal efficiency

3.4.1

drying efficiency

ratio of the total heat utilized to vaporize moisture in the commodity to the amount of heat added to the drying air, expressed in % also known as heat utilization efficiency

3.4.2

heating system efficiency

ratio of the amount of heat added to the drying air to the heat available in heat source, expressed in %

3.4.2.1

combustion efficiency

ratio of the amount of heat released by the heat source to the heatavailable in the heat source, expressed in %

3.4.2.2

furnace efficiency

ratio of the amount of heat added to the drying air to the heat released by the heat source, expressed in %

3.5

foreign matter

all matters other than the commodity

3.6

fuel consumption

total amount of fuel consumed by the heating system per unit of drying time, expressed in L/h or kg/h

3.7

heat utilization

total amount of heat utilized to vaporize moisture in the commodity, expressed in kJ/kgwater

3.8

moisture gradient

difference between the maximum and the minimum moisture contentrandomly sampled after drying

3.9

moisture reduction rate

ratio of the average percent moisture content removed from the commodity tothe drying time, expressed in %/h

3.10

running-in

preliminary operation of the machine to make various adjustments prior to the conduct of the test until the operation is stable

3.11

static pressure

pressure build-up in the plenum chamber to maintain uniform distribution ofair flow, expressed in Pa

3.12

test applicant

entity that officially applied for a machinery testing

4 Principle of the Test

The test shall be carried out to verify the actual specification of the Food dryer. Its specifications shall be validated with TZS #### (Food dryer – Specifications).

5 Test Instruments and Materials

5.1 Test instruments

The suggested list of minimum field and laboratory test equipment and materials needed to carry out the test is specified in Annex A (Minimum list of field and laboratory test equipment and materials). These instruments shall be calibrated regularly. It shall be physically checked and cleaned for operation before and after each test. A checklist of instruments and materials to be used before departure to and from the testing area shall be prepared.

5.2 Test materials

- **5.2.1** The material to be used for testing drying oven shall be fresh commodity. The amount of material shall be sufficient for one full load of the dryer to be tested.
- **5.2.2** Fruit to be dried shall be single variety and the minimum moisture content shallbe 75%. The fruits shall be prepared as necessary before drying.
- **5.2.3** For drying salted fish and anchovies, the fish shall be fresh, wholesome and fit for human consumption. Salt should be of food grade quality and should meet the purity requirements of standards for iodized salt as per TZS ###.
- **5.2.4** Seaweed to be dried shall be fresh and of one species only. Sea cucumber shall be appropriately processed prior to drying. Each sea cucumber should be at least 300 g in weight.
- **5.2.5** Other product according to available standards.

6 General

6.1 Conditions for the test

6.1.1 Test site conditions

The drying oven shall be tested as installed for normal operation. The site should have ample provisions for material handling, temporary storage, workspace and should be suitable for normal working conditions. Adequate ventilation and lighting shall be provided in the area.

6.1.2 Selection of the drying oven to be tested

A dryer submitted for testing shall be sampled as shown in Table 1 and Table 2 below or any other accepted method of selection.

	For Visual and Dimensional Tests	For other Tests
Lot Size	Sample size	Sample size
N	n	n
Up to 10	1	1
11 to 25	2	2
26 to 50	3	2
51 to 100	5	2
101 to 300	13	3
301 to 500	32	5
501 to 1000	50	8
1001 to above	80	13

Table 1 - Scale of Sampling

Table 2 - Scale of Sampling and Permissible Number of Defectives

	For Visual and Dimensional Tests		For o	ther Tests
Lot Size		Permissible		Permissible
	Sample size	Number of	Sample size	Number of
Ν	n	Defectives	n	Defectives
Up to 10	1	0	1	0
11 to 25	2	0	2	0
26 to 50	3	0	2	0
51 to 100	5	0	2	0
101 to 300	13	1	3	0
301 to 500	32	3	5	0
501 to 1000	50	5	8	1
1001 to above	80	7	13	1

6.1.3 Suspension/Termination of test

- **6.1.3.1** The test may be suspended if the machine stops during test run due to power source breakdown or malfunction. If the machine will not be able to continue its operation, the test shall be terminated.
- **6.1.3.2** For solar dryers, test shall be suspended if there is cloud cover for more than a total of two hours anytime during the test.

