

# PHILIPPINE NATIONAL STANDARD

PNS/PAES 252:2011  
(PAES published 2011)  
ICS 65.060.01

---

---

## Agricultural machinery – Coffee Pulper - Specifications



**BUREAU OF PRODUCT STANDARDS**

Member to the International Organization for Standardization (ISO)  
Standards and Conformance Portal: [www.bps.dti.gov.ph](http://www.bps.dti.gov.ph)

**National Foreword**

This Philippine Agricultural Engineering Standards PAES 252:2011, Agricultural machinery – Coffee Pulper – Specifications was approved for adoption as Philippine National Standard by the Bureau of Product Standards upon the recommendation of the Agricultural Machinery Testing and Evaluation Center (AMTEC) and the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development of the Department of Science and Technology (PCARRD-DOST).

## **Foreword**

The formulation of this national standard was initiated by the Agricultural Machinery Testing and Evaluation Center (AMTEC) through the project “Development of Standards for Agricultural Production and Postharvest Machinery” funded by the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development – Department of Science and Technology (PCARRD – DOST)

This standard has been technically prepared in accordance with BPS Directives Part 3:2003 – 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 the preparation of this standard, the following documents/publications were considered:

Coffee pulpers.<http://www.alvanblanch.co.uk/coffee%20Pulper%20.pdf>.<accessed on June 01, 2009>

Damil Engineers Pvt. Ltd..<http://www.damilengineers.com/french/e-brochure.pdf>.<accessed on June 01, 2009>

Garcia, Lawrence Dean Basisto. Testing and evaluation of the CvSU coffee pulper based on the formulated standard specifications and methods of test. Undergraduate Thesis. Agricultural Machinery Division, Institute of Agricultural Engineering, College of Engineering and Agro-Industrial Technology, University of the Philippines Los Baños. April 2007

Gersona coffee pulper.<http://mrdcsagada.blogspot.com/2008/02/mrdc-products.html>.<accessed on June 01, 2009>

Potential and future of wet coffee processing in eastern africa.<http://www.ratescenter.org/pdf/Coffee/Ulf%20Kusserow%20-%20Ecologic%20Wet%20Proces.pdf>.<accessed on June 01, 2009>

Pulper cum washer for coffee.<http://www.tnau.ac.in/tech/implements/proc11.htm>.<accessed on June 01, 2009>

Small scale processing of coffee.<http://www.mixph.com/2009/02/small-scale-processing-of-coffee.html>.<accessed on June 01, 2009>

---

**PHILIPPINE AGRICULTURAL ENGINEERING STANDARD PAES 252:2011**  
**Agricultural Machinery – Coffee Pulper – Specifications**

---

## **1 Scope**

This standard specifies the manufacturing and performance requirements for coffee pulper.

## **2 References**

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

|                      |  |
|----------------------|--|
| <b>AWS D1.1:2000</b> | Structural Welding Code - Steel  |
| <b>PAES 102:2000</b> | Agricultural Machinery – Operator’s Manual – Content and Presentation                              |
| <b>PAES 103:2000</b> | Agricultural Machinery – Method of Sampling  |
| <b>PAES 311:2001</b> | Engineering Materials - Screws for Agricultural Machines – Specifications and Applications         |
| <b>PAES 313:2001</b> | Engineering Materials – Bolts and Nuts for Agricultural Machines – Specifications and Applications |
| <b>PAES 253:2011</b> | Agricultural Machinery – Coffee Pulper – Methods of Test   |

## **3 Definitions**

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

### **3.1**

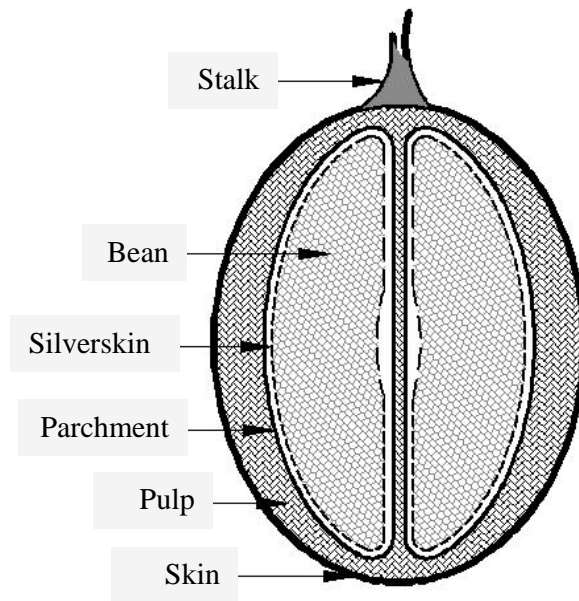
#### **coffee pulper**

machine to remove and separate the soft pulp of ripe coffee cherry without making any damage to the parchment coffee

