PHILIPPINE NATIONAL STANDARD

PNS/PAES 206:2015
(PAES published 2015)
ICS 65.060.01

Agricultural machinery – Rice mill – Specifications
National Foreword

The Philippine Agricultural Engineering Standards PAES 206:2015, Agricultural machinery – Rice mill – Specifications was approved for adoption as Philippine National Standard by the Bureau of Philippine Standards upon the recommendation of the Agricultural Machinery Testing and Evaluation Center (AMTEC) and the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development of the Department of Science and Technology (PCAARRD-DOST).

This standard cancels and replaces PNS/PAES 206:2003 (PAES published 2000).
Foreword

The revision of this national standard was initiated by the Agricultural Machinery Testing and Evaluation Center (AMTEC) under the project entitled “Development of Standards for Rice Production and Postproduction Machinery” which was funded by the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD) of the Department of Science and Technology (DOST).

This standard has been technically prepared in accordance with PAES 010–2 – Rules for the Structure and Drafting of International Standards.

The word “shall” is used to indicate mandatory requirements to conform to the standard.

The word “should” is used to indicate that among several possibilities one is recommended as particularly suitable without mentioning or excluding others.

In preparation of this standard, the following documents/publications were considered:


Codex Standard for Rice. 198-1995

Primer on Philippine Grains Standardization Program of the National Food Authority.


1 Scope

This standard specifies the requirements for rice mill.

2 References

The following normative documents contain provisions, which through reference in this text constitute provisions of this National Standard:


PNS/PAES 103:2000 Agricultural Machinery – Method of Sampling

PNS/PAES 138:2004 Agricultural Machinery – Guidelines on After Sales Service

PNS/PAES 202:2015 Agricultural Machinery – Heated–Air Mechanical Grain Dryer – Methods of Test

PNS/PAES 207:2015 Agricultural Machinery – Rice Mill – Methods of Test


3 Definitions

For the purpose of this standard the following definitions shall apply:

3.1 bran
outer layer of the brown rice consisting of the aleurone cells covering the endosperm of the rice grain

3.2 broken grains
pieces of grains smaller than three-fourths (3/4) of the average length of the unbroken kernels
3.3
brown rice
dehulled rice
cargo rice
dehusked rice
rice kernels from which only the hull has been removed and with the bran layer still intact

3.4
coefficient of hulling
ratio of the dehulled grains to the total amount of grain input, expressed in percent

3.5
coefficient of wholeness
ratio of the whole brown rice to the total amount of dehulled grains, expressed in percent

3.6
head rice
grain or a piece of a grain with its length equal to or greater than three-fourths (3/4) of the average length of the whole kernels

3.7
huller
husker
dehuller
component of a rice mill that removes the hulls (palea and lemma) from the grains

3.8
hulling efficiency
product of the coefficient of hulling and the coefficient of wholeness of grains, expressed in percent

3.9
input capacity
weight of paddy per unit loading time into the huller, expressed in metric tons per hour

3.10
milled rice
white rice
grains obtained after the removal of hull, bran and germ

3.11
milling capacity
quantity of paddy that the rice mill can process to a specified quality per total milling time, expressed in metric tons per hour

3.12
milling degree
extent or degree by which the bran layer of the brown rice is removed as a result of whitening
3.13 **milling recovery**
ratio of the weight of milled rice to the total weight of paddy, expressed in percent

3.14 **milling recovery index**
ratio of the milling recovery obtained in actual testing, to the milling recovery obtained from the laboratory test mill

3.15 **multi-pass rice mill**
rice mill that employs a series of two or more whitening/polishing machines

3.16 **paddy**
rough rice
“palay”
unhulled grain of *Oryza sativa*, which means, grain with the glumes enclosing the kernel

3.17 **percent head rice**
ratio of the weight of grains with a size of three-fourths (3/4) or more of the whole grain to the total weight of milled rice, expressed in percent

3.18 **percent head rice index**
ratio of the percent head rice obtained in actual testing, to the percent head rice obtained from the laboratory test mill

3.19 **polisher**
device of a rice mill, which removes the remaining bran on the milled rice and produces a glossy appearance

3.20 **rice hull**
rice husk
outer most rough covering of the paddy grain (palea and lemma) consisting of the empty glumes, floral glumes, and awn

3.21 **rice mill**
machine used to remove the hull and bran of the paddy to produce milled rice and consists mainly of hulling and whitening assembly

3.21.1 **cone “cono” type**
type of rice mill having an under-runner stone disc huller and vertical cone whitener (Figure 1)
3.21.2 rubber roll type

type of rice mill using rubber roll huller and utilizes friction and/or combination of other types of whitener (Figure 2)
3.21.3 **centrifugal type**
type of a huller with rotating blades and utilizes pressure such as Coriolis’ force, frictional force from the blades, or impact force at collision with the blades and the peripheral surface (Figure 3)

![Figure 3 - Centrifugal huller](image)

3.22 **single-pass rice mill**
rice mill that employs only one whitening machine (Figure 4)