6.2 Pre-test activities

6.2.1 Running-in and preliminary adjustment

The dryer shall undergo a running-in period before the start of the test. Itshall be operated

for sufficient duration with or without load. During the running-in period, the various adjustments of the machine shall be made according to the recommendations of the manufacturer.

6.2.2 Verification of specification

The manufacturer specifications including the physical details shall be verified using Annex B (Specifications of drying oven). A stable and level surface shall be used as reference plane for verification of dimensional machine specifications.

6.2.3 Preparation of the drying for testing

The dryer shall be checked to ensure that it has been assembled and installed in accordance with the instruction of the manufacturer.

6.2.4 Sampling of test materials

Test materials shall be collected for analysis. Procedures for sampling is shown in Annex C (Sampling procedures).

7 Performance Test and Procedures

7.1 Test set-up

- **7.1.1** The temperature sensor shall be mounted on or inside the dryer for temperature sensing. These shall be mounted at the following locations:
 - a) outside the dryer for ambient temperature measurement;
 - b) at the plenum interface, if applicable, for the drying air temperature;
 - c) after the plenum or with the commodity;
 - d) immediately outside the dryer to measure exhaust air temperature; and
 - e) at the commodity.
- **7.1.2** Temperature sensors shall be partially shielded to minimize errors due to heat radiation. Additional sensors may be installed as necessary.
- **7.1.3** For the measurement of static pressure, a pitot tube and manometer or any other suitable apparatus shall be installed at the plenum/transition duct (between blower and dryer), if applicable.
- **7.1.4** For the measurement of airflow rate or air velocity, an anemometer, air velocitymeter, or any other suitable apparatus shall be used, if applicable.

7.2 Operation of the drying oven

7.2.1 The dryer shall be operated under normal working condition as prescribed by the manufacturer or as specified in the operator's manual until the desired moisture content of the product is achieved. The drying operation shall be conducted at the test site

including all measurements which form part of the test.

7.2.2 The control of drying air condition shall be made by adjusting the temperature settings at the control box, or by manually adjusting the furnace by the manufacturer's representative, if automatic temperature control mechanism is not fitted. Adjustment for the purpose of maintaining a steady temperature of the drying air may be made at any time but any adjustment of an automatic control shall have been concurred by the test engineer and the official representative of the test applicant.

7.3 Test trial

One test trial at full capacity shall be adopted.

7.4 Sampling

Samples shall be collected from the input and final output during the test trial. Procedures for sampling is shown in Annex C (Sampling procedures).

7.5 Data collection

7.5.1 Dryer load capacity

The load capacity shall be measured in terms of weight.

7.5.2 Temperatures

The wet bulb and dry bulb temperature of the ambient, drying air, and exhaustair, and the commodity temperature shall be recorded every 30 minutes.

7.5.3 Air velocity

The air velocity shall be measured at the air duct or at the heat exchanger, whichever is applicable. It shall be measured using an anemometer, air velocity meter, or any other suitable apparatus, expressed in m/s, every 30 minutes.

7.5.4 Moisture content

- 7.5.4.1 The initial moisture content shall be determined from samples taken from theinput commodity using the procedures in the laboratory analysis as specifiedin Annex D (Laboratory analysis).
- 7.5.4.2 Samples for moisture content determination shall be taken every 30 minutes at the bottom, middle, and top drying racks (for vertically arranged trays) or beginning, center, and last drying trays (for horizontally arranged trays). The change in weight of the samples shall be used to determine the rate of moisture content reduction.

7.5.5 Static pressure

Static pressure shall be measured every 30 minutes by the use of pitot tube and manometer or any other suitable apparatus. The pitot tube and manometer shall be mounted at the plenum/transition duct (between blower and dryer), if applicable.

