



BSI Standards Publication

Oilseed meals — Determination of moisture and volatile matter content

National foreword

This British Standard is the UK implementation of ISO 771:2021.

The UK participation in its preparation was entrusted to Technical Committee AW/307, Oilseeds, animal and vegetable fats and oils and their by-products.

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

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

ISBN 978 0 539 05157 5

ICS 67.200.20

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 March 2021.

Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

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

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





COPYRIGHT PROTECTED DOCUMENT

© ISO 2021, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO’s member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents		Page
Foreword		iv
1	Scope	1
2	Normative references	1
3	Terms and definitions	1
4	Principle	1
5	Apparatus	1
6	Sample	2
6.1	Sampling	2
6.2	Preparation of test sample	2
7	Procedure	2
8	Expression of results — Method of calculation and formula	3
9	Precision	3
9.1	Results of interlaboratory test	3
9.2	Repeatability	3
9.3	Reproducibility	3
10	Test report	3
Annex A (informative) Results of an international collaborative trial		5
Annex B (informative) Examples of <i>r</i> and <i>R</i> values		7
Bibliography		8

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 $(103 \pm 2)^\circ\text{C}$ 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

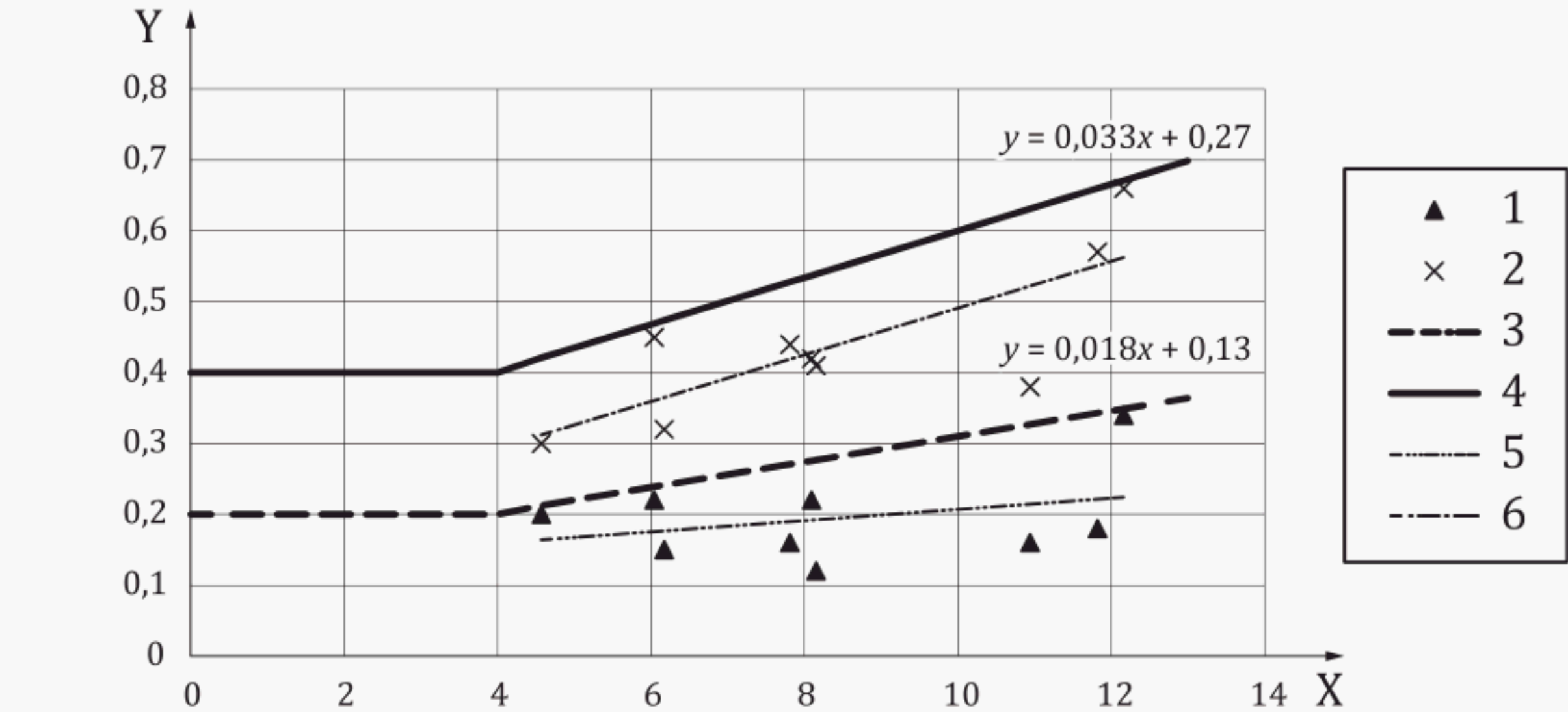
The precision of the method was established by interlaboratory tests carried out in 2019 in accordance with [ISO 5725-1](#) and [ISO 5725-2](#). Eleven laboratories participated in the tests. The following nine samples were used in the test.

- 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 (<i>N</i>)	11	11	11	11	11	11	11	11	11
Number of laboratories retained after eliminating outliers (<i>n</i>)	11	11	11	11	11	11	11	11	11
Number of individual test results of all laboratories on each sample (<i>z</i>)	2	2	2	2	2	2	2	2	2
Mean value (<i>m</i>), g/100g	4,57	11,82	8,15	6,04	7,81	12,16	8,09	6,17	10,94
Repeatability standard deviation (<i>s_r</i>)	0,07	0,06	0,04	0,08	0,06	0,12	0,08	0,05	0,06
Relative repeatability (<i>C_{V,r}</i>), %	1,54	0,53	0,53	1,33	0,73	0,99	0,99	0,86	0,54
Repeatability limit <i>r</i> (<i>s_r</i> × 2,8)	0,20	0,18	0,12	0,22	0,16	0,34	0,22	0,15	0,16
Reproducibility standard deviation (<i>s_R</i>)	0,11	0,20	0,15	0,16	0,16	0,24	0,15	0,11	0,14
Relative reproducibility (<i>C_{V,R}</i>), %	2,34	1,73	1,80	2,67	2,03	1,95	1,87	1,85	1,24
Reproducibility limit <i>R</i> (<i>s_R</i> × 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*

S
B
-
B
2

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards-based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Copyright in BSI publications

All the content in BSI publications, including British Standards, is the property of and copyrighted by BSI or some person or entity that owns copyright in the information used (such as the international standardization bodies) and has formally licensed such information to BSI for commercial publication and use.

Save for the provisions below, you may not transfer, share or disseminate any portion of the standard to any other person. You may not adapt, distribute, commercially exploit or publicly display the standard or any portion thereof in any manner whatsoever without BSI's prior written consent.

Storing and using standards

Standards purchased in soft copy format:

- A British Standard purchased in soft copy format is licensed to a sole named user for personal or internal company use only.
- The standard may be stored on more than one device provided that it is accessible by the sole named user only and that only one copy is accessed at any one time.
- A single paper copy may be printed for personal or internal company use only.

Standards purchased in hard copy format:

- A British Standard purchased in hard copy format is for personal or internal company use only.
- It may not be further reproduced – in any format – to create an additional copy. This includes scanning of the document.

If you need more than one copy of the document, or if you wish to share the document on an internal network, you can save money by choosing a subscription product (see 'Subscriptions').

Reproducing extracts

For permission to reproduce content from BSI publications contact the BSI Copyright and Licensing team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email cservices@bsigroup.com.

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Useful Contacts

Customer Services

Tel: +44 345 086 9001

Email: cservices@bsigroup.com

Subscriptions

Tel: +44 345 086 9001

Email: subscriptions@bsigroup.com

Knowledge Centre

Tel: +44 20 8996 7004

Email: knowledgecentre@bsigroup.com

Copyright & Licensing

Tel: +44 20 8996 7070

Email: copyright@bsigroup.com

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

