

PHILIPPINE NATIONAL STANDARD

PNS/PAES 244:2010
(PAES published 2010)
ICS 65.060.01

Agricultural machinery – Biomass Shredder – Specifications



BUREAU OF PRODUCT STANDARDS

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

National Foreword

This Philippine Agricultural Engineering Standards PAES 244:2010, Agricultural machinery – Biomass Shredder – 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 of the 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:

PAES 219:2004 Agricultural Machinery – Forage Chopper – Specifications

PAES 222:2005 Agricultural Machinery – Chipping Machine – Specifications

Coco fiber, shredder, pelletizer and stove.

<http://www.bioenergylists.org/beloniococofiber>. < accessed on May 22, 2009>

Details on working with multi cut mode. http://www.indiamart.com/kiranengineers/pcat-docs/Multi_Cut.pdf. <accessed on May 22, 2009>

AMTEC Test Reports for Biomass Shredder

1 Scope

This standard specifies the manufacturing and performance requirements for biomass shredder including biomass shredder with chipping section.

2 References

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

AWS D1.1:2000	Structural Welding Code - Steel
PAES 102:2000	Agricultural Machinery – Operator’s Manual – Content and Presentation
PAES 103:2000	Agricultural Machinery – Method of Sampling
PAES 311:2001	Engineering Materials - Screws for Agricultural Machines – Specifications and Applications
PAES 313:2001	Engineering Materials – Bolts and Nuts for Agricultural Machines – Specifications and Applications
PAES 245:2010	Agricultural Machinery – Biomass Shredder – Methods of Test

3 Definitions

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

3.1

biomass shredder

machine used to cut biomass materials into strips (see Figure 1)

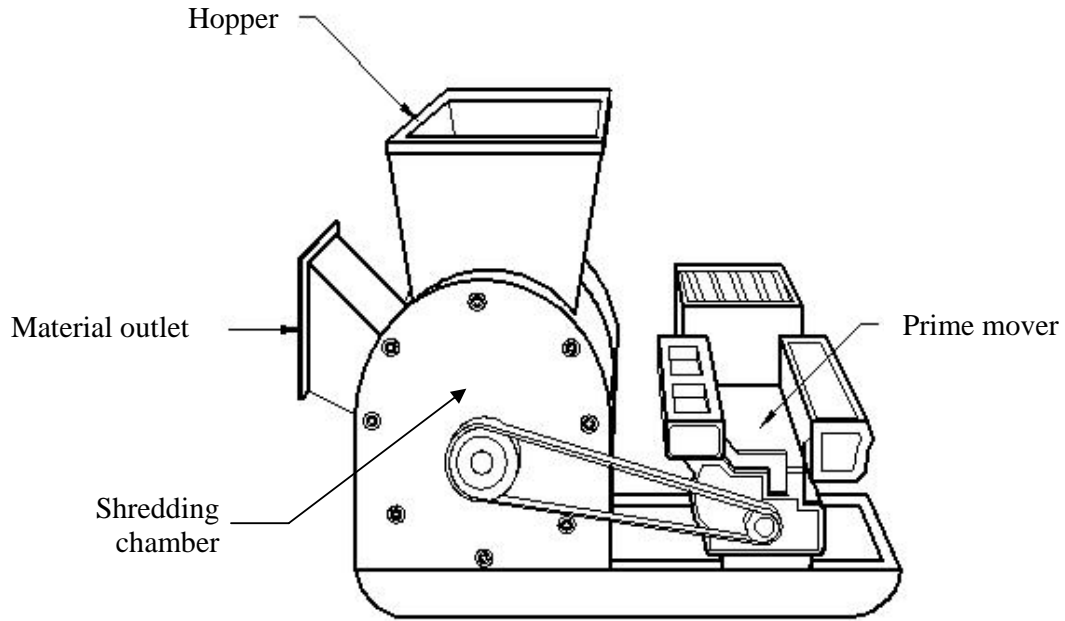


Figure 1a. Parts of biomass shredder

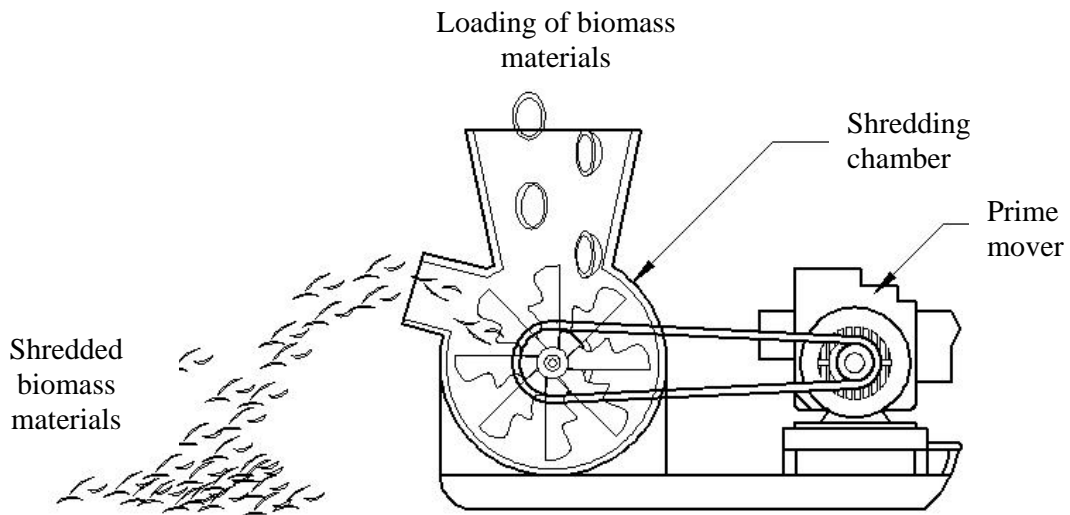


Figure 1b. Schematic diagram of biomass shredder

**3.2
chipping section**

part of a shredding machine which is used to cut or sliced twigs or small branches of trees into small and uniform sizes called chips

