
**Rice — Determination of the potential
milling yield from paddy and from husked
rice**

*Riz — Détermination des rendements à l'usinage à partir du riz paddy et du
riz décortiqué*



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Printed in Switzerland

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 6646 was prepared by Technical Committee ISO/TC 34, *Agricultural food products*, Subcommittee SC 4, *Cereals and pulses*.

This second edition cancels and replaces the first edition (ISO 6646:1984), which has been revised and completed with precision data from an interlaboratory study.

Annex A forms a normative part of this International Standard. Annex B is for information only.

Introduction

The milling yields obtained from abrasive testing mills of the same model, although with differing adjustments, may vary more widely than those obtained from different types of abrasive testing mill.

This International Standard details a method to standardize the determination of milling yield, to ensure that results obtained by different operators using abrasive test mills are comparable.

A list of standards related to this International Standard is given in the bibliography.

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Rice — Determination of the potential milling yield from paddy and from husked rice

1 Scope

This International Standard specifies a laboratory method for the determination of the yield of husked rice obtained from paddy or parboiled paddy (*Oryza sativa* L.), and for the determination of the yield of milled head rice obtained from paddy or parboiled paddy, or from husked rice or husked parboiled rice.

This International Standard is only applicable to abrasive milling equipment.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 712, *Cereals and cereal products — Determination of moisture content — Routine reference method*.

ISO 7301, *Rice — Specification*.

3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in ISO 7301 and the following apply.

3.1

husked rice yield

amount of husked rice obtained from paddy

3.2

milled rice yield

amount of milled rice (head rice, broken kernels and chips) obtained from paddy or husked rice

3.3

milled head rice yield

amount of milled head rice obtained from paddy or husked rice

4 Principle

The husk is mechanically removed from paddy. The resultant husked rice is then weighed. Next, the pericarp and germ are mechanically removed from the husked rice to a fixed reduction in mass and the resulting milled head rice is weighed.

5 Apparatus

Usual laboratory apparatus and, in particular, the following.

5.1 Sample divider, conical sampler or multiple-slot sampler with distribution system.

5.2 Testing husker, suitable for removal of the husk from paddy without damaging the kernels.

5.3 Abrasive testing mill, suitable for removal of the pericarp and germ from husked rice.

5.4 Tweezers.

5.5 Small bowls.

5.6 Balance, capable of weighing to the nearest 0,01 g.

6 Sampling

Sampling is not part of the method specified in this International Standard. A recommended sampling method is given in ISO 13690 [1].

It is important the laboratory receive a sample which is truly representative and has not been damaged or changed during transport or storage.

7 Preparation of test sample

The laboratory sample shall have a mass of not less than 1,5 kg.

Carefully mix the laboratory sample to make it as homogeneous as possible, then reduce it through a sample divider (5.1) to obtain the test sample.

Determine the moisture content of the test sample according to ISO 712. The acceptance range is a mass fraction of $(13,0 \pm 1,0) \%$.

If the moisture content is outside the acceptance range, the laboratory sample should be conditioned at ambient temperature and humidity for a sufficient period to obtain a moisture content within the specified range.

8 Procedure

8.1 Adjustment of equipment

8.1.1 Testing husker adjustment

Adjustment of the test equipment shall be carried out prior to the determination.

The testing husker (5.2) shall be considered correctly adjusted when, subsequent to dehusking of rice samples with grain dimensions similar to those of the laboratory sample, the following are not present:

- husked rice with damage to the pericarp,
- grains of paddy or husked rice in the separated husk,
- husk particles in the husked rice.

8.1.2 Testing mill adjustment

Adjustment of the test equipment shall be carried out prior to the determination.

Adjust the testing mill (5.3) by milling rice samples of grain dimensions similar to those of the laboratory sample in order to remove a mass fraction of $(f \pm 0,5)$ % of the husked rice so that the mass of milled head rice minus the mass of milled whole kernels is $\leq 3,0$ % (head rice includes whole kernels). The value of f shall be agreed by the parties involved.

8.2 Determination of husked rice yield (see Figure A.1 in annex A)

Take the test sample and divide it to give a portion suitable for the equipment. Weigh it to the nearest 0,01 g. A minimum of 200 g is recommended.

Spread the paddy and remove any extraneous matter.

Dehusk the paddy in the testing husker (5.2). Any grains of paddy which are not dehusked shall be separated from the husked rice and passed through the testing husker again.

Weigh the total yield of husked rice to the nearest 0,01 g.

