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Rice — Specification

Riz — Spécifications

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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.

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 7301 was prepared by Technical Committee ISO/TC 34, *Agricultural food products*.

Annex A forms an integral part of this International Standard. Annex B is for information only.

Rice — Specification

1 Scope

This International Standard lays down the minimum specifications for rice (*Oryza sativa* L.) of the following types: husked rice, husked parboiled rice, milled rice and milled parboiled rice, suitable for human consumption, directly or after reconditioning, and which is the subject of international trade.

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 712 : 1985, *Cereals and cereal products — Determination of moisture content (Routine reference method)*.

ISO 950 : 1979, *Cereals — Sampling (as grain)*.

3 Definitions

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

3.1 paddy; paddy rice; rough rice: Rice retaining its husk after threshing.

3.2 husked rice; cargo rice¹⁾: Paddy from which the husk only has been removed.

The processes of husking and handling, particularly of parboiled rice, may result in some loss of bran.

3.3 milled rice: Rice obtained after milling which involves removing all or part of the bran and germ from the husked rice.

It could further be classified into the following degrees of milling.

- a) **undermilled rice**: Rice obtained by milling husked rice but not to the degree necessary to meet the requirements of well-milled rice.
- b) **well-milled rice**: Rice obtained by milling husked rice in such a way that some of the germ, and all the external layers and most of the internal layers of the bran have been removed.
- c) **extra-well-milled rice**: Rice obtained by milling husked rice in such a way that almost all the germ, and all the external layers and the largest part of the internal layers of the bran, and some of the endosperm, have been removed.

3.4 parboiled rice: Rice, the starch of which has been fully gelatinized by soaking paddy or husked rice in water followed by a heat treatment and a drying process.

3.5 glutinous rice; waxy rice: Special varieties of rice (*Oryza sativa* L. *glutinosa*) the kernels of which have a white and opaque appearance. The starch of glutinous rice consists almost entirely of amylopectin. It has a tendency to stick together after cooking.

3.6 size of kernels, broken kernels and chips

3.6.1 whole kernel: Kernel without any broken part.

3.6.2 head rice: Kernel, the length of which is greater than or equal to three-quarters of the average length of the corresponding whole kernel.

3.6.3 large broken kernel: Fragment of kernel, the length of which is less than three-quarters but greater than one-half of the average length of the corresponding whole kernel.

3.6.4 medium broken kernel: Fragment of kernel, the length of which is less than or equal to one-half but greater than one-quarter of the average length of the corresponding whole kernel.

1) The term "brown rice" is sometimes used as a synonym.

3.6.5 small broken kernel: Fragment of kernel, the length of which is less than or equal to one-quarter of the average length of the corresponding whole kernel but which does not pass through a metal sieve with round perforations 1,4 mm in diameter.

3.6.6 chip: Fragment of kernel which passes through a metal sieve with round perforations 1,4 mm in diameter.

3.7 extraneous matter: Organic and inorganic components other than kernels of rice, whole or broken:

- a) organic extraneous matter, i.e. foreign seeds, husks, bran, fragments of straw, etc.;
- b) inorganic extraneous matter, i.e. stones, sand, dust, etc.

3.8 heat-damaged kernels: Kernels, whole or broken, that have changed their normal colour as a result of heating. This category includes whole or broken kernels that are yellow due to alteration. Parboiled rice in a batch of non-parboiled rice is also included in this category.

3.9 damaged kernels: Kernels, whole or broken, showing obvious deterioration due to moisture, pests, disease or other causes, but excluding heat-damaged kernels (3.8).

3.10 immature kernels: Kernels, whole or broken, which are unripe and/or underdeveloped.

3.11 chalky kernels: Kernels, whole or broken, except for glutinous rice, of which at least three-quarters of the surface has an opaque and floury appearance.

3.12 red kernels: Kernels, whole or broken, having a red coloration covering more than one-quarter of their surface, but excluding heat-damaged kernels (3.8).

