

PHILIPPINE NATIONAL STANDARD

PNS/PAES 204:2015
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ICS 65.060.50

Agricultural machinery – Mechanical rice thresher – Specifications



BUREAU OF PRODUCT STANDARDS*

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National Foreword

The Philippine Agricultural Engineering Standards PAES 204:2015, Agricultural machinery – Mechanical rice thresher - 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 204:2003 (PAES published 2000).

PHILIPPINE AGRICULTURAL ENGINEERING STANDARD PNS/PAES 204:2015
Agricultural Machinery – Mechanical Rice Thresher – Specifications

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:

Regional Network for Agricultural Machinery (RNAM) Test Codes and Procedures for Harvesting Machine, Technical Series No. 12:1983.

1 Scope

This standard specifies the requirements for manufacture and performance of the mechanical rice thresher.

2 References

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

PNS/PAES 102:2000 Agricultural Machinery – Operator’s Manual – Content and Presentation

PNS/PAES 205:2015 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

broken grain

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

3.4

chaff

empty grains and crushed straw being discharged from the threshing chamber

3.5

compact thresher

small sized thresher

3.6

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

3.7

cracked grains

grains which show signs of fissures, fractures or splinters

3.8

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

3.9

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

3.10

mechanical rice thresher

machine used to detach and separate the paddy from the panicles

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

3.11

moisture content

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

NOTE

It is calculated as:

$$\text{Moisture Content (MC), \% d.b.} = \frac{M_0 - M_1}{M_1} \times 100$$

Where:

M_0 is the initial mass in grams of the test portion

M_1 is the mass in grams of the dry test portion

3.12

palay

paddy

rice

rough rice

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

3.13

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

3.14

purity

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

3.15

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

3.16

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

3.17

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

3.18

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

3.19

standard thresher

common type of thresher that gives off a capacity of 0.3 – 1.5 tons/hr

3.20

straw length

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

3.21

threshed grain

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

3.22

threshing unit

threshing chamber

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

3.23

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

3.24

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

3.25

threshing element

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

3.26

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

3.27

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

3.28

throw-in thresher

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

3.29

total grain input

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

3.30

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

3.31

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 (Figure 1)

4.1.2 Throw-in type (Figure 2)

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 (Figure 3)