NOTE: This is auxiliary component of some biomass shredder

3.3

biomass

organic materials used as renewable source of energy and other agricultural applications

3.4

hopper

part of the biomass shredder where the biomass materials to be cut are loaded

3.5

prime mover

electric motor or internal combustion engine used to drive the biomass shredder

3.6

input capacity

weight of biomass material fed into the shredder, expressed in kilogram per hour

3.7

shredding efficiency

ratio of the weight of the input biomass materials less unshredded biomass materials, to the total weight of the input biomass materials to the shredder, expressed in percent

4 Classification

The classification of biomass shredder shall be based according to the following:

4.1 Mode of Installation

4.1.1 Stationary type

Biomass shredder that is installed permanently and commonly provided with adjustable anchors to level up the machine during operation. (see Figure 2)

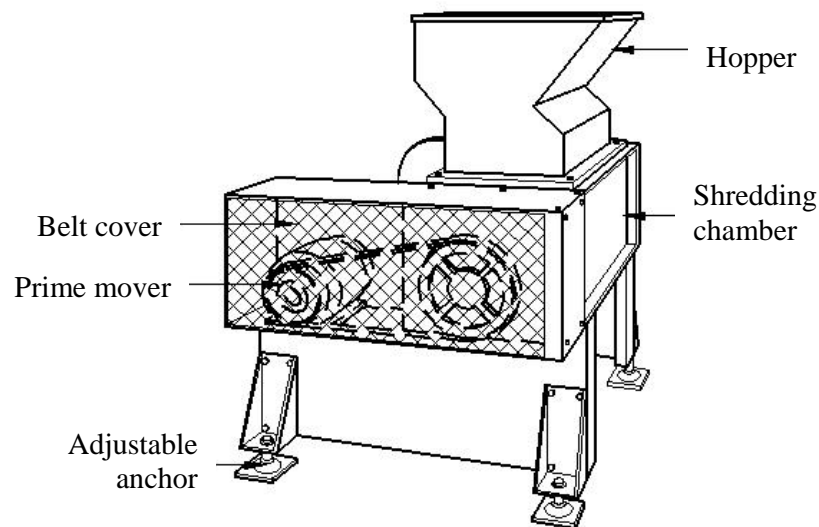


Figure 2. Parts of stationary type of biomass shredder

4.1.2 Mobile Type

4.1.2.1 Trailer type

Biomass shredder that is commonly hitched to transport vehicle to facilitate mobility. (see Figure 3)

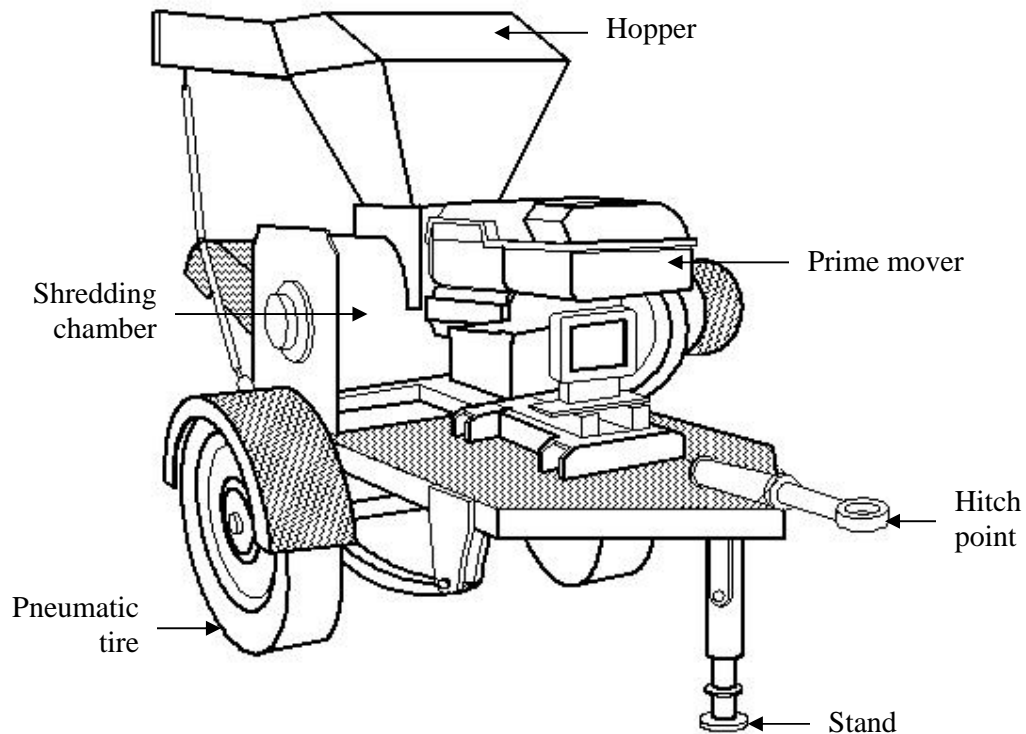


Figure 3. Parts of trailer type biomass shredder

4.1.2.2 Cart type

Biomass shredder that is being manually pushed and/or pulled by a person to facilitate mobility. (see Figure 4)