7.5.6 Duration of test

The duration of the test trial shall be carried out with the same operational setting. The length of the test shall be such that one full load capacity of commodity has been dried to the desired final moisture content as specified by the applicable product standard presented in 6.4 of TZS ### (Food dryer — Specifications). The desired final moisture content shall be as recommended by the test applicant if no product standard is available.

7.5.7 Noise level

- **7.5.7.1** The noise level shall be measured using noise level meter 50 mm away from the operator's ear. The measurement shall be done at the dryer's control panel and feeding area when the dryer is full with burner on and operating at the recommended settings of different components of the dryer.
- **7.5.7.2** For each data to be taken, there shall be a minimum of five observations. Before obtaining the data, the speed of components, and other functional characteristics should be ensured to have stabilized. The time of recording shall be properly allocated during the whole duration of the test trial.

7.5.8 Power requirement

7.5.8.1 Measurement of electric power requirement

A power meter shall be used to measure the voltage, current, and the total electric power requirement of the dryer. There shall be three sets of datawith a minimum of five observations per set taken with and without load.

7.5.8.2 Measurement of fuel consumption

After the test, the total amount of fuel consumed and the total time of operation shall be recorded.

7.5.8.3 Measurement of solar irradiance

Solar irradiance shall be measured in W/m² every 30 minutes by an appropriate measuring device.

7.5.9 Drying loss

The fresh and dried commodity products collected at all areas of the machine, other than the discharge outlet, should be weighed for the determination of drying loss.

7.6 Data recording and observations

The record sheet for all data and information during the test is shown in Annex E (Performance test data sheet). The observations to be taken during the performance test shall be recorded in this sheet.

8 Laboratory Analysis of Dried Samples

Laboratory analysis shall be conducted to determine the moisture content of the material used before and after the drying test. The laboratory procedure to be followed in the analysis is specified in Annex D (Laboratory analysis) while the data sheet is shown in Annex F (Laboratory analysis data sheet).

9 Data Analysis

The machine specifications and results of the test shall be presented in tabularform in which the data shall be taken from Annex B (Specifications of drying oven) and E (Performance test data sheet). A schematic diagram of the dryerset-up shall also be included. The observations made on the machine while inoperation shall be supported with photographs.

10 Formula

The formula to be used during calculation and testing are presented in Annex G (Formulas used during calculations and testing).

11 Test Report

The test report shall include the following information in the order given below:

- a) Name of testing agency;
- b) Test report number;
- c) Title;
- d) Summary of results;
- e) Purpose and scope of test;
- f) Methods of test;
- g) Description of the machine;
- h) Specifications;
- i) Results;
- j) Observations (include pictures); and
- k) Names, signatures, and designation of test engineers.

Annex A

(Informative)

Minimum list of field and laboratory

test equipment and materials

No.	Equipment/material	Quantity
A.1	Field test	
A.1.1	Thermometer/Temperature sensor	4
A.1.2	Hygrometer	
A.1.3	Anemometer/Air velocity meter	1
A.1.4	Timer	
	Minimum resolution: 0.1 second	2
A.1.5	Measuring tape	1
A.1.6	Sound level meter	1
	Range: 30 – 130 dB (A)	
A.1.7	Weighing scale	
	Capacity: 100 kg Scale	1
	divisions: 0.5 kg	
A.1.8	Power meter	1
	50 Hz, 230 V	
A.1.9	Camera	1
A.1.10	Scientific calculator	1
A.1.11	Graduated cylinder	1
	Capacity: 1L; Increments: 20 ml	
A.1.12	Pitot tube/Manometer	1
A.1.13	Moisture meter	1
A.1.14	Tachometer	1
A.1.15	Labeling tags which include:	
	Date of test	
	Dryer on test	20
	Sample source	
	Variety/Species	
	Trial number	
A.1.16	Sample bags	50
Δ 2	Laboratory test	
~· £		

A 2 4	Weighing eacle	4
A.2.1	Concept: 1000 g	
	Scale Divisions: 0.01 a	
A 2 2	Scale Divisions: 0.01 g	1
A.2.2		1
A.2.3		1
A.2.4	Aluminum moisture can	3

Annex B

(Informative)