8.3 Determination of milled head rice yield

8.3.1 Starting from paddy or parboiled paddy (see Figure A.2)

8.3.1.1 Operate according to 8.2 to obtain the husked rice.

Divide the husked rice to give a portion suitable for the equipment. Weigh and record the mass to nearest 0,01 g. A minimum of 100 g is recommended.

8.3.1.2 Thoroughly clean the testing mill (5.3). Introduce the husked rice sample and mill it for the time necessary to remove the mass fraction $(f \pm 0,5)$ % of its total mass. The milling time has to be predetermined by trials on each test sample.

Weigh the obtained milled rice and record the mass to the nearest 0,01 g.

Separate the head rice from the broken kernels and place the two fractions in separate bowls.

Weigh the head rice and record the mass to the nearest 0,01 g.

8.3.2 Starting from husked rice or from husked parboiled rice (see Figure A.3)

8.3.2.1 Take the test sample and divide it to give a portion suitable for the equipment. Weigh it to the nearest 0,01 g. A minimum of 100 g is recommended.

Spread the husked rice and remove any extraneous matter.

8.3.2.2 Continue as given in 8.3.1.2.

9 Expression of results

Calculate the results as quotients to four decimal places according to Table 1.

Table 1 — Calculation of milling yields

Yield	Mass (<i>m</i>) of test portion starting from	
	paddy	husked rice ^a
Y_0 (husked rice)	m_y / m_x	m_z / m_y
Y_1 (milled rice)	m_1 / m_w	m_1 / m_z
Y_2 (milled head rice)	m_2 / m_w	m_2 / m_z
^a Including extraneous matter.		

Refer to the scheme of the procedure given in annex A (Figure A.1 or A.2 for paddy; Figure A.3 for husked rice).

Express the results of yields as percentages, referred to the starting material, as follows:

- potential yield of husked rice (Y_h)

$$Y_h = Y_0 \times 100 \%$$

- potential yield of milled rice (Y_m)

$$Y_m = Y_0(100 - f) \%$$

- potential yield of milled head rice (Y_{mh})

$$Y_{mh} = Y_0 Y_2 \frac{100 - f}{Y_1} \%$$

Calculate the results for each category to two decimal places, and report them to the nearest 0,1 %.

10 Precision

10.1 Interlaboratory test

Details of an interlaboratory test on the precision of the method are summarized in annex B. The values derived from this interlaboratory test may not be applicable to concentration ranges and matrices other than those given.

10.2 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 the arithmetic mean of the values for r from the interlaboratory study:

- for husked rice, 1 %;
- for milled head rice, 2 %.

10.3 Reproducibility

The absolute differences 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 the arithmetic mean of the values for R from the interlaboratory study:

- for husked rice, 3 %;
- for milled head rice, 5 %.

11 Test report

The test report shall specify:

- all information necessary for the complete identification of the sample;
- the sampling method used, if known;
- the test method used, with reference to this International Standard;
- all operating details not specified in this International Standard, or regarded as optional, together with details of any incidents which may have influenced the test result(s);
- the test result(s) obtained; or if the repeatability has been checked, the final quoted result obtained.

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Annex A (normative)