3.13 red-streaked kernels: Kernels, whole or broken, with red streaks, the lengths of which are greater than or equal to one-half of that of the whole kernel, but where the surface covered by these red streaks is less than one-quarter of the total surface.

3.14 pecks: Kernels, whole or broken, of parboiled rice of which more than one-quarter of the surface is dark brown or black in colour.

3.15 other kinds of rice

3.15.1 Paddy in husked rice, in husked parboiled rice, in milled rice and in milled parboiled rice.

3.15.2 Husked rice in husked parboiled rice, in milled rice and in milled parboiled rice.

3.15.3 Milled rice in husked parboiled rice and in milled parboiled rice.

3.15.4 Glutinous in non-glutinous rice.

4 Specification

4.1 General, organoleptic and health characteristics

Kernels of rice, whether or not parboiled, husked or milled, and whether or not whole or broken, shall be sound, clean and free from foreign odours or odour which indicates deterioration.

The levels of additives and pesticide residues and other contaminants shall not exceed the maximum limits permitted by the national regulations of the country of destination or, in their absence, by the joint FAO/WHO Commission of Codex Alimentarius.

The presence of living insects, which are visible to the naked eye, is not permitted.

4.2 Physical and chemical characteristics

4.2.1 The moisture content, determined in accordance with ISO 712, shall be not greater than 15 % (*m/m*).

NOTE — Lower moisture contents may be required for certain destinations depending on the climate, duration of transport and storage. For further details, see ISO 6322, parts 1, 2 and 3.

4.2.2 The maximum contents of extraneous matter, defective kernels and other kinds of rice in husked and milled rice, whether or not parboiled, and determined in accordance with the method described in annex A, shall be not greater than the values specified in table 1.

4.2.3 All commercial contracts should show clearly the total percentage of broken kernels permitted, classified according to the agreed categories, and the relative proportions of each category, and the total percentages of extraneous matter and

Table 1

Defect	Reference to the definition	Husked rice %	Milled rice (non-glutinous) %	Husked parboiled rice %	Milled parboiled rice %
Extraneous matter	3.7				
a) organic		1,5	0,5	1,5	0,5
b) inorganic		0,5	0,5	0,5	0,5
Paddy	3.1	2,5	0,3	2,5	0,3
Husked rice	3.2	—	1,0	—	1,0
Milled rice	3.3	—	—	2,0	2,0
Heat-damaged kernels	3.8	4,0 ^{*)}	3,0	8,0 ^{*)}	6,0
Damaged kernels	3.9	4,0	3,0	4,0	3,0
Immature kernels	3.10	12,0	2,0	12,0	2,0
Chalky kernels	3.11	11,0 ^{*)}	11,0	—	—
Red kernels	3.12	12,0	4,0	12,0	4,0
Red-streaked kernels	3.13	—	8,0	—	8,0
Glutinous rice	3.5	1,0 ^{*)}	1,0	1,0 ^{*)}	1,0
Pecks	3.14	—	—	4,0 ^{*)}	2,0

^{*)} After milling.

of defective kernels, determined in accordance with the method described in annex A.

The proportion of chips shall not exceed 0,1 %.

5 Sampling

Sampling shall be carried out in accordance with ISO 950.

6 Test methods

The tests shall be carried out using the methods specified in ISO 712 and in annex A.

7 Packaging

The packaging shall not transmit any smell or taste and shall not contain substances which may damage the product or constitute a health risk. If bags are used, they shall be clean, sufficiently strong and well stitched.

8 Marking

The packages shall be marked or labelled as required by the countries concerned.

Annex A (normative)

Determination of extraneous matter, broken kernels, defective kernels and other kinds of rice

A.1 Principle

Manual separation and weighing of extraneous matter, broken kernels, defective kernels and other kinds of rice according to the following types: husked rice, milled rice, husked parboiled rice and milled parboiled rice.

