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Oilseeds — Determination of impurities content

Graines oléagineuses — Détermination de la teneur en impuretés

Reference number
ISO 658 : 1988 (E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 658 was prepared by Technical Committee ISO/TC 34, *Agricultural food products*.

This second edition cancels and replaces the first edition (ISO 658 : 1980), of which it constitutes a minor revision.

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Oilseeds — Determination of impurities content

1 Scope

This International Standard specifies a method for the determination of the impurities content of oilseeds used as primary industrial materials. It also defines the various categories of impurities as usually understood.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 659 : 1988, *Oilseeds — Determination of hexane extract (or light petroleum extract), called "oil content".*

ISO 664 : 1977, *Oilseeds — Reduction of contract samples to analysis samples.*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 impurities: All foreign matter, organic and inorganic, other than seeds of the species under consideration.

3.2 fines: The particles passing through the sieves for which the aperture sizes are given in table 1, according to the species being analysed.

In the case of groundnut, meal from the seeds contained in the fines is not regarded as an impurity.

3.3 non-oleaginous impurities: Non-oleaginous foreign bodies (for example bits of wood, pieces of metal, stones, seeds of non-oleaginous plants), fragments of stalks, leaves and all other non-oleaginous parts belonging to the oleaginous seed analysed (for example bits of shell, loose or adhering to palm kernels), retained by the sieves of the aperture sizes given in table 1. In the case of seeds sold in their shells, for example sunflower seeds (*Helianthus annuus* Linnaeus) or pumpkin seeds (*Cucurbita pepo* Linnaeus), the loose shells are regarded as impurities only if their proportion is larger than that of the corresponding kernels present in the same sample.

3.4 oleaginous impurities : Oilseeds other than those of the species under consideration.

4 Principle

Separation of the impurities, by sieving and sorting, into three categories as follows:

- fines;
- non-oleaginous impurities;
- oleaginous impurities.

Determination of the mass of total impurities or, on request, of the mass of each category of impurity.

5 Apparatus

5.1 Sieves, having round holes of the diameter given in table 1.

Table 1 — Diameter of holes of sieves

Nature of product	Aperture diameter mm
Copra	2,0
Medium and larger-sized seeds (see ISO 664)	1,0
Small seeds (see ISO 664)	0,5

5.2 Tweezers, or other suitable instruments.

5.3 Analytical balance.

6 Procedure

6.1 Test portion

Take as the test portion a complete test sample obtained in accordance with ISO 664. For a complete analysis, two or four test samples are necessary (see 7.2).

Weigh the test portion to an accuracy of at least 0,1 %.

6.2 Determination

The determination of impurities content shall be carried out sufficiently quickly to avoid any appreciable change in the moisture content of the seed.

6.2.1 Separation of fines

Separate the fines quantitatively by sieving the test portion on the sieve (5.1) and collect them.

In the case of groundnut, collect the total fines thus obtained, which include non-oleaginous fines and fines from the seed, weigh them to the nearest 0,01 g and determine their oil content by the method specified in ISO 659. Determine also the oil content of the pure seeds by the method specified in ISO 659 in order to calculate the content of non-oleaginous fines.

6.2.2 Separation of oleaginous and non-oleaginous impurities

6.2.2.1 Copra and medium and larger-sized seeds

In the material retained by the sieve (5.1), separate by means of tweezers or any other suitable instrument (5.2) the non-oleaginous impurities (3.3) on the one hand, if necessary detaching bits of shell adhering to the seeds (as is the case with palm kernels), and the oleaginous impurities (3.4) on the other hand.

Weigh together, to the nearest 0,01 g, the non-oleaginous and oleaginous impurities and the fines (6.2.1), except in the case of groundnut.

On request, weigh separately, to the nearest 0,01 g, each category of impurity.

If stipulated in the contract, note the nature of the oleaginous impurities in order that this may be recorded in the test report.

6.2.2.2 Small seeds

Transfer the residue from the sieve (5.1) to a second sieve so as to retain impurities larger than the seeds[1], or separate these impurities by means of tweezers or any other suitable instrument (5.2).

On request, sort this fraction into non-oleaginous impurities (3.3) and oleaginous impurities (3.4).

Weigh separately, to the nearest 0,01 g, the fines (6.2.1) and the impurities (non-oleaginous and oleaginous) larger than the seeds, and also the partially sorted seeds.

Using an aliquot portion of the latter fraction of seeds (at least 10 g, weighed to the nearest 0,01 g), separate, by sorting, on the one hand the non-oleaginous impurities of about the same size as the pure seeds, and on the other hand the small foreign oleaginous seeds. Weigh these two fractions of impurities, to the nearest 1 mg, together or, on request, separately.

6.2.3 Grouping of foreign oilseeds

If required, the foreign oilseeds may be grouped and weighed according to species, in order to show in the test report the percentage by mass of each species.

6.2.4 Number of determinations

Carry out two determinations on the same laboratory sample using two test samples.

7 Expression of results

7.1 Method of calculation

7.1.1 Express the results as a percentage by mass of total impurities. On request, the percentage of each category of impurity may be indicated.

7.1.2 When the determination of impurities content has been carried out on the whole test portion (see 6.2.2.1), the percentages by mass shall be calculated as follows:

Total impurities, % (m/m)

$$I_t = m_4 \times \frac{100}{m_0}$$

or

$$I_t = P + I_n + I_o$$

Fines, % (m/m)

$$P = m_1 \times \frac{100}{m_0}$$

Non-oleaginous impurities, % (m/m)

$$I_n = m_2 \times \frac{100}{m_0}$$

Oleaginous impurities, % (m/m)

$$I_o = m_3 \times \frac{100}{m_0}$$

1) To assist the removal of large impurities, a 3,15 mm mesh may be used.

where

m_0 is the mass, in grams, of the test portion;

m_1, m_2, m_3 are the respective masses, in grams, of each category of impurity;

m_4 is the mass, in grams, of all the impurities, including the fines.