Specifications of Food dryer

Name of Applicant:	
Address :	
Tel. No. :	
Name of Manufacturer	
Address	
Tel. No.	
GENERAL INFORMATION	
Make :	Туре :
Serial No.	Brand/Model :
Date of Manufacture:	
Testing Agency :	Test Engineer:
Location of Test :	Date of Test :
\mathbf{O}	

			Actual
	ITEMS	Manufacturer's	Measurement/
No.		Specifications	Inspection by the
			Testing Agency
1	Drying capacity, kg/h		
2	Drying chamber		
2.1	Material(s) of construction		
2.2	Dimensions, mm		
2.2.1	Length		
2.2.2	Width		
2.2.3	Height		
2.3	Drying racks		
2.3.1	Material(s) of construction		
2.3.2	Dimensions, mm		
2.3.2.1	Length		
2.3.2.2	Width		
2.3.2.3	Thickness	6	
3	Air distribution system		
3.1	Plenum		
3.1.1	Material(s)		
3.1.1.1	Intake manifold		
3.1.1.2	Exhaust manifold		
3.2	Ducting		
3.2.1	Material		
3.2.2	Dimensions, mm		
3.2.2.1	Length		
3.2.2.2	Diameter (if cylindrical)		
3.2.2.3	Width (if rectangular)		
3.2.2.4	Height (rectangular)		
3.3	Blower/Fans		
3.3.1	Туре		
3.3.2	Brand/Model		
3.3.3	Maximum airflow rate,		
	m3/min		
3.3.4	Maximum static pressure,(Pa)		
0.05		15	
3.3.5	iviaterial(s) of construction		

No.	ITEMS	Manufacturer's Specifications	Actual Measurement/ Inspection by the Testing Agency
3.3.6	Prime mover		
3.3.6.1	For electric motors		
3.3.6.1.1	Туре		
3.3.6.1.2	Brand		
3.3.6.1.3	Make or manufacturer		
3.3.6.1.4	Serial number		
3.3.6.1.5	Rated power, kW		
3.3.6.1.6	Rated speed, rpm		
3.3.6.1.7	Frequency, Hz		
3.3.6.1.8	Voltage, V		
3.3.6.1.9	Maximum load current, A		
3.3.6.2	For engine		
3.3.6.2.1	Туре		
3.3.6.2.2	Brand		
3.3.6.2.3	Make or manufacturer		
3.3.6.2.4	Serial number	2	
3.3.6.2.5	Displacement, cc		
3.3.6.2.6	Cylinder arrangement		
3.3.6.2.7	Rated power, kW		
3.3.6.2.8	Rated speed, rpm		
3.3.7	Other (specify)		
4	Heating system		
4.1	Main		
4.1.1	Туре		
4.1.2	Heat source		
4.1.3	Presence of temperature		
	control		
4.1.4	Fuel consumption, L/h		
4.1.5	Other feature(s)		

No.	ITEMS	Manufacturer's Specifications	Actual Measurement/ Inspection by the Testing Agency
4.2	Supplementary		
4.2.1	Type (direct or indirect)		
4.2.2	Type of fuel		
4.2.3	Type of temperature control		
4.2.4	Other feature(s)		
5	Instruments and controls		0
5.1	Temperature		
5.1.1	Drying air temperature		
5.1.1.1	Type (s)		\sim
5.1.1.2	Location (s)		
5.1.2	Commodity temperature		
5.1.2.1	Type(s)		
5.1.2.2	Location(s)	• ()	
5.2	Pressure/airflow		
	indicator(s)		
5.2.1	Type(s)		
5.2.2	Location(s)		
5.3	Other feature(s)		
6	Safety feature(s)		
6.1	Product safety		
6.2	Machine safety		
6.3	Operation and		
	maintenance safety		

Annex C

(Normative)

Sampling procedures

C.1 Sampling procedures for commodity product

The conditions of the input such as moisture content to be used in each test shall be taken using three "representative samples", which represent the different conditions of commodity in the bulk. This is done by randomly taking samples at the top, middle and bottom portions of the bulk. Half of the samples shall be used for laboratory analysis and the other half shall be used for reference purposes or for an eventual second check in case of review. Samples representing the materials for the test trial shall be placed in appropriate containers for laboratory analysis.

