
Green coffee — Procedure for calibration of moisture meters — Routine method

*Café vert — Mode opératoire d'étalonnage des humidimètres —
Méthode de routine*





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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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Green coffee — Procedure for calibration of moisture meters — Routine method

1 Scope

This International Standard specifies a procedure for adjustment and subsequent calibration of moisture meters for green coffee beans with reference samples (RSs).

The RSs are green coffee beans of various moisture contents, determined by a standard method (ISO 6673).

NOTE This method of determining the loss in mass can be considered, by convention, as a method for determining the water content and can be used as such by agreement between the interested parties.

This International Standard is applicable to green coffee as beans.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3509, *Coffee and coffee products — Vocabulary*

ISO 6673:2003, *Green coffee — Determination of loss in mass at 105 °C*

ISO/IEC Guide 99, *International vocabulary of metrology — Basic and general concepts and associated terms (VIM)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 3509, ISO/IEC Guide 99, and the following apply.

3.1

reference sample

RS

sample of green coffee beans, sufficiently homogeneous and stable with reference to specified properties, which has been established to be fit for its intended use in measurement or in examination of nominal properties

NOTE See Annex A.

4 Principle

From green coffee beans, a set of samples with different moisture contents is prepared, to be taken as reference samples (RS). Their individual moisture content (or mass fraction loss) values are obtained by the respective determinations of loss in mass by applying ISO 6673.

These RSs with assigned moisture values are used for calibration of moisture meters.

5 Equipment and material

5.1 Green coffee as beans, in a quantity sufficient to prepare n reference samples, RS_i , $i = 1 \dots n$ (the minimum is 5), with moisture mass fraction ranges between 8,5 % and 13,5 %, prepared according to A.1.

5.2 Thermometer, range between 0 °C to 120 °C, scale division 0,1 °C, provided the moisture meter does not display the sample temperature.

5.3 Moisture meter, equipped with all the accessories specified by the manufacturer. It shall include a channel for green coffee, which will be the subject of calibration.

5.4 Balance, capable of being read to the nearest 0,1 g.

5.5 Equipment necessary for determinations according to ISO 6673.

6 Procedure

6.1 Test conditions

The procedure shall be carried out at ambient temperature and at a relative humidity from 40 % to 70 %.

Prior to the test, allow conditioning of the green coffee bean RSs to ambient temperature.

6.2 Alignment of instrument deviation

6.2.1 Before adjustment, verify the equipment in accordance with the manufacturer's instructions.

NOTE The verification is necessary to ensure the electronic gauging.

6.2.2 For moisture meters with direct reading, select green coffee beans channel.

6.2.3 For each RS_i , obtain the difference between the reference sample moisture mass fraction, w_{RSi} , determined according to ISO 6673, and the moisture meter reading, w_{ri} , where i is the reference sample number assigned. Record them as $\Delta w_i = w_{RSi} - w_{ri}$ in the column headed "Difference" of Table 1.

6.2.4 Calculate the average of the differences, $\overline{\Delta w}$, and adjust the moisture meter bias according to the manufacturer's operation manual.

Table 1 — Input values to obtain the bias for moisture meter adjustment

Reference sample $RS_i, i = 1 \dots n$	Moisture mass fraction of reference sample ^a w_{RSi}	Equipment reading on sample w_{ri}	Difference $\Delta w_i = w_{RSi} - w_{ri}$
RS1			
RS2			
...			
$RS(n-1)$			
RSn			
$\overline{\Delta w}$			
^a The moisture content (or mass fraction loss), w_{RSi} , is obtained using ISO 6673.			

6.3 Calibration of moisture meter

6.3.1 For calibration, use the moisture meter after adjustment (6.2).

6.3.2 Take the oven moisture values of the RSs, obtained according to A.2, and insert the figures into the appropriate w_{RSi} cells in Table 2.

6.3.3 Take a test portion from RS1 in accordance with the equipment manufacturer's instructions or the equipment capacity, and pour it into the moisture meter. Record the reading from the equipment in the cell matching the first row, RS1, and column, $w_{r1,1}$, of Table 2; this cell corresponds to $w_{r1,1}$.

Provided the equipment requires a defined test portion quantity, use the balance specified in 5.4.

6.3.4 Repeat the the procedure specified in 6.3.3 with the same test portion twice and record the readings in the subsequent cells which correspond to $w_{r1,2}$, and $w_{r1,3}$ for RS1.

At least three determinations shall be performed.

6.3.5 Calculate the arithmetic average of the RS1 readings, $w_{r1,1}$, $w_{r1,2}$, and $w_{r1,3}$, and record it in the corresponding cell of column $\overline{w_{ri,j}}$, $i = 1 \dots n$; $j = 1,2,3$ of Table 2.

6.3.6 Calculate the experimental standard deviation, s_1 , of $w_{r1,1}$, $w_{r1,2}$, and $w_{r1,3}$ and insert it into the corresponding cell of column s_i of Table 2.

6.3.7 Measure the temperature of the test portion RS1 and record it in the corresponding cell of column T_i of Table 2.

6.3.8 Repeat the procedure as specified in 6.3.3 to 6.3.7 with the other reference samples, RS2 to RS n and their test portions.

6.3.9 Determine a correction term, C_{ri} , to compensate for an estimated systematic effect of moisture for each w_{ri} moisture reading by applying Formula (1)

$$C_{ri} = w_{RSi} - \overline{w_{ri,j}} \quad i = 1 \dots n \quad j = 1,2,3 \quad (1)$$

NOTE For an example, see Table D.2.

Table 2 — Input values to obtain the calibration of moisture meter

Reference sample	Sample temperature °C	Equipment readings on RSs and corresponding mean				Standard deviation of reading	Reference sample moisture ^a	Moisture meter correction
RS i	T_i	$w_{ri,1}$	$w_{ri,2}$	$w_{ri,3}$	$\overline{w_{ri,j}}$	s_i	w_{RSi}	$C_{ri} = w_{RSi} - \overline{w_{ri,j}}$
RS1								
RS2								
...								
RS($n - 1$)								
RS n								
^a The moisture content (or mass fraction loss), w_{RSi} , is obtained using ISO 6673; see A.2.								

6.4 Temperature correction

6.4.1 Calculate the moisture reading correction term, C_T , due to bean temperature (if not automatically done by the instrument itself) based on equipment manufacturer instructions; otherwise follow steps 6.4.2 to 6.4.5.