### **3.2**

#### **coffee cherry**

ripened fruits of coffee shrubs (see Fig. 1)



**Figure. 1. Parts of coffee cherry (cross-section)**

### 3.3

#### **flute**

thread like component of rotating cylinder of the pulping chamber

### 3.4

#### **flute inclination**

angle of inclination of the rubber coated flutes

### 3.5

#### **input capacity**

weight of coffee cherry fed into the pulper per unit of time, expressed in kilogram per hour

### 3.6

#### **output capacity**

weight of parchment coffee collected at coffee outlet per unit time, expressed in kilogram per hour

### 3.7

#### **pulping**

process of removing and separating the skin and pulp of coffee cherry

**3.8**

**mucilage**

slimy layer found between the pulp and adhering to the parchment

**3.9**

**parchment**

endocarp of the coffee cherry, lies between the fleshy part (or pulp) of the cherry and coffee bean

**3.10**

**parchment coffee**

final output product when the coffee cherry has undergone pulping process

**3.11**

**main parchment coffee outlet**

part of machine where parchment coffee are collected

**3.12**

**pulp outlet**

part of machine where pulps are collected

**3.13**

**pulp**

red or green thin fleshy outer layer of the coffee cherry

**3.14**

**pulping efficiency**

ratio of total weight of parchment coffee collected at all outlets to the total coffee cherry input to the machine, expressed in percentage

**3.15**

**pulping recovery**

ratio between the total weight of parchment coffee collected at the main outlet to the total weight of input coffee cherry to the machine, expressed in percentage

**3.16**

**separation loss**

ratio of the total weight of the parchment coffee that comes out to the pulp outlet to the total input weight of coffee cherry to the pulper, expressed in percentage

**3.17**

**unpulped loss**

ratio of the total weight of unpulped coffee cherry to the total input weight of coffee cherry to the pulper, expressed in percentage

**3.18****scattering loss**

ratio of the total weight of the parchment coffee that fell around the base of coffee pulper to the total coffee cherry input to the machine, expressed in percentage

**3.19****mechanically damaged parchment coffee**

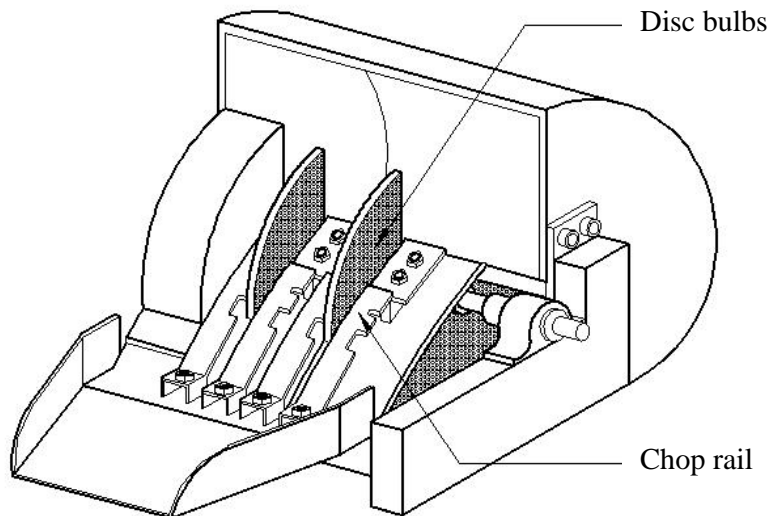
ratio of the total weight of damaged parchment coffee to the total weight of sample, expressed in percentage