A.2 Apparatus

A.2.1 Sample divider, conical sampler or multiple-slot sampler with a distribution system.

A.2.2 Metal sieve, with round perforations 1,4 mm in diameter.

A.2.3 Tweezers, scalpel and paintbrush.

A.2.4 Small bowls.

A.2.5 Balance, with an accuracy to 0,01 g.

A.3 Sampling

See clause 5.

A.4 Procedure

When a kernel has several defects, it shall be classified in the category where the maximum permissible value is the lowest (see table 1).

All parts of kernels which get stuck in the perforations of a sieve shall be considered to be retained by the sieve.

The average length is determined on the basis of measuring the length of 100 whole kernels chosen at random.

A.4.1 Preparation of test sample

Carefully mix the laboratory sample to make it as uniform as possible, then proceed to reduce it, if necessary, using a divider (A.2.1) until a quantity of about 800 g is obtained.

Note if an odour, particular or foreign to rice, is detected as well as the presence of living or dead insects, their fragments and excreta, and all anomalies.

A.4.2 Determination

Divide the test sample using the divider (A.2.1) into two equal fractions of about 400 g.

According to the types considered, i.e. husked rice, milled rice, husked parboiled rice or milled parboiled rice, use the appropriate procedure described hereafter.

A.4.2.1 Husked rice (see the scheme given in clause A.7)

Weigh to the nearest 0,1 g one of the test portions so obtained and separate into the bowls (A.2.4) the organic extraneous matter (3.7), inorganic extraneous matter (3.7) and paddy (3.1). Weigh to the nearest 0,01 g the fractions so obtained.

Divide the second test portion using the divider in order to obtain four different aliquot parts of about 100 g each.

Weigh to the nearest 0,01 g a first aliquot part. Spread it out and separate into the bowls the damaged kernels (3.9), immature kernels (3.10) and the red kernels (3.12). Weigh the fractions so obtained to the nearest 0,01 g.

Weigh to the nearest 0,01 g a second aliquot part. Spread it out and separate into the bowls the broken kernels, classifying them into large broken kernels (3.6.3), medium broken kernels (3.6.4), small broken kernels (3.6.5) and chips (3.6.6); the separation of chips and small broken kernels is carried out with the sieve (A.2.2). Weigh the fractions so obtained to the nearest 0,01 g.

Proceed with the milling of a third aliquot part. Weigh the milled rice to the nearest 0,01 g. Spread it out and separate into the bowls the heat-damaged kernels (3.8), chalky kernels (3.11) and glutinous rice (3.5). Weigh the fractions so obtained to the nearest 0,01 g.

A.4.2.2 Milled rice (see the scheme given in clause A.8)

Weigh to the nearest 0,1 g one of the test portions so obtained and separate into the bowls (A.2.4) the organic extraneous matter (3.7), inorganic extraneous matter (3.7), paddy (3.1) and husked rice (3.2). Weigh the fractions so obtained to the nearest 0,01 g.

Divide the second test portion with the divider in order to obtain four different aliquot parts of about 100 g each.

Weigh to the nearest 0,01 g a first aliquot part. Spread it out and separate into the bowls the heat-damaged kernels (3.8), damaged kernels (3.9), immature kernels (3.10), chalky kernels (3.11), red kernels (3.12), red-streaked kernels (3.13) and glutinous rice (3.5). Weigh the fractions so obtained to the nearest 0,01 g.

Weigh to the nearest 0,01 g a second aliquot part. Spread it out and separate into the bowls the broken kernels, classifying them into large broken kernels (3.6.3), medium broken kernels (3.6.4), small broken kernels (3.6.5) and chips (3.6.6); the separation of chips and small broken kernels is carried out with the sieve (A.2.2). Weigh the fractions so obtained to the nearest 0,01 g.

