

PHILIPPINE NATIONAL STANDARD

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Agricultural machinery – Multipurpose thresher – Specifications



BUREAU OF PRODUCT STANDARDS*

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National Foreword

The Philippine Agricultural Engineering Standards PAES 262:2015, Agricultural machinery – Multipurpose 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).

PHILIPPINE AGRICULTURAL ENGINEERING STANDARD PNS/PAES 262:2015
Agricultural Machinery – Multipurpose Thresher – Specifications

Foreword

The formulation 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:

PNS/PAES 204:2000 – Agricultural Machinery – Mechanical Rice Thresher – Specifications

PNS/PAES 208:2000 – Agricultural Machinery – Power – Operated Corn Sheller – Specifications

Primer on Philippine Grains Standardization Program. 2002. National Food Authority. Quezon City, Philippines

Rice Postharvest Technology. 1995. The Food Agency Ministry of Agriculture, Forestry and Fisheries. Tokyo, Japan.

Rice Postproduction Technology A Technical Reference Guide. 2003. Philippine Rice Postproduction Consortium. Japan Grain Inspection Association. National Food Authority. Quezon City.

PHILIPPINE AGRICULTURAL ENGINEERING STANDARD PNS/PAES 262:2015
Agricultural Machinery – Multipurpose Thresher – Specifications

1 Scope

This standard specifies the requirements for manufacture and performance of a multipurpose thresher that could perform paddy threshing, corn husking and corn shelling operations.

2 References

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

PNS/PAES 101:2000 Agricultural Machinery – Technical Means for Ensuring Safety – General

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

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

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

PNS/PAES 263:2015 Agricultural Machinery – Multipurpose Thresher – Methods of Test

3 Definitions

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

3.1

axial flow

throw-in type of thresher/sheller 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 or weight of corn kernels blown by the sheller fan, to the weight of the total grain input of the thresher, expressed in percent

3.3

broken grain

grains that were broken and/or dehulled (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

closed-frame cylinder

type of shelling/threshing cylinder formed by a rolled metal sheet/plate or formed by longitudinal bars adjacently arranged forming a continuous cylinder (Figure 1)

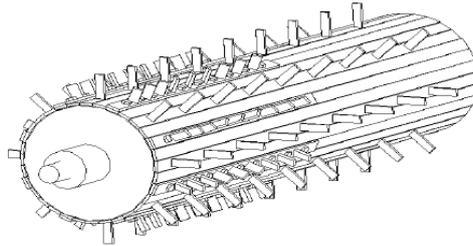


Figure 1 – Closed-frame type cylinder

NOTE The shelling elements are either attached around the periphery of a cylinder or at the longitudinal bars.

3.6

compact thresher

small sized thresher

3.7

concave grate

concave component

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

3.8

corn ear

pistillate inflorescence of the plant *Zea mays* L., enclosed with a leaf-like protective covering known as husk

3.9

corn cob

part of the ear corn where the kernels are attached

3.10

corn husker-sheller

machine used to remove the husk of corn ear, detach, separate and clean the corn kernels from the cobs in one operation

3.11

corn sheller

machine used to detach, separate and clean the corn kernels from the cobs

3.12

cracked kernels

cracked grains

kernels or grains which show signs of fissures or fractures or splinters

3.13

cylinder-type

type of threshing/shelling unit consisting of a cylinder with shelling elements such as knife bar or pegtooth

NOTE The cylinder rotates inside a concave component.

3.14

disc-type

type of threshing/shelling unit consisting of a vertical disc with spiked surface

NOTE The disc rotates along horizontal axis.