**4 Classification**

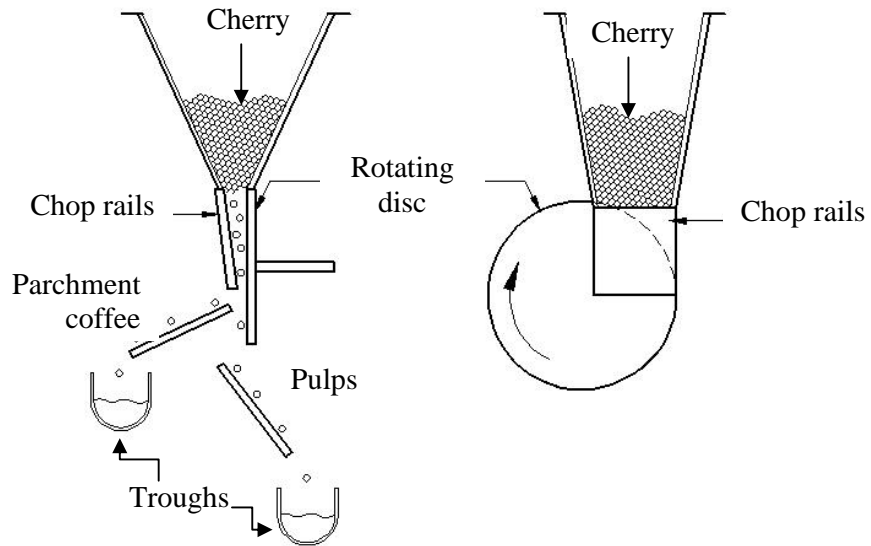
The classification of coffee pulper shall be based according to the following:

**4.1 Pulping mechanism****4.1.1 Disc pulper (Fig. 2a and 2b)**

Pulper that uses rubbing action of disc bulbs and chop rails to remove the pulp from parchment coffee.



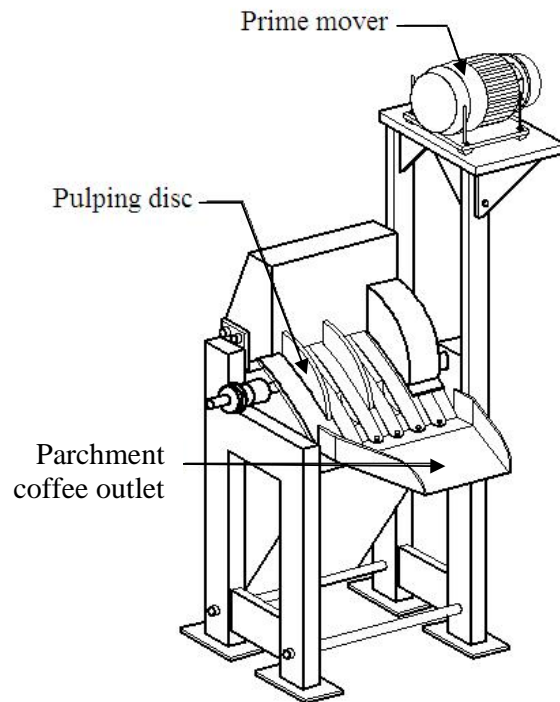
**Figure. 2a. Disc Pulper**



**Figure. 2b. Schematic diagram of disc pulper**

Disc pulper shall be classified according to power source:

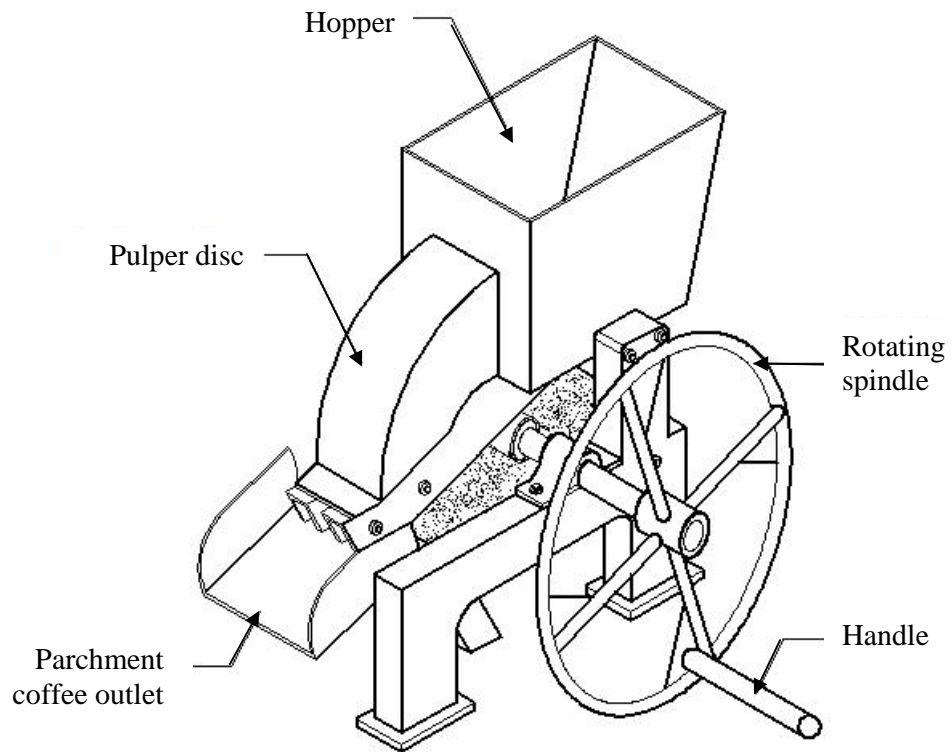
**4.1.1.1 Mechanically operated (Fig. 3)**