Procedure schemes

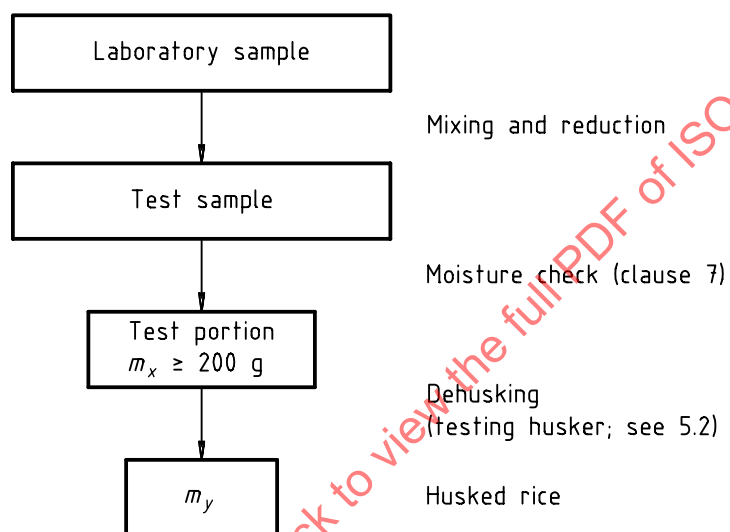


Figure A.1 — Starting from paddy or parboiled paddy: yield of husked rice

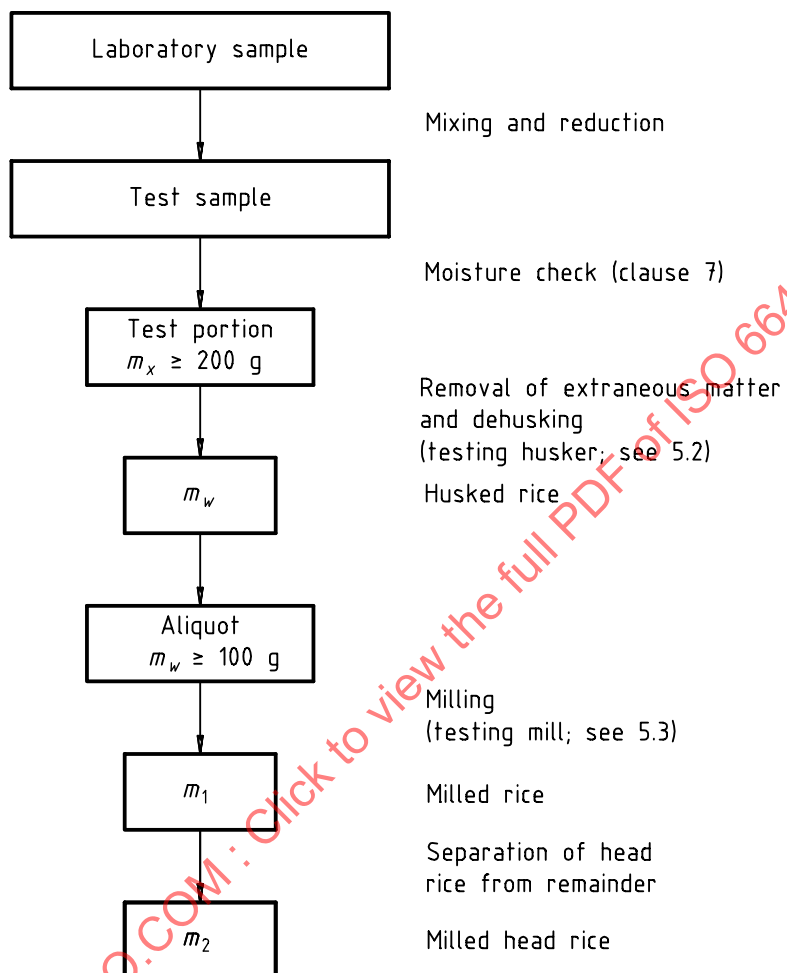


Figure A.2 — Starting from paddy or parboiled paddy: yield of husked rice, milled rice and milled head rice

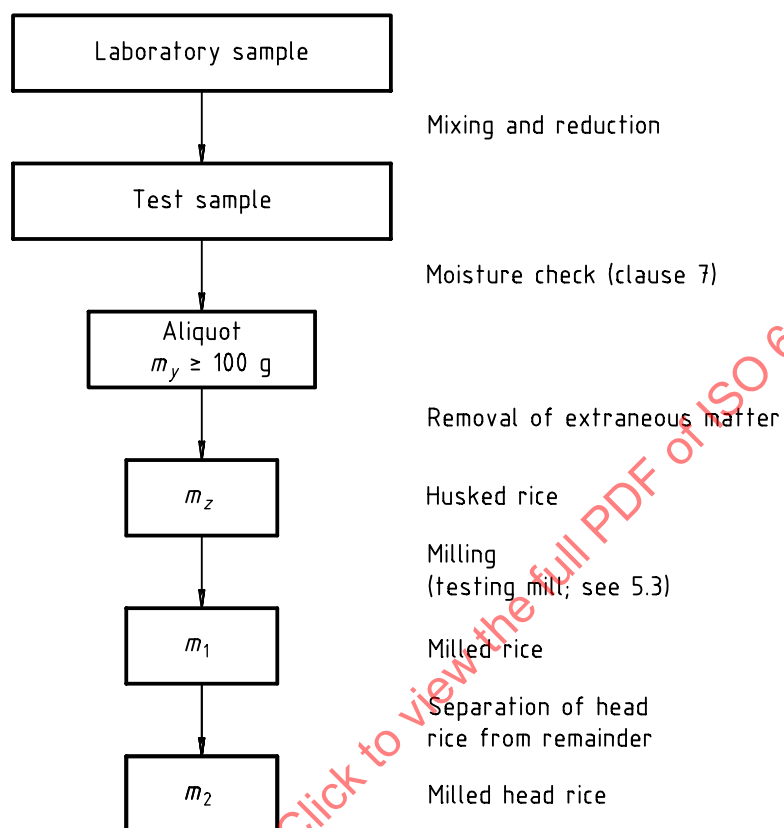


Figure A.3 —Starting from husked rice or husked parboiled rice: yield of milled rice and milled head rice