3.15

ear corn

dehusked corn

corn-in-cob

unshelled fruit of the corn plant where the husk has been removed mechanically or manually

3.16

efficiency

ratio of the weight of the threshed grains and shelled kernels collected at all outlets, to the total grain input in the machine, expressed in percent

3.17

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

3.18

hopper-fed type

type of corn sheller wherein the ear corn are fed into shelling chamber by gravity

3.19

kernel

dry and indehiscent seed developed from the ovary of the ear corn

3.20

kernel-ear corn ratio

ratio of the weight of the corn kernel present in the ear corn to the weight of the ear corn

3.21

mechanical rice thresher

machine used to detach and separate the paddy from the panicles

3.22

mechanically damaged kernels

kernels that were broken during the operation

3.23

moisture content

amount of moisture in the grain or in the kernel expressed as percentage of the total weight of the sample, wet basis

3.24

multipurpose thresher

machine that could perform paddy threshing, corn husking and corn shelling operations

3.25

net cracked kernel

difference between the percent cracked sample taken before and after the shelling operation

3.26

open-frame cylinder

type of threshing/shelling cylinder where the shelling elements are attached to the equally spaced longitudinal bars arranged cylindrically

3.27

palay

paddy

rice

rough rice

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

3.28

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

3.29

purity

ratio of the weight of clean corn kernels or clean grains/paddy, to the total weight of unclean corn kernels or grains/paddy sample, expressed in percent

3.30

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

3.31

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

3.32

scattering loss

ratio of the weight of corn kernels or grains that fell out from the machine during shelling/threshing operation to the weight of the total corn kernel or grains input of the sheller/thresher, expressed in percent

3.33

shelling cylinder

threshing cylinder

shelling drum

threshing drum

part of the unit that rotates about an axis and it is equipped with pegs on its periphery

3.34

shelling unit

threshing unit

shelling chamber

threshing chamber

part of the unit where the kernels and grains are detached and separated from the corn cobs and panicles

3.35

shelled kernels

whole and damaged corn kernels separated from the cob after shelling

3.36

separation loss

ratio of the weight of corn kernels or grains that come out of the shelling/threshing chamber with the cobs at the cob outlet or out of the threshing chamber with the straw, to the weight of the total corn kernel input of the sheller, expressed in percent

3.37

sifter

cleaning mechanism component

sifter

wire mesh or perforated metal sheet that rotates or moves back-and-forth and allow smaller particles to fall through the openings and larger particles to remain on top

3.38**standard thresher**

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

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

3.39**straw length**

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

3.40**recovery**

ratio of the weight of the shelled corn or grains collected from the main outlet, to the total weight of the corn kernel or grains input in the machine, expressed in percent

3.41**table-fed type**

type of corn sheller wherein the ear corn are fed into shelling chamber with the application of external force

3.42**threshed grain**

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

3.43**threshing element**

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

3.44**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

3.45**throw-in thresher**

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

3.46**total grain input**

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

3.47**unshelled kernels**

kernels that remain in the cob after shelling

3.48

unshelled loss

unthreshed loss

ratio of the weight of corn kernels/grains that remained in the cobs of the corn/panicles of the plants fed into the chamber, to the weight of the total corn kernel input of the sheller, expressed in percent

3.49

whole kernels

unbroken kernels after shelling

4 Classification

The classification if the machine will be used as thresher shall be based on the following:

4.1 Method of feeding

4.1.1 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)

