

Foreword

This standard is a revision of the PNS 143:1988 “Specification for Mechanical Paddy Thresher” initiated by the Agricultural Machinery Testing and Evaluation Center (AMTEC) under the project entitled “Standardization of Postharvest Machinery Testing and Evaluation” which was funded by the Bureau of Postharvest Research and Extension (BPRES) of the Department of Agriculture (DA).

This revised standard was reviewed by the Study Team on Formulation of Standard for Mechanical Paddy Thresher and by the Technical Committee for Postharvest Machinery and was circulated to various private and government agencies/organizations concerned for their comments and reactions. This standard was presented to the Philippine Society of Agricultural Engineers (PSAE) and subjected to a public hearing organized by the National Agriculture and Fisheries Council (NAFC).

This revision has been technically revised in accordance with PNS 01: Part 4:1998 – Rules for the Structure and Drafting of Philippine National Standards.

Revisions had been made to adopt various improvements in the design of the machine that may affect its performance. The following were the modifications to this standard:

- performance criteria were changed based on the results of actual tests conducted by Agricultural Machinery Testing and Evaluation Center (AMTEC);
- performance parameters were included to meet the set performance criteria;
- materials of construction for threshing elements was specified; and
- warranty period provided for parts and services and basic tools were specified.

In the preparation of this standard, reference was made to AMTEC Test Reports on Mechanical Rice Thresher, Volume 1.

Agricultural Machinery – Mechanical Rice Thresher – Specifications

1 Scope

This standard specifies the requirements for mechanical rice thresher.

2 Reference

The following normative document contains provisions which through reference in this text constitute provisions of this National Standard:

PAES 205:2000 Agricultural Machinery: Mechanical Rice Thresher – Methods of Test.

3 Definitions

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

3.1**axial flow thresher**

throw-in type of thresher which allows the cut plants to move in a helical manner around the threshing cylinder with a net effect of moving the material axially between the feeding and discharge outlets

3.2**blower loss**

ratio of the weight of grains blown with the chaff by the thresher fan, to the weight of the total grain input of the thresher, expressed in percent

3.3**chaff**

empty grains and crushed straw being discharged from the threshing chamber

3.4**concave grate**

concave component

iron grill frame partially or fully surrounding the cylinder on which the threshing elements rubs, shear and/or impact the cut plants

3.5**cracked grains**

grains which show signs of fissures or fractures or splinters

3.6

grain-straw ratio

grain content

ratio of the weight of the grains present in the panicles, to the total weight of the grain and straw in the same sample

3.7

hold-on thresher

type of thresher wherein the panicles of the cut plants are fed into the threshing chamber while the stalks are mechanically or manually held during the threshing operation

3.8

mechanically damaged grain

grains that were broken and/or dehulled (partially or fully) as a result of threshing operation

3.9

mechanical rice thresher

machine used to detach and separate the palay from the panicles

NOTE It may or may not have a grain cleaning unit.

3.10

moisture content

amount of moisture in the grain expressed as percentage of the total weight of the sample (wet basis)

NOTE It is calculated as:

$$\text{Moisture Content, \% w.b.} = \frac{M_0 - M_1}{M_1} \times 100$$

Where:

M_0 = initial mass in grams of the test portion

M_1 = mass in grams of the dry test portion

3.11

palay

paddy

rice

rough rice

unhulled grain of *Oryza sativa* L., that is, grain with the hull/husk

3.12

peg-tooth cylinder

type of threshing cylinder wherein spikes or pegs are attached on the periphery of the cylinder in tandem or in helical arrangements

3.13

purity

ratio of the weight of clean grains, to the total weight of unclean grains sample, expressed in percent

3.14**rasp-bar cylinder**

type of threshing cylinder wherein threshing is done between bar-like protrusions in parallel orientation laid on the periphery of the cylinder and stationary bars built into or attached to the concave grate

3.15**rated engine speed**

engine speed indicated in revolutions per minute (rpm) of the engine shaft as specified by the engine manufacturer for operation at nominal continuous load

3.16**scattering loss**

ratio of the weight of grains that fell out from the machine during threshing operation, to the weight of the total grain input of the thresher, expressed in percent

3.17**separation loss**

ratio of the weight of grains that come out of the threshing chamber with the straw, to the weight of total grain input of the thresher, expressed in percent

3.18**straw length**

cut plants length measured from the point of cut to the tip of the panicle

3.19**threshed grain**

grains that are detached from the panicles by the thresher inclusive of mature, immature, and damaged grains

3.20**threshing unit**

threshing chamber

part of the thresher where the grains are detached and separated from the panicles