**Figure. 3. Motor-driven disc pulper**



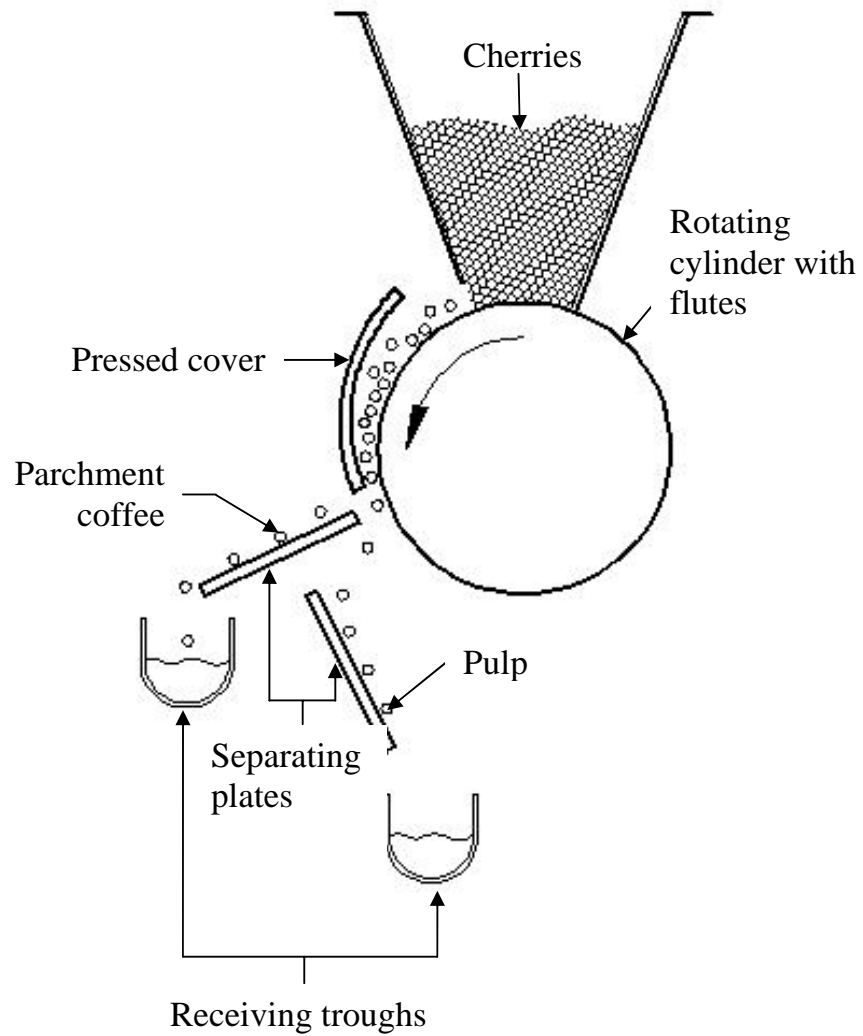
**4.1.1.2 Manually operated (see Fig. 4)**



**Figure. 4. Manually operated disc pulper**

**4.1.2 Drum pulper (Fig. 5)**

Pulper that uses a rotating cylinder with flutes inside a fixed pressed plate with pulping channels and ribs.