4.4 Capacity

4.4.1 Compact

4.4.2 Standard

4.5 Cleaning mechanism

4.5.1 Fan/Blower

4.5.2 Sifter

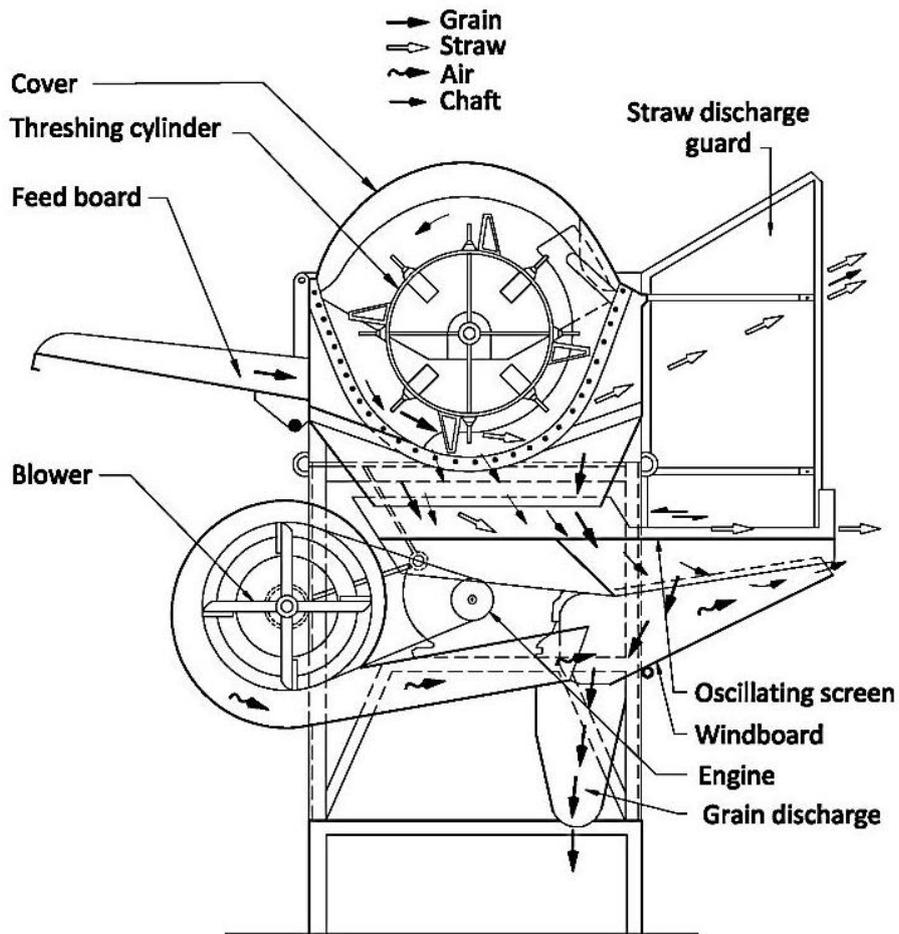


Figure 2 - Throw-in type

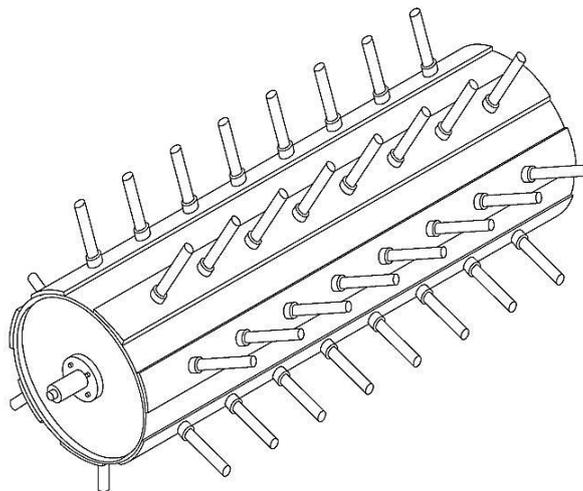


Figure 3 - Peg-tooth cylinder

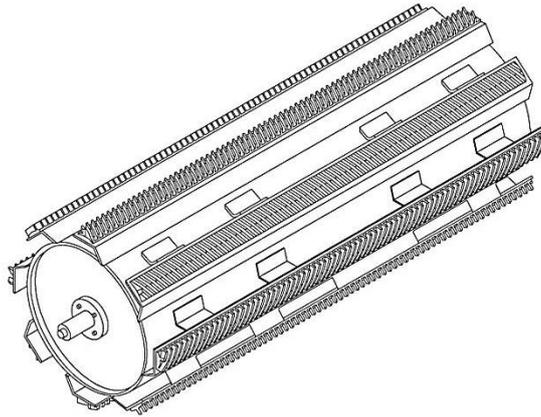


Figure 4 - Rasp-bar cylinder

The classification if the machine will be used as corn sheller shall be based on the following:

4.6 Mode of application

4.6.1 Corn Husker-Sheller

4.6.2 Corn Sheller

4.7 Method of feeding

4.7.1 Hopper-fed type

4.7.2 Table-fed type

4.8 Shelling unit

4.8.1 Cylinder –type

4.8.1.1 Number of cylinder

4.8.1.1.1 Single cylinder

4.8.1.1.2 Multi-cylinder

4.8.1.2 Type of cylinder

4.7.1.2.1 Closed-frame cylinder

4.7.1.2.2 Open-frame cylinder

5 Materials of Construction

5.1 Steel bars and metal sheet or plate shall be generally used in the manufacture of the different components of the multipurpose thresher.

5.2 Shelling and threshing elements shall be made of steel alloy 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 the multipurpose thresher shall be as specified in Table 1.

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

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

Table 1 – Performance Criteria for Multipurpose Thresher

CRITERIA	Performance Data	
	(Tested as Thresher)	(Tested as Sheller-Husker)
1. Recovery, percent, minimum	97	97
2. Efficiency , percent, minimum	99.8	99.5
3. Losses, percent, maximum		
a) Blower Loss	1.2	1.0
b) Separation Loss	1.3	1.0
c) Unthreshed/Unshelled Loss	0.2	0.5
e) Scattering Loss	0.3	0.5
4. Purity, percent, minimum		98
a) With Sifter and Fan	97.0	
b) Without Sifter and With Fan	95.0	
c) Without Cleaning Devices (delete)	80.0	
5. Mechanically Damaged Grain, percent, maximum	2.0	3.0
6. Net Cracked Grain, percent, maximum	5.0	5.0
7. Noise Level, [dB (A)], maximum	95.0*	95*

*Allowable noise level for four (4) hours of continuous exposure based on Occupational Safety and Health Standards, Department of Labor and Employment, Philippines. 2013.

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

6.5 Visual speed indicator of the recommended threshing/shelling cylinder speed shall be provided.

7 Workmanship and Finish

7.1 Multipurpose thresher shall be free from manufacturing defects that may be detrimental to its operation. The welding shall be satisfactory in all aspects and should not be brittle and porous.

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. The warning notice shall be in accordance with PNS/PAES 101:2000 – Agricultural Machinery – Technical Means for Ensuring Safety – General.

7.4 Rotating parts should be dynamically balanced.

8 Warranty for Construction and Services

8.1 The construction shall be rigid and durable without major breakdown of the threshing and cleaning mechanisms, shelling and separating mechanisms, fans, 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 unit and shall not include normal wear and tear and consumable parts. General requirements of the warranty shall be in accordance with PNS/PAES 138:2004 – Agricultural Machinery – Guidelines on After Sales Service.

9 Maintenance and Operation

9.1 Each unit shall be provided with ear plugs or ear muffs, dust masks and the following basic tools: three (3) pieces open wrenches; one (1) piece each of Philips and flat screw driver; one (1) piece adjustable wrench; dust masks and set of manufacturer's standard tools required for maintenance.

9.2 An instruction manual which conforms to PNS/PAES 102:2000 – Agricultural Machinery – Operator's Manual – Content and Presentation 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 Sampling

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

11 Testing

The unit shall be tested in accordance with PNS/PAES 263:2015 – Agricultural Machinery – Multipurpose Thresher– Methods of Test.

12 Marking and Labeling

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

12.1 Brand Name or Registered trademark of the manufacturer

12.2 Model or Serial number

12.3 Name and address of the manufacturer/importer/distributor

12.4 Country of manufacture/Made in the Philippines

12.5 Power requirement, kW

12.6 Recommended threshing/shelling cylinder speed, rpm

12.7 Maximum weight capacity

12.8 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.

12.9 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 or blister and shall remain legible.

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