A.4.2.3 Husked parboiled rice (see the scheme given in clause A.9)

Weigh to the nearest 0,1 g one of the test portions so obtained and separate into the bowls (A.2.4) the organic extraneous matter (3.7), inorganic extraneous matter (3.7) and paddy (3.1). Weigh the fractions so obtained to the nearest 0,01 g.

Divide the second test portion with the divider in order to obtain four different aliquot parts of about 100 g each.

Weigh to the nearest 0,01 g a first aliquot part. Spread it out and separate into the bowls the damaged kernels (3.9), immature kernels (3.10), red kernels (3.12) and milled rice (3.3). Weigh the fractions so obtained to the nearest 0,01 g.

Weigh to the nearest 0,01 g a second aliquot part. Spread it out and separate into the bowls the broken kernels, classifying them into large broken kernels (3.6.3), medium broken kernels (3.6.4), small broken kernels (3.6.5) and chips (3.6.6); the separation of chips and small broken kernels is carried out with the sieve (A.2.2). Weigh the fractions so obtained to the nearest 0,01 g.

Proceed with the milling of a third aliquot part. Weigh the milled rice to the nearest 0,01 g. Spread it out and separate into the bowls the heat-damaged kernels (3.8), glutinous rice (3.5) and pecks (3.14). Weigh the fractions so obtained to the nearest 0,01 g.

A.4.2.4 Milled parboiled rice (see the scheme given in clause A.10)

Weigh to the nearest 0,1 g one of the test portions so obtained and separate into the bowls (A.2.4) the organic extraneous matter (3.7), inorganic extraneous matter (3.7), paddy (3.1) and husked rice (3.2). Weigh the fractions so obtained to the nearest 0,01 g.

Divide the second test portion with the divider in order to obtain four different aliquot parts of about 100 g each.

Weigh to the nearest 0,01 g a first aliquot part. Spread it out and separate into the bowls the heat-damaged kernels (3.8), damaged kernels (3.9), immature kernels (3.10), red kernels (3.12), red-streaked kernels (3.13), milled rice (3.3), glutinous rice (3.5) and pecks (3.14). Weigh the fractions so obtained to the nearest 0,01 g.

Weigh to the nearest 0,01 g a second aliquot part. Spread it out and separate into the bowls the broken kernels, classifying them into large broken kernels (3.6.3), medium broken kernels (3.6.4), small broken kernels (3.6.5) and chips (3.6.6); the separation of chips and small broken kernels is carried out with the sieve (A.2.2). Weigh the fractions so obtained to the nearest 0,01 g.

A.5 Expression of results

Express the amount of the following categories as a percentage of the mass of the product as received.

Report the result for each category to one decimal place, referring to the rounding rule given in ISO 31-0¹⁾.

A.5.1 Husked rice

Organic extraneous matter	$\frac{m_1 \times 100}{m_w}$
Inorganic extraneous matter	$\frac{m_2 \times 100}{m_w}$
Paddy	$\frac{m_3 \times 100}{m_w}$
Heat-damaged kernels	$\frac{m_{11} \times 100}{m_z}$
Damaged kernels	$\frac{m_4 \times 100}{m_x}$
Immature kernels	$\frac{m_5 \times 100}{m_x}$
Chalky kernels	$\frac{m_{12} \times 100}{m_z}$
Red kernels	$\frac{m_6 \times 100}{m_x}$
Glutinous rice	$\frac{m_{13} \times 100}{m_z}$
Large broken kernels	$\frac{m_7 \times 100}{m_y}$
Medium broken kernels	$\frac{m_8 \times 100}{m_y}$
Small broken kernels	$\frac{m_9 \times 100}{m_y}$
Chips	$\frac{m_{10} \times 100}{m_y}$

For the meaning of the symbols, refer to the scheme of procedure given in clause A.7.

1) ISO 31-0 : 1981, *General principles concerning quantities, units and symbols*.