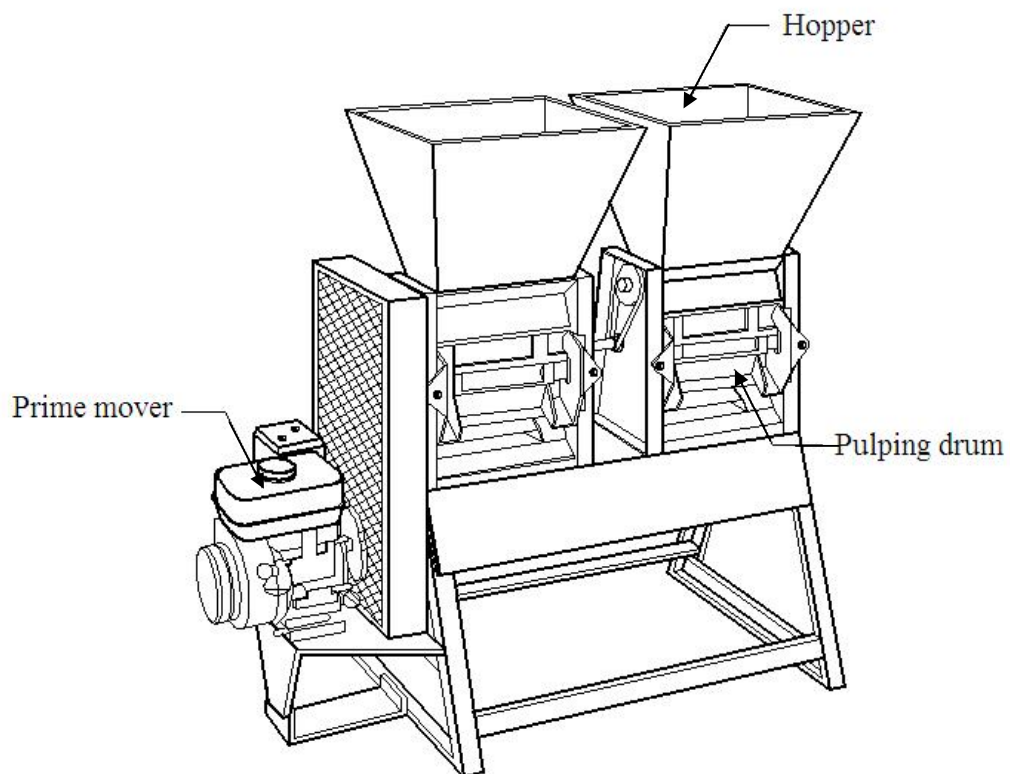


**Figure. 5. Drum Pulper**

Drum pulper shall be classified according to:

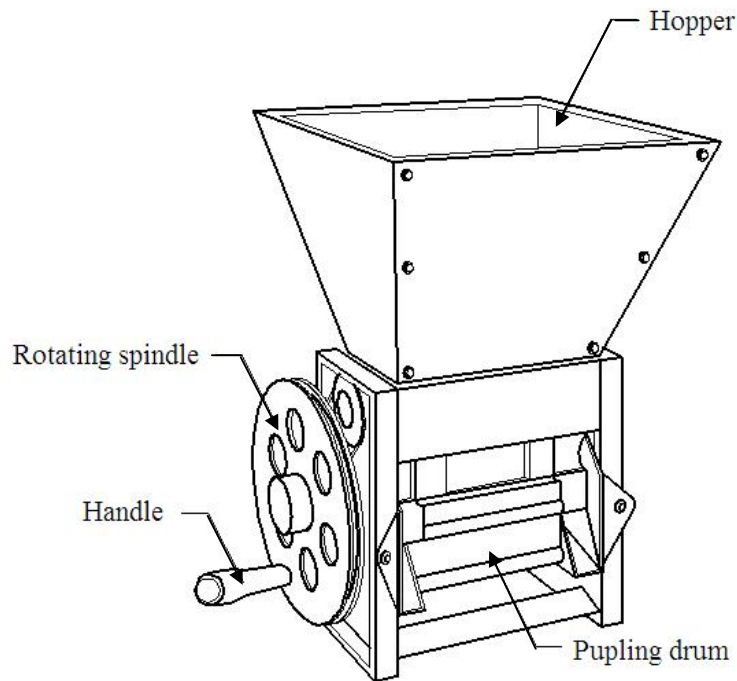
**4.1.2.1 Power Source**

**4.1.2.1.1 Mechanically operated (Fig. 6)**



**Figure. 6. Motor-driven coffee drum pulper**

**4.1.2.1.2 Manually operated (Fig. 7)**



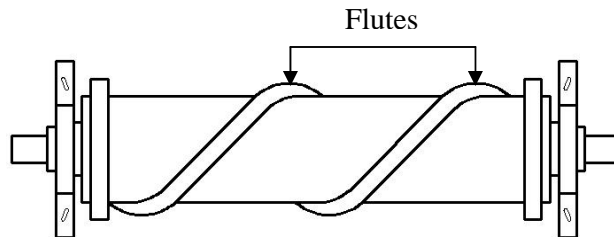
**Figure. 7. Manually operated drum pulper**

**4.1.3 Fluted Cylinder**

Pulper that uses rotating cylinder with flutes or threads.