4.3.2 Rasp-bar cylinder (Figure 4)

4.3.3 Wire-loop cylinder (Figure 5)

4.4 Capacity

4.4.1 Compact

4.4.2 Standard

4.4.3 High capacity

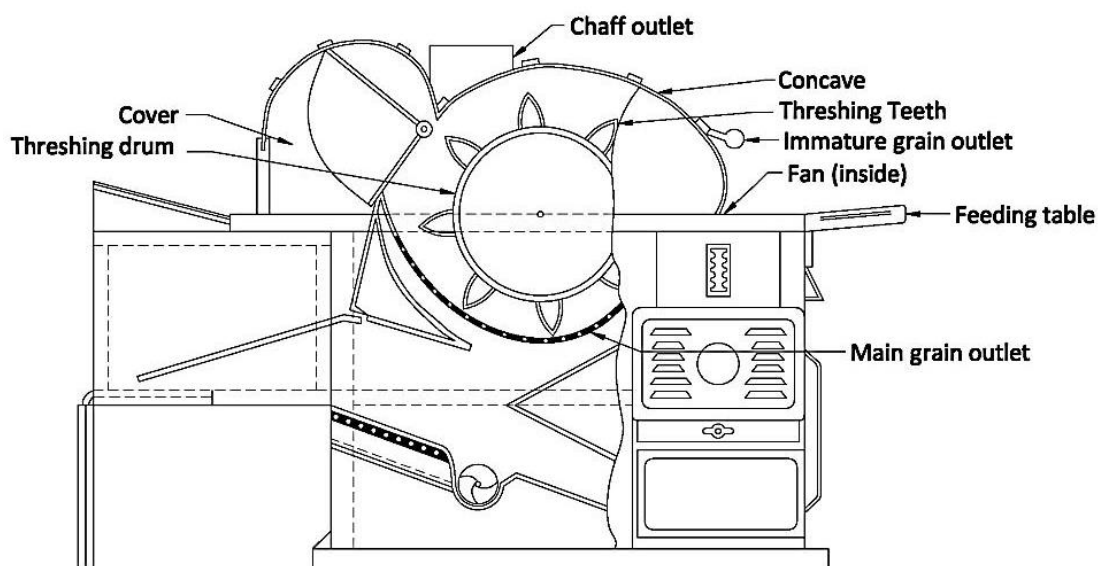


Figure 1 - Hold-on type

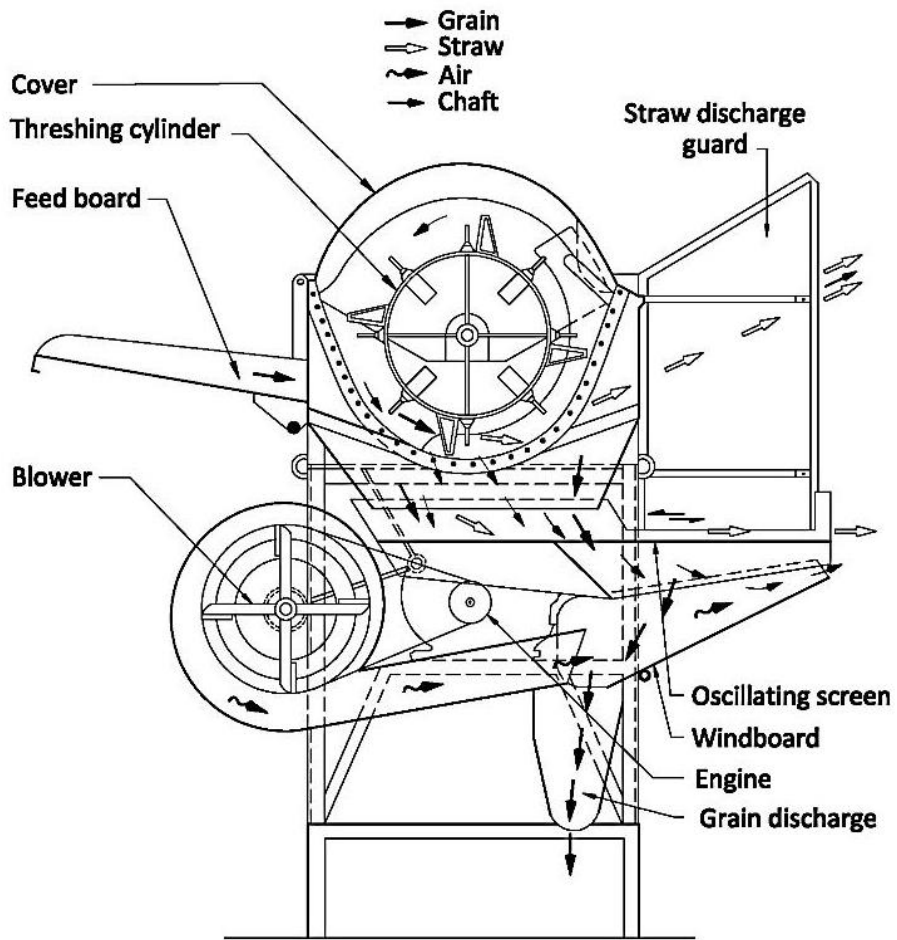


Figure 2 - Throw-in type

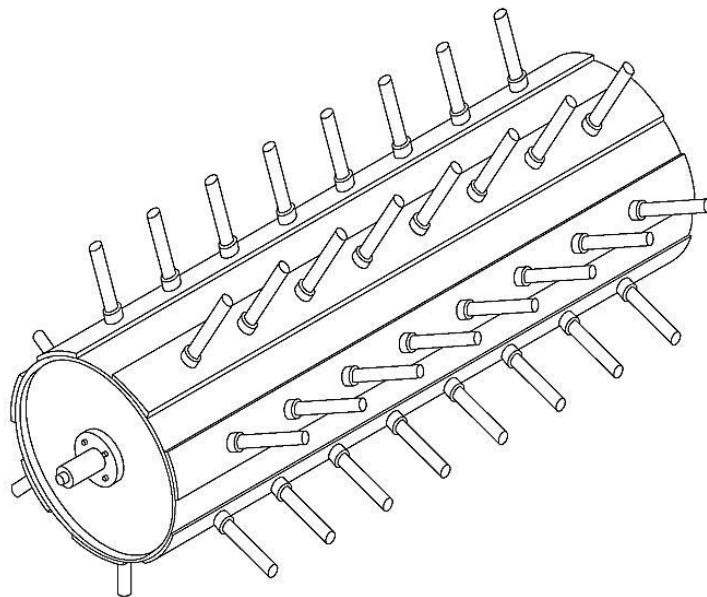


Figure 3 - Peg-tooth cylinder

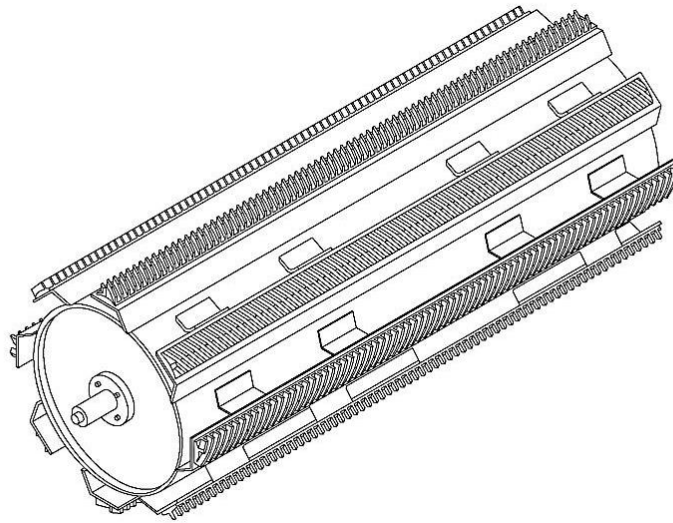


Figure 4 - Rasp-bar cylinder

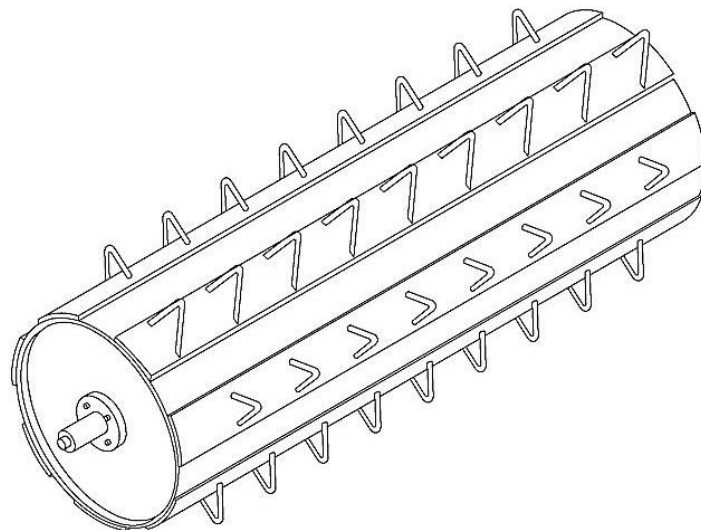


Figure 5 - Wire-loop cylinder

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, American Iron and Steel Institute (AISI) 1040 – 1055 or its 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, Department of Labor and Employment, Philippines. 2013.

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

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

6.4 Visual speed indicator of the recommended threshing cylinder speed shall 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 one (1) year after acceptance of the unit.

8.2 A one (1) year warranty on parts and services, in accordance to the manufacturer's warranty policy, shall be provided. This shall start upon the acceptance of the thresher and shall not include normal wear and tear and consumable parts.

9 Maintenance and Operation

9.1 Each mechanical rice thresher unit shall be provided with dust masks and set of manufacturer's standard tools required for maintenance.