C.2 Handling of samples

All samples to be taken to the laboratory shall be placed in appropriate containers and properly labeled. If the samples are not to be immediately analyzed, it should be stored in proper condition and kept in dry and airtight containers.

Annex D

(Normative)

Laboratory analysis

D.1 Moisture Content Determination

Take three-100 g samples of commodity. Place the samples in samplecontainers and record its initial weight. Dry the samples in a laboratory oven with temperature of 103 $^{\circ}C \pm 1 \,^{\circ}C$ for 24 hours. After the drying process, the sample containers with the dried samples should be placed in desiccators and allow to cool to ambient temperature. Weigh the sample containers with the dried samples and record the final weight. Calculate the moisture content using the formula given in Annex G (Formulas used during calculations and testing).

D.2 Water Activity Determination

Determine the water activity (a_w) of the dried product using the water activity meter. Inspect for the presence of foreign matters.

Annex E

(Informative)

Performance test data sheet

Date:		
Test Engineers:	Location:	
Assistants:	Machine:	
Test Requested by:	Manufacturer:	

No.	Items	Data
1	Commodity	\sim
1.1	Туре	
1.2	Variety /Species	6.2
1.3	Initial moisture content of commodity	
	product, %wb	
1.4	Dimensions	
1.5	Total weight of commodity, kg	
2	Ambient conditions	
2.1	Temperature	
2.1.1	Dry bulb, °C	
2.1.2	Wet bulb, °C	
2.2	Relative humidity, %	
2.3	Atmospheric pressure, Pa	
3	Dryer performance	
3.1	Drying rate, kg/batch or kg/h	
3.2	Drying air temperature, °C	
3.3	Ave. exhaust air temperature, °C	
3.3.1	Wet bulb	
3.3.2	Dry Bulb	
3.4	Ave. exhaust air relative humidity, °C	
3.5	Ave. air flow rate, m ³ /s	
3.6	Ave. static pressure, Pa	
3.7	Fuel consumption, L/h or kg/h	
3.8	Electrical power consumption, kW	

	Items	Data
3.9	Drying time, h	
3.10	Moisture content reduction	
	per pass or per batch, %/h	
3.11	Drying system efficiency, %	
3.11.1	Heat utilized for drying, kJ/h	
3.11.2	Heat available from source	
	(e.g. biomass, fuel, electric or solar),	
	kJ/h	
3.12	Burner/furnace efficiency, %	0
3.13	Heating system efficiency, %	
3.13.1	Heat added to drying air, kJ/h	
3.14	Heat utilization, KJ/kg of H2O	
3.15	Drying efficiency, %	
3.16	Final moisture content of commodity	$\sim 0^{\circ}$
	product, $\%_{wb}$ or $\%_{db}$)	
3.17	Moisture content gradient, %	5
3.17	Moisture content gradient, %	

4 Other Observations

4.1 Ease of cleaning the machine

4.2 Ease of adjusting and repairing of parts

4.3 Ease of loading input and collecting output

4.4 Safety 4.5 Labor Requirements

4.6 Failure or abnormalities that may be observed on the machine or its componentparts during and after the cleaning operation.



Annex F

(Informative)

Laboratory analysis data sheet

 Machine Tested:
 Analyzed by:

 Date of Test:
 Date Analyzed:

1 Moisture content (% wet basis or %dry basis)

Condition	Trial 1	Trial 2	Trial 3	Average
Before Drying				\sim
After Drying				

2 Change in color

Condition	Trial 1	Trial 2	Trial 3	Average
Before Drying				
After Drying				

3 Water activity

Condition	Trial 1	Trial 2	Trial 3	Average
Before Drying				
After Drying	SO.			