Fluted cylinder pulper shall be classified according to flute inclination.

**4.1.3.1 43° Flute inclination (Fig. 8)**



**Figure. 8. Pulping cylinder with 43° flute inclination**

#### 4.1.3.2 50° Flute inclination (Fig. 9)

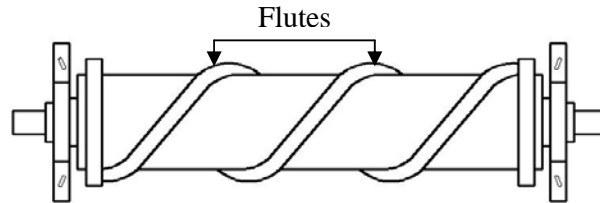


Figure. 9. Pulping cylinder with 50° flute inclination

#### 4.1.3.3 60° Flute inclination (Fig. 10)

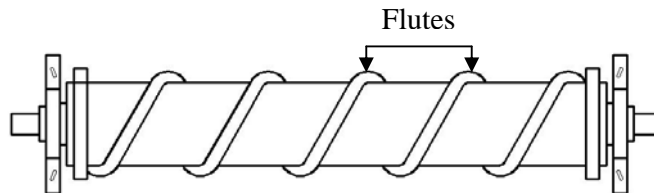


Figure. 10. Pulping cylinder with 60° flute inclination

#### 4.1.4 Slotted plate pulper (Fig. 11 and 12)

Pulper machine that uses a fixed slotted metal screen and a rotating cylinder that serves as the pulping chamber.

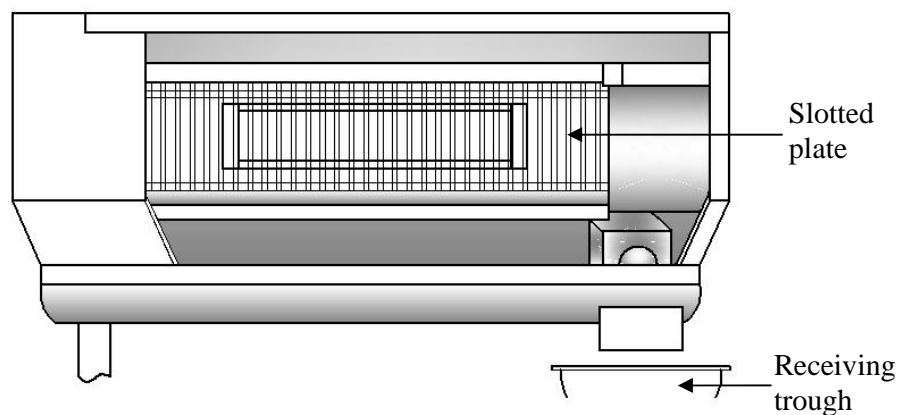
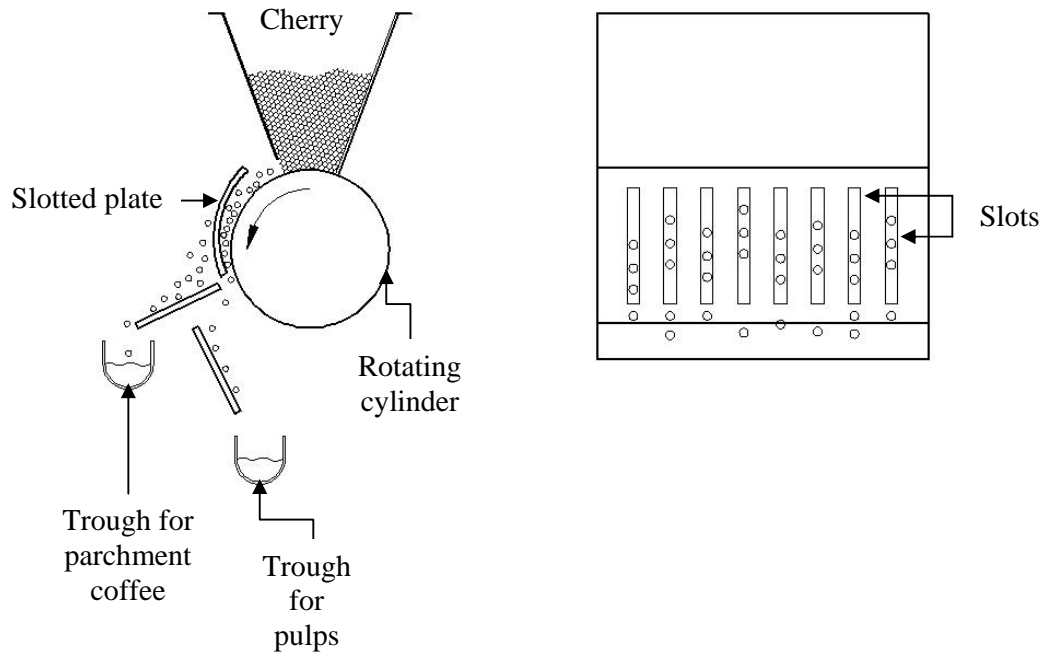