3.21**threshing cylinder**

threshing drum

part of the threshing unit that rotates about an axis and it is equipped with either pegs, rasp bars, or wire loops on its periphery

3.22**threshing efficiency**

ratio of the weight of the threshed grains collected at all outlets, to the total grain input of the thresher, expressed in percent

3.23**threshing element**

attachments of the threshing cylinder such as pegtooth, wire-loop and rasp-bar that detaches the grains from the panicles

3.24

threshing recovery

ratio of the weight of the threshed grains collected at the main grain outlet, to the weight of the total grain input of the thresher, expressed in percent

3.25

through flow thresher

throw-in type of thresher wherein cut plants are fed between the rotating cylinder and stationary concave and the threshed materials/straws are discharged out of the threshing chamber tangentially

3.26

throw-in thresher

type of thresher which detaches the grains by feeding the cut plants into the machine

3.27

total grain input

sum of the weights of collected threshed grains and all grains loss during threshing

3.28

unthreshed loss

ratio of the weight of grains that remained in the panicles of the plants fed into the threshing chamber, to the weight of total grain input of the thresher, expressed in percent

3.29

wire-loop cylinder

type of threshing cylinder wherein wires of the same arc and size are attached on the periphery of the cylinder in tandem arrangement with or without the threshing concave

4 Classification

The classification of mechanical rice thresher shall be based on the following:

4.1 Method of feeding

4.1.1 Hold-on type

4.1.2 Throw-in type

4.2 Operation

4.2.1 Axial flow type

4.2.2 Through flow type

4.3 Threshing cylinder

4.3.1 Peg-tooth cylinder

4.3.2 Rasp-bar cylinder

4.3.3 Wire-loop cylinder

5 Materials of Construction

5.1 Steel bars and metal sheet shall be generally used for the manufacture of the different components of the mechanical rice thresher.

5.2 Threshing elements shall be made of alloy steel, or heat-treated carbon steel (AISI 1040 – 1055 or its ISO equivalent).

6 Performance and Other Requirements

6.1 The performance criteria for mechanical rice thresher shall be as specified in Table 1.

Table 1. Performance Criteria for Mechanical Rice Thresher.

Criteria	Performance Data
Threshing Recovery, percent, minimum	97.0
Threshing Efficiency, percent, minimum	99.8
Losses, percent, maximum	
a) Blower Loss	1.2
b) Separation Loss	1.3
c) Unthreshed Loss	0.2
d) Scattering Loss	0.3
Purity, percent, minimum	
a) With Sifter and Fan	97.0
b) Without Sifter and With Fan	95.0
c) Without Cleaning Devices	80.0
Mechanically Damaged Grain, percent, maximum	2.0
Net Cracked Grain, percent, maximum	5.0
Noise Level, [db(A)], maximum	95.0*

* Allowable noise level for four (4) hours of continuous exposure based on Occupational Safety and Health Standards, Ministry of Labor, Philippines. 1983.

6.2 Sealed type bearings shall be used as protection against dust. There shall be provision for lubrication of non-sealed type bearings and bushings.

6.3 Belt cover or guard and provisions for belt tightening and adjustments shall be provided.

6.4 Provisions for the safety of the operators in the feeding port and other moving parts shall be included in the thresher.

6.5 Threshing cylinder speed indicator should be provided.

7 Workmanship and Finish

7.1 Mechanical rice thresher shall be free from manufacturing defects that may be detrimental to its operation.

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

7.3 Mechanical rice thresher shall be free from sharp edges and surfaces that may injure the operator.

7.4 Rotating parts should be dynamically balanced.

8 Warranty for Construction and Durability

8.1 The construction shall be rigid and durable without major breakdown of the threshing and cleaning mechanisms within six (6) months.

8.2 Warranty shall be provided for parts and services within six (6) months after the purchase of the thresher, except on fast moving and easy to wear parts such as belts.

9 Maintenance and Operation

9.1 Each mechanical rice thresher unit shall be provided with dust masks and the following basic tools: three (3) pieces open wrenches; one (1) piece each of Philips and flat screw driver; and one (1) piece adjustable wrench.

9.2 An instruction manual which conforms to PAES 102:2000 shall be provided.

9.3 A training on the recommended threshing cylinder speed for operators shall be provided

10 Testing

Mechanical rice thresher shall be tested in accordance with PAES 205:2000-Agricultural Machinery: Mechanical Rice Thresher – Methods of Test.

11 Marking and Labeling

Each mechanical rice thresher 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
- 11.7** Country of manufacture/Made in the Philippines
- 11.8** Power requirement, kW
- 11.9** Recommended threshing cylinder speed, rpm
- 11.10** Date of testing and name of testing agency
- 11.11** Safety/Precautionary markings