A.5.2 Milled rice

Organic extraneous matter	$\frac{m_1 \times 100}{m_w}$
Inorganic extraneous matter	$\frac{m_2 \times 100}{m_w}$
Paddy	$\frac{m_3 \times 100}{m_w}$
Husked rice	$\frac{m_4 \times 100}{m_w}$
Heat-damaged kernels	$\frac{m_5 \times 100}{m_x}$
Damaged kernels	$\frac{m_6 \times 100}{m_x}$
Immature kernels	$\frac{m_7 \times 100}{m_x}$
Chalky kernels	$\frac{m_8 \times 100}{m_x}$
Red kernels	$\frac{m_9 \times 100}{m_x}$
Red-streaked kernels	$\frac{m_{10} \times 100}{m_x}$
Glutinous rice	$\frac{m_{11} \times 100}{m_x}$
Large broken kernels	$\frac{m_{12} \times 100}{m_y}$
Medium broken kernels	$\frac{m_{13} \times 100}{m_y}$
Small broken kernels	$\frac{m_{14} \times 100}{m_y}$
Chips	$\frac{m_{15} \times 100}{m_y}$

For the meaning of the symbols, refer to the scheme of procedure given in clause A.8.

A.5.3 Husked parboiled rice

Organic extraneous matter	$\frac{m_1 \times 100}{m_w}$
Inorganic extraneous matter	$\frac{m_2 \times 100}{m_w}$
Paddy	$\frac{m_3 \times 100}{m_w}$
Milled rice	$\frac{m_7 \times 100}{m_x}$
Heat-damaged kernels	$\frac{m_{12} \times 100}{m_z}$
Damaged kernels	$\frac{m_4 \times 100}{m_x}$
Immature kernels	$\frac{m_5 \times 100}{m_x}$
Red kernels	$\frac{m_6 \times 100}{m_x}$
Glutinous rice	$\frac{m_{13} \times 100}{m_z}$
Pecks	$\frac{m_{14} \times 100}{m_z}$
Large broken kernels	$\frac{m_8 \times 100}{m_y}$
Medium broken kernels	$\frac{m_9 \times 100}{m_y}$
Small broken kernels	$\frac{m_{10} \times 100}{m_y}$
Chips	$\frac{m_{11} \times 100}{m_y}$

For the meaning of the symbols, refer to the scheme of procedure given in clause A.9.

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ISO 7301:1988

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A.5.4 Milled parboiled rice

Organic extraneous matter	$\frac{m_1 \times 100}{m_w}$
Inorganic extraneous matter	$\frac{m_2 \times 100}{m_w}$
Paddy	$\frac{m_3 \times 100}{m_w}$
Husked rice	$\frac{m_4 \times 100}{m_w}$
Milled rice	$\frac{m_{10} \times 100}{m_x}$
Heat-damaged kernels	$\frac{m_5 \times 100}{m_x}$
Damaged kernels	$\frac{m_6 \times 100}{m_x}$
Immature kernels	$\frac{m_7 \times 100}{m_x}$
Red kernels	$\frac{m_8 \times 100}{m_x}$
Red-streaked kernels	$\frac{m_9 \times 100}{m_x}$

Glutinous rice	$\frac{m_{11} \times 100}{m_x}$
Pecks	$\frac{m_{12} \times 100}{m_x}$
Large broken kernels	$\frac{m_{13} \times 100}{m_y}$
Medium broken kernels	$\frac{m_{14} \times 100}{m_y}$
Small broken kernels	$\frac{m_{15} \times 100}{m_y}$
Chips	$\frac{m_{16} \times 100}{m_y}$

For the meaning of the symbols, refer to the scheme of procedure given in clause A.10.

A.6 Test report

The test report shall show the method used and the results obtained. It shall also mention any operating details not specified in this annex, or regarded as optional, together with details of any incidents likely to have influenced the results.

The test report shall include all the information necessary for the complete identification of the sample.