4 Other observations

Condition	Trial 1	Trial 2	Trial 3
Before Drying			
After Drying			

Annex G

(Normative)

Formulas used during calculations and testing

- G.1 Capacity
- G.1.1 Drying capacity

$$C_d = \frac{W_i}{T}$$

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where:

Cd	is the drying capacity, kg/h
Wi	is the initial weight of test material, kg
Т	is the total drying time, h

G.2 Moisture reduction rate

$$MC_r = \frac{MC_i - MC_j}{T_d}$$

where:

MCr	is the moisture reduction rate (kg/h)
MCi	is the initial moisture content of test material (%)MCf
	is the final moisture content of test material (%) <i>Td</i>
	is the actual drying time (h)

G.2.1 Moisture content

G.2.1.1 Moisture content wet basis

$$MC_{wb} = \frac{m_r}{m_i}$$

where:

MC_{wb}	is the moisture content wet basis ($\%_{wb}$)
m _r	is the amount of water removed, g
m _i	is the initial mass of sample before drying, g

G.2.1.2 Moisture content dry basis

$$MC_{db} = \frac{m_r}{m_f}$$

where:

MC _{db}	is the moisture content wet basis ($\%_{db}$)
m _r	is the amount of water removed, g
m _f	is the final mass of sample after drying, g

G.3 Heating system efficiency

$$HSE = \frac{Q_d}{Q_s} \times 100$$

$$Q_d = \frac{(h_2 - h_1) \times v}{v_{sp}} \times 60 \min \cdot h$$

 $Q_s = F_{FR} \times HV_F$ for fuel-fed/biomass burners

 $Q_s = P_{in} = I_{in} \times V_{in}$ for indirect resistance heating and heat pumpswhere: HSE is the heating system efficiency, % is the heat supplied to the drying chamber, kJ/h Q_d Q_{s} is the heat available in the source, kJ/h is the final enthalpy of drying air (see psychrometric chart) h_2 h_1 is the initial enthalpy of ambient air (see psychrometric chart) is the airflow rate of drying, m³/min Va is the specific volume of drying air, m³/kg dry air Vsp F_{FR} is the fuel feed rate, kg/h HV_{F} is the heating value of fuel, kJ/kg (See Annex H) is the input power to the heating element, kW Pin is the input current, A l_{in} 26 is the input voltage, V Vin

$$q_u = \frac{Q_d \times T_d}{m_{\rm r}}$$

	$Q_d \times T_d$
	$q_u = \frac{m_r}{m_r}$
where:	
q_u	is the heat utilized, kJ/kg
Q_d	is the heat supplied to the drying chamber, kJ/h
T _d	is the drying time, h
m _r	is the moisture removed, kg
	.*.C
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00	

G.5 Drying efficiency

$$Eff_d = \frac{Q_r}{Q_d} \times 100$$

$$\mathsf{Q}_{\mathsf{r}=\frac{hvap \times mr}{Td}}$$

where:

Eff _d	is the drying efficiency, %
Q _r	is the heat required to vaporize moisture inside the commodity, kJ/h
Q _d	is the heat supplied to the drying chamber, kJ/h <i>hvap</i>
	is the latent heat of vaporization of water, kJ/kgTd
	is the drving time. h

G.6 Drying system efficiency

$$Eff_{ds} = \frac{Q_r}{Q_s} \times 100$$

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where:

Eff _{ds}	is the drying system efficiency, %)
Q _r	is the heat required to vaporize moisture inside the commodity,kJ/h
Q _s	is the heat available in the source, kJ/h

G.7 Moisture gradient

$$MC_{grad} = MC_{max,f} - MC_{min,f}$$

where:

MC _{grad}	is the moisture gradient
MC _{max, f}	is the maximum moisture content of the dried commodity
MC _{min, f}	is the minimum moisture content of the dried commodity

G.8 Drying loss

$$L_d = \frac{W_s}{W_o} \times 100$$

where:

- L_d is the drying loss, %
- W_s is the total weight of dried products collected at all areas of the machine other than the discharge outlet, kg
 W_o is the total weight of dried products, kg

Annex H

(Informative)

List of heating value of fuels that are usually used in biomass furnace

Biomass fuel ¹	Heating value ¹ , kJ/kg
Corn cobs (at 10% MC)	21587
Rice hulls (at 7% MC)	13927
Wood chips (at 36%-58%MC)	20100

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