![Figure 4 - Layout of a rubber roll single pass rice mill](image)

3.23 **well-milled rice**
rice grain from which the hull, the germ, the outer bran layers, and the greater part of the inner bran layer have been removed, but part of the lengthwise streaks of the bran layers may still be present on less than 20% of the sample grains
3.24 whitener
component of a rice mill that removes the bran in the brown rice

3.24.1 abrasive type
type of whitening machine consisting of a cylinder or cone coated with abrasive material such as emery stone or any similar materials enclosed in a perforated steel housing

3.24.2 friction type
type of whitening machine consisting of a ridged cylinder enclosed in a perforated steel housing

4 Classification
The classification of rice mill, shall be based on the following:

4.1 Method of Operation
4.1.1 Single-pass rice mill
4.1.2 Multi-pass rice mill

4.2 Type of Huller
4.2.1 Under-runner stone disc
4.2.2 Rubber roll type
4.2.3 Centrifugal type

5 Performance and Other Requirements
5.1 The performance criteria for rice mill shall be as specified in Table 1.

5.2 The specified capacity at the brown rice output of the paddy separator must be attained.

5.3 The rubber roll shall be able to process the input capacity as stated in PNS/PAES 214:2004 – Agricultural Machinery – Rubber Roll for Rice Mill – Specifications.
Table 1 – Performance Criteria for Rice Mill

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>Performance Data</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Single pass</td>
<td>Multi-pass</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rubber Roll</td>
<td>Centrifugal</td>
<td>Under Runner Type</td>
<td>Rubber Roll</td>
</tr>
<tr>
<td>1. Hulling Efficiency (%), minimum</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>2. Milling Recovery Index, minimum</td>
<td>0.98</td>
<td>0.98</td>
<td>0.97</td>
<td>0.98</td>
</tr>
<tr>
<td>3. Percent Head Rice Index, minimum</td>
<td>0.90</td>
<td>0.90</td>
<td>0.90</td>
<td>0.90</td>
</tr>
<tr>
<td>4. Milling Degree</td>
<td>Well milled</td>
<td>Well milled</td>
<td>Well milled</td>
<td>Well milled</td>
</tr>
<tr>
<td>5. Noise Level, [dB (A)], maximum</td>
<td>92*</td>
<td>92*</td>
<td>92*</td>
<td>92*</td>
</tr>
<tr>
<td>6. No. of Paddy per kilogram milled rice</td>
<td>15</td>
<td>15</td>
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<td>15</td>
</tr>
</tbody>
</table>

* Allowable noise level for six (6) hours of continuous exposure based on Occupational Safety Health Standards, Department of Labor and Employment, Philippines, 2013.

Note: For other types of huller, refer to ISO Standard.

6 Workmanship and Finish

6.1 Rice mill shall be free from manufacturing defects that may be detrimental to its operation.

6.2 Any uncoated metallic surfaces shall be free from rust and shall be painted properly.

6.3 Rice mill shall be free from sharp edges and surfaces that may injure the operator. The warning notice shall be in accordance with PNS/PAES 101:2000 – Agricultural Machinery – Technical Means for Ensuring Safety – General.

7 Warranty for Construction and Services

7.1 The construction of the rice mill shall be rigid and durable without major breakdown of the hulling, whitening, separating, aspirating, and conveying mechanism within six (6) months.

7.2 Warranty shall be provided for parts and services within six (6) months after the installation and acceptance by the user, except on easy to wear parts such as belts, rubber rolls, and screens. General requirements of the warranty shall be in accordance with PNS/PAES 138:2004 – Agricultural Machinery – Guidelines on After Sales Service.

8 Maintenance and Operation

8.1 Each rice mill shall be provided with at least three (3) pieces of dust masks and the basic tools as specified by the manufacturer: one (1) set each of Allen and open wrenches and one (1) piece each of cross and flat screw driver.
8.2 An instruction manual which conforms to PNS/PAES 102:2000 – Agricultural Machinery – Operator’s Manual – Content and Presentation shall be provided.

8.3 There shall be provisions for lubrication of non-sealed type bearings and belt tightening.

8.4 Provisions for safety of the operator from all moving components of the rice mill such as belt guard or cover shall be included.

9 Sampling

The rice mill shall be sampled for testing in accordance with PNS/PAES 103:2000 – Agricultural Machinery – Method of Sampling.

10 Testing

The sampled rice mill shall be tested in accordance with PNS/PAES 207:2015 – Agricultural Machinery – Rice Mill – Methods of Test

11 Marking and Labeling

Each unit of rice mill shall be marked at prominent place with the following information:

11.1 Registered trademark of the manufacturer

11.2 Brand

11.3 Model

11.4 Serial number

11.5 Name and address of the manufacturer

11.6 Name and address of the importer/distributor

11.7 Country of manufacture /Made in the Philippines

11.8 Input capacity, metric tons/h

11.9 Power requirement, kW

11.10 Safety/Precautionary markings