9.2 An operator's manual which conforms to PNS/PAES 102:2000 Agricultural Machinery – Operator's Manual – Content and Presentations shall be provided.

9.3 A training on the proper operation specifically on threshing cylinder speed shall be provided by the supplier to the operator.

10 Testing

Mechanical rice thresher shall be tested in accordance with PNS/PAES 205:2015-Agricultural Machinery: Mechanical Rice Thresher – Methods of Test.

11 Marking and Labelling

11.1 The mechanical rice thresher shall be marked in English, with the following information, using a plate, stencil or by directly punching it at the most conspicuous place:

11.1.1 Brand name or Registered trademark of the manufacturer

11.1.2 Model and/or Serial number

11.1.3 Maximum weight capacity

11.1.4 Name, address and contact number of the distributor

11.1.5 Country of manufacture

11.1.6 Power requirement, hp/kW

11.1.7 Recommended threshing cylinder speed, rpm

11.2 Other additional markings shall be provided and shall include the name and address of the importer, if imported (optional).

11.3 Safety/ precautionary markings shall be provided. Markings shall be stated in English or Filipino and shall be printed in red color with a white background.

11.4 The markings shall have a durable bond with the base surface material. The markings shall be water and heat resistant under normal cleaning procedures. It shall not fade, discolor, crack, peel and shall remain legible.

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