



BSI Standards Publication

Oilseed meals — Determination of moisture and volatile matter content

National foreword

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A list of organizations represented on this committee can be obtained on request to its committee manager.

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Second edition
2021-03-30

**Oilseed meals — Determination of
moisture and volatile matter content**

*Tourteaux de graines oléagineuses — Détermination de la teneur en
eau et en matières volatiles*



Reference number
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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 2, *Oleaginous seeds and fruits and oilseed meals*.

This second edition cancels and replaces the first edition (ISO 771:1977), which has been technically revised. The main changes compared with the previous edition are as follows:

- organization of a new collaborative trial in order to add repeatability and reproducibility data.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Oilseed meals — Determination of moisture and volatile matter content

1 Scope

This document specifies a method for the determination of the moisture and volatile matter content of oilseed meals obtained by the extraction of oil from oilseeds by pressure and/or solvent.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 5502](#), *Oilseed residues — Preparation of test samples*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

moisture and volatile matter content

loss in weight measured under the operating conditions specified in this document

Note 1 to entry: The moisture and volatile matter content is expressed as a mass fraction in grams per 100 g.

4 Principle

The sample is ground to a particle size of 1 mm, followed by drying of a test portion at (103 ± 2) °C in an oven at atmospheric pressure, until practically constant mass is reached.

5 Apparatus

5.1 Analytical balance, readability 0,000 1 g, weighing precision 0,001 g.

5.2 Mechanical mill, easy to clean and allowing the meals to be ground, without heating and without appreciable change in the moisture, volatile matter and oil content, to particles passing completely through the sieve (5.3).

5.3 Sieve, with apertures of diameter 1 mm.

5.4 Flat-bottomed vessel, of metal, resistant to attack under the test conditions, provided with a well-fitting lid and allowing the test portion to be spread to about 0,2 g/cm² (e.g. diameter of vessel 50 mm to 70 mm, height about 30 mm). Glass vessels with ground closures may also be used.

8 Expression of results — Method of calculation and formula

The moisture and volatile matter content w , as a mass fraction in grams per 100 g, is given by [Formula \(1\)](#):

$$w = \frac{m_1 - m_2}{m_1 - m_0} \times 100 \quad (1)$$

where

- m_0 is the mass, in grams, of the vessel;
- m_1 is the mass, in grams, of the vessel and test portion before drying;
- m_2 is the mass, in grams, of the vessel and test portion after drying.

Use the mean value from the 2 reps if repeatability conditions are satisfied ([9.2](#)) and express the result to one decimal place.

9 Precision

9.1 Results of interlaboratory test

Details of an interlaboratory test on the precision of the method are summarized in [Annex A](#). The values derived from this interlaboratory test might not be applicable to concentration ranges and matrices other than those given.

9.2 Repeatability

The absolute difference between two independent single test results, obtained using the same method on identical test material in the same laboratory by the same operator using the same equipment within a short interval of time, will in not more than 5 % of cases be greater than r given as followed:

- for mean value less than 4,0 % (in mass fraction): $r = 0,2$ %;
- for mean value more than 4,0 % (in mass fraction): $r = 0,018x + 0,13$ (see [Figure A.1](#)).

With x corresponding to the mean value of two reps. Some examples of r values are given in [Annex B](#).

9.3 Reproducibility

The absolute difference between two single test results, obtained using the same method on identical test material in different laboratories with different operators using different equipment, will in not more than 5 % of cases be greater than R given as followed:

- for mean value less than 4,0 % (in mass fraction): $R = 0,4$ %;
- for mean value more than 4,0 % (in mass fraction): $R = 0,033x + 0,27$ (see [Figure A.1](#)).

With x corresponding to the mean value of two reps. Some examples of R values are given in [Annex B](#).

10 Test report

The test report shall specify:

- a) all information necessary for the complete identification of the sample;
- b) the test method used with reference to this document, i.e. ISO 771:2021;

- c) all operating details not specified in this document, or regarded as optional, together with details of any incidents that could have influenced the result;
- d) the test result(s) obtained;
- e) the date of the test.

Annex A (informative)

Results of an international collaborative trial

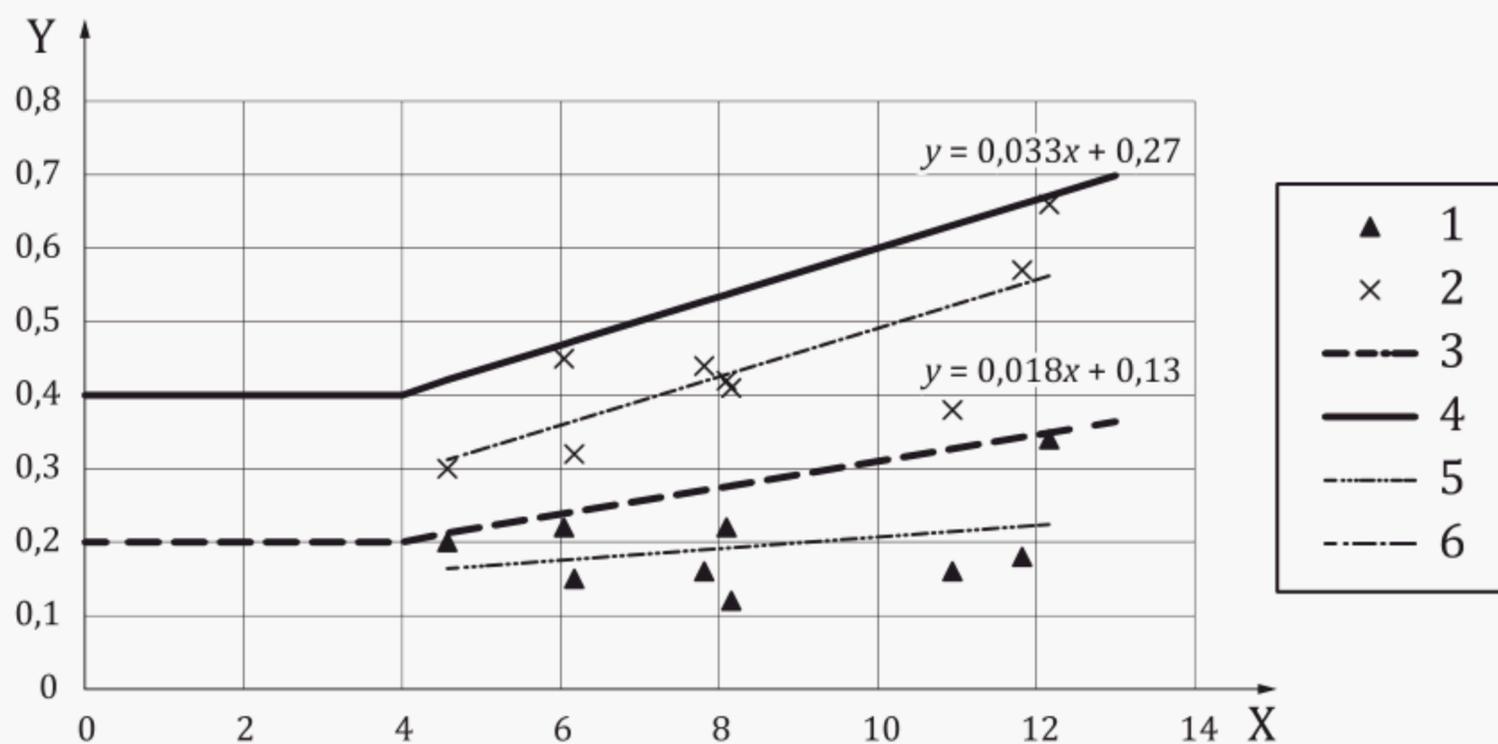
The precision of the method was established by interlaboratory tests carried out in 2019 in accordance with [ISO 5725-1](#) and [ISO 5725-2](#). Eleven laboratories participated in the tests. The following nine samples were used in the test.

- A: Expeller rapeseed meal
- B: Rapeseed meal
- C: Dried rapeseed meal
- D: Expeller sunflower meal
- E: Post-extraction sunflower meal
- F: Sunflower meal
- G: Dried sunflower meal
- H: Ground expeller soya meal
- I: Soya meal

The results of the interlaboratory tests are given in [Table A.1](#).

Table A.1 — Summary of statistical results (results in g/100 g)

Sample	A	B	C	D	E	F	G	H	I
Number of participating laboratories (N)	11	11	11	11	11	11	11	11	11
Number of laboratories retained after eliminating outliers (n)	11	11	11	11	11	11	11	11	11
Number of individual test results of all laboratories on each sample (z)	2	2	2	2	2	2	2	2	2
Mean value (m), g/100g	4,57	11,82	8,15	6,04	7,81	12,16	8,09	6,17	10,94
Repeatability standard deviation (s_r)	0,07	0,06	0,04	0,08	0,06	0,12	0,08	0,05	0,06
Relative repeatability ($C_{V,r}$), %	1,54	0,53	0,53	1,33	0,73	0,99	0,99	0,86	0,54
Repeatability limit r ($s_r \times 2,8$)	0,20	0,18	0,12	0,22	0,16	0,34	0,22	0,15	0,16
Reproducibility standard deviation (s_R)	0,11	0,20	0,15	0,16	0,16	0,24	0,15	0,11	0,14
Relative reproducibility ($C_{V,R}$), %	2,34	1,73	1,80	2,67	2,03	1,95	1,87	1,85	1,24
Reproducibility limit R ($s_R \times 2,8$)	0,30	0,57	0,41	0,45	0,44	0,66	0,42	0,32	0,38



Key

- X moisture and VM g/100 g
- Y (r, R) g/100 g
- 1 r values
- 2 R values
- 3 r limit
- 4 R limit
- 5 r linear regression
- 6 R linear regression

Equation corresponds to the r and R limit from r and R values obtained during the international collaborative trial.

Figure A.1 — Relation between (r, R) and moisture and volatile matter

Annex B (informative)

Examples of *r* and *R* values

Average range	<i>r</i>	<i>R</i>
<4,0	0,20	0,40
4,0 to 4,3	0,21	0,41
4,3 to 4,6	0,21	0,42
4,6 to 4,9	0,22	0,43
4,9 to 5,2	0,22	0,44
5,2 to 5,5	0,23	0,45
5,5 to 5,8	0,23	0,46
5,8 to 6,1	0,24	0,47
6,1 to 6,4	0,25	0,48
6,4 to 6,7	0,25	0,49
6,7 to 7,0	0,26	0,50
7,0 to 7,3	0,26	0,51
7,3 to 7,6	0,27	0,52
7,6 to 7,9	0,27	0,53
7,9 to 8,2	0,28	0,54
8,2 to 8,5	0,28	0,55
8,5 to 8,8	0,29	0,56
8,8 to 9,1	0,29	0,57
9,1 to 9,4	0,30	0,58
9,4 to 9,7	0,30	0,59
9,7 to 10,0	0,31	0,60
10,0 to 10,3	0,32	0,61
10,3 to 10,6	0,32	0,62
10,6 to 10,9	0,33	0,63
10,9 to 11,2	0,33	0,64
11,2 to 11,5	0,34	0,65
11,5 to 11,8	0,34	0,66
11,8 to 12,1	0,35	0,67
12,1 to 12,4	0,35	0,68
12,4 to 12,7	0,36	0,69
12,7 to 13,0	0,36	0,70

Bibliography

- [1] [ISO 5500](#), *Oilseed residues — Sampling*
- [2] [ISO 5725-1](#), *Accuracy (trueness and precision) of measurement methods and results — Part 1: General principles and definitions*
- [3] [ISO 5725-2](#), *Accuracy (trueness and precision) of measurement methods and results — Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method*

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