7.1.3 When only a part of the impurities has been separated from the whole test portion and the other parts from an aliquot portion of the remainder (see 6.2.2.2), the percentages by mass shall be calculated as follows:

Total impurities, % (m/m)

$$I_t = \frac{m_4 \times 100}{m_0} + \frac{(m_0 - m_4) \times m_5 \times 100}{m_0 \times m_6}$$

or

$$I_t = P + I_n + I_o$$

Fines, % (m/m)

$$P = m_1 \times \frac{100}{m_0}$$

Non-oleaginous impurities, % (m/m)

$$I_n = \left(m_{2a} + m_{2b} \times \frac{m_a}{m_b} \right) \times \frac{100}{m_0}$$

Oleaginous impurities, % (m/m)

$$I_o = \left(m_{3a} + m_{3b} \times \frac{m_a}{m_b} \right) \times \frac{100}{m_0}$$

where

m_0 is the mass, in grams, of the initial test portion;

m_1 is the mass, in grams, of the fines;

m_{2a} is the mass, in grams, of the fraction of non-oleaginous impurities larger than seeds of the basic species and separated from the whole test portion;

m_{2b} is the mass, in grams, of the fraction of non-oleaginous impurities of approximately the same size as seeds of the basic species and separated from the aliquot portion of the residue obtained by eliminating, from the test portion, fines and impurities larger than seeds of the basic species;

m_{3a} is the mass, in grams, of the fraction of oleaginous impurities larger than seeds of the basic species and separated from the whole test portion;

m_{3b} is the mass, in grams, of the fraction of oleaginous impurities of approximately the same size as seeds of the basic species and separated from the aliquot portion of the residue obtained by eliminating, from the test portion, fines and impurities larger than seeds of the basic species;

m_a is the mass, in grams, of the residue obtained by eliminating, from the initial test portion, fines and impurities larger than seeds of the basic species:

$$m_a = m_0 - m_1 - m_{2a} - m_{3a}$$

m_b is the mass, in grams, of the aliquot portion of the residue of mass m_a, from which the impurities of approximately the same size as the seeds of the basic species have been separated;

m_4 is the mass, in grams, of the fines and of the fraction of impurities larger than seeds of the basic species and separated from the whole test portion;

m_5 is the mass, in grams, of the fraction of impurities separated from the aliquot portion of the residue obtained by eliminating, from the test portion, the fines and the impurities larger than seeds of the basic species;

m_6 is the mass, in grams, of the aliquot portion from which the impurities of mass m_5, of approximately the same size as the seeds of the basic species, have been separated.

7.1.4 In the case of groundnut the percentages by mass shall be calculated as follows :

Total impurities, % (m/m)

$$I_t = \frac{m_1 \times 100}{m_0} \left(1 - \frac{H_2}{H_1} \right) + \frac{m_4 \times 100}{m_0}$$

or

$$I_t = P_s + I_n + I_o$$

Total fines, % (m/m)

$$P = m_1 \times \frac{100}{m_0}$$

Foreign fines, % (m/m)

$$P_s = \frac{m_1 \times 100}{m_0} \left(1 - \frac{H_2}{H_1} \right)$$

Non-oleaginous impurities, % (m/m)

$$I_n = \frac{m_2 \times 100}{m_0}$$

Oleaginous impurities, % (m/m)

$$I_o = \frac{m_3 \times 100}{m_0}$$

where

m_0 is the mass, in grams, of the test portion;

m_1 is the mass, in grams, of the fines;

m_2 and m_3 are the respective masses, in grams, of the non-oleaginous impurities and the oleaginous impurities;

m_4 is the mass, in grams, of the impurities other than the fines;

H_1 is the oil content, expressed as a percentage by mass, of the pure seed;

H_2 is the oil content, expressed as a percentage by mass, of the fines.

7.1.5 Take as the result the arithmetic mean of the two determinations, if the conditions of repeatability (see 7.2) are satisfied.

7.1.6 Report the results to two decimal places for impurities contents not exceeding 0,5 % (m/m) and to one decimal place for impurities contents above this limit.

7.2 Repeatability

The difference between the results of two determinations, carried out in rapid succession by the same analyst, shall not exceed the values indicated in table 2.

If the difference is greater than the limit indicated in table 2, obtain two other test portions, analyse one as before and keep the other for a fourth determination if necessary. In this case, take as the result the arithmetic mean of the result obtained from the third analysis and the nearest result obtained from the previous analyses, provided that the difference does not exceed the allowed limit.

Table 2 — Permissible difference between results of two parallel determinations

Impurities content % (m/m)	Maximum permissible difference % (m/m)
Up to and including 0,5	0,2
Over 0,5 to 1,0 inclusive	0,4
Over 1,0 to 2,0 inclusive	0,6
Over 2,0 to 3,0 inclusive	0,8
Over 3,0 to 4,0 inclusive	1,0
Over 4,0 to 5,0 inclusive	1,2
Over 5,0 to 6,0 inclusive	1,4
Over 6,0	1,6

Failing this, analyse also the fourth test portion and take as the result the mean of the four determinations.

8 Test report

The test report shall show the method used and the results obtained (total impurities and, on request, each category of impurity). If the product contains foreign oleaginous seeds, and if stipulated by the contract, indicate not only their total percentage by mass but also their nature. If required, the percentage by mass of each species of foreign oleaginous seeds may also be indicated.

The test report shall also mention all operating details not specified in this International Standard or regarded as optional, as well as any circumstances that may have influenced the results.

The test report shall include all details required for the complete identification of the sample.

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