Figure. 11. Slotted plate coffee pulper



**Figure. 12. Schematic diagram of slotted plate coffee pulper**

## **4.2 Mode of Feeding**

### **4.2.1 Dry feeding**

Coffee cherry are fed into the hopper of the coffee pulper without using water

### **4.2.2 Wet feeding**

Coffee cherry are fed into the hopper of the coffee pulper using water

## **5 Manufacturing Requirements**

- 5.1** Steel bars, metal sheet or plate and heavy-duty mild steel shall be generally used for the manufacture of the different components of the coffee pulper. Parts that are in direct contact to the parchment coffee and coffee cherry shall be made of non-corrosive and food grade materials.
- 5.2** Pulping mechanisms/pulping chamber shall be made of food grade and non-corrosive materials (e.g. stainless steel grade 304)
- 5.3** Clearance between the rotating disc or cylinder and the fixed cover shall be adjustable. It shall be gradually decreasing in size.
- 5.4** For wet feeding hopper, inlet for the intake water shall be provided to avoid clogging of pulp and beans during operation.
- 5.5** Water-pulp-parchment conveyor (if available) shall be designed to oscillate to avoid pulp and parchment to get stocked on the conveyor.
- 5.6** Frame and stand shall be able to support the whole coffee pulper assembly during operation. Frame shall be anchored to avoid vibration.
- 5.7** Main parchment coffee outlet shall be made of food grade and non-corrosive materials (e.g. stainless steel grade 304).
- 5.8** Maximum speed for the shaft of the mechanized coffee pulper shall be 120 rpm.
- 5.9** Maximum speed for the shaft of the manual coffee pulper shall be 60 rpm.
- 5.10** Bolts and screws to be used shall conform to the requirements of PAES 311 and 313.
- 5.11** Sizes of the parts of the coffee pulper shall conform to the manufacturer's specifications.

## **6 Performance Requirements**

The coffee pulper when tested in accordance with PAES 253 shall conform to the following requirements:

- 6.1** Input and output capacity shall meet the specifications of the manufacturer.
- 6.2** The performance criteria for coffee pulper shall be as specified in Table 1.

**Table 1. Performance Criteria for Coffee Pulper**

| <b>Criteria</b>   | <b>Performance Data</b> |
|---|-------------------------|
| Pulping Recovery, percent, minimum                      | 93.5                    |
| Pulping Efficiency, percent, minimum                    | 95.0                    |
| Losses, percent, maximum                                |                         |
| a) Separation Loss                                      | 1.0                     |
| b) Unpulped Loss  | 5.0                     |
| c) Scattering Loss                                      | 0.5                     |
| Purity, percent, minimum                                | 98                      |
| Mechanically damaged parchment coffee, percent, maximum | 3.5                     |
| Noise Level, [dB(A)], maximum                           | 92.0*                   |

\* Allowable noise level for six (6) hours of continuous exposure based on Occupational Safety and Health Standards, Ministry of Labor, Philippines.1983

## **7 Safety, Workmanship and Finish**

- 7.1** The base of coffee pulper shall be rigid and its rotating components shall be statically and dynamically balanced.
- 7.2** The coffee pulper shall be free from manufacturing defects.
- 7.3** Pulping mechanism shall be adjustable and replaceable.
- 7.4** All surfaces that are not in direct contact with products shall be free from rust and shall be coated with a suitable paint material.
- 7.5** The external part of the coffee pulper shall be free from sharp edges and rough surfaces.
- 7.6** Belt cover or guard shall be provided
- 7.7** There shall be provision for belt tightening and adjustments.
- 7.8** Mechanism for immediate load disengagement between prime mover and coffee pulper shall be provided.
- 7.9** All welded parts shall be water-tight and smoothly polished and it shall pass visual inspection criteria (AWS D1.1:2000) for discontinuity of materials.
- 7.10** Welded joints shall not be less than 4 mm (1/8 inch) side fillet welded. Undercut shall not exceed 2 mm (1/16 inch) for any length of weld.



## **8 Warranty for Fabrication and Durability**

- 8.1** Warranty against defective materials and workmanship shall be provided for parts and services except for normal wear and tear of consumable maintenance parts such as belts within six months from the date of purchase.
- 8.2** The construction shall be rigid and durable without breakdown of its major components for at least six months from the date of purchase.

## **9 Maintenance and Operation**

- 9.1** Each coffee pulper unit shall be provided with a set of standard tools prescribed by the manufacturer.
- 9.2** An operator's manual which conform to PAES 102, shall be provided.
- 9.3** The coffee pulper shall be easy to clean and operate.

## **10 Testing**

Coffee pulper shall be tested in accordance with PAES 253.

## **11 Marking**

- 11.1** Each coffee pulper shall be marked in English with the following information using a stencil or by directly punching it on a plate and shall be positioned at a most conspicuous place:
  - 11.1.1** Registered trademark of the manufacturer
  - 11.1.2** Brand
  - 11.1.3** Model
  - 11.1.4** Serial number
  - 11.1.5** Input capacity, kg/h
  - 11.1.6** Recommended pulping speed, rpm
  - 11.1.7** Power requirement, kW
  - 11.1.8** Name and address of the dealer
  - 11.1.9** Name and address of the distributor, if imported

- 11.1.10** Country of manufacture (if imported) / “Made in the Philippines” (if manufactured in the Philippines)
- 11.2** Appropriate safety precautions shall be provided. Marking shall be stated in English and Filipino and shall be printed in red color with a white background.
- 11.3** The markings shall have a durable bond with the base surface material.
- 11.4** The markings shall be all weather resistant and under normal cleaning procedures, it shall not fade, discolor, crack or blister and shall remain legible.

# Philippine Agricultural Engineering Standards

AMTEC-UPLB – PCARRD Project: “Development of Standards for Agricultural Production and Postharvest Machinery”

## Technical Committee 1. Production Machinery

Chairman: Engr. Joel R. Panagsagan  
Agricultural Machinery Manufacturers and Distributors Association  
(AMMDA), Inc.

Members: Dr. Caesar Joventino M. Tado  
Philippine Rice Research Institute (PhilRice)

Engr. Francia M. Macalintal  
National Agricultural and Fishery Council (NAFC)  
Department of Agriculture

Engr. Emerito V. Banal  
Metal Industry Research and Development Center (MIRDC)  
Department of Science and Technology

Engr. Cirilo M. Namoc  
Philippine Society of Agricultural Engineers (PSAE)

## Technical Committee 2. Postharvest Machinery

Chairman: Engr. George Q. Canapi  
Agricultural Machinery Manufacturers and Distributors Association  
(AMMDA), Inc.

Members: Engr. Dionisio C. Coronel, Sr.  
National Food Authority (NFA)  
Department of Agriculture

Engr. Reynaldo P. Gregorio  
Bureau of Postharvest Research and Extension (BPRE)  
Department of Agriculture

Engr. Jose B. Ferrer  
Metal Industry Research and Development Center (MIRDC)  
Department of Science and Technology

Dr. Elmer D. Castillo  
Philippine Society of Agricultural Engineers (PSAE)

*your partner in product quality and safety*



**BUREAU OF PRODUCT STANDARDS**

---

---

3F Trade and Industry Building  
361 Sen. Gil J. Puyat Avenue, Makati City 1200, Metro Manila, Philippines  
T/ (632) 751.3125 / 751.3123 / 751.4735  
F/ (632) 751.4706 / 751.4731  
E-mail : [bps@dti.gov.ph](mailto:bps@dti.gov.ph)  
[www.dti.gov.ph](http://www.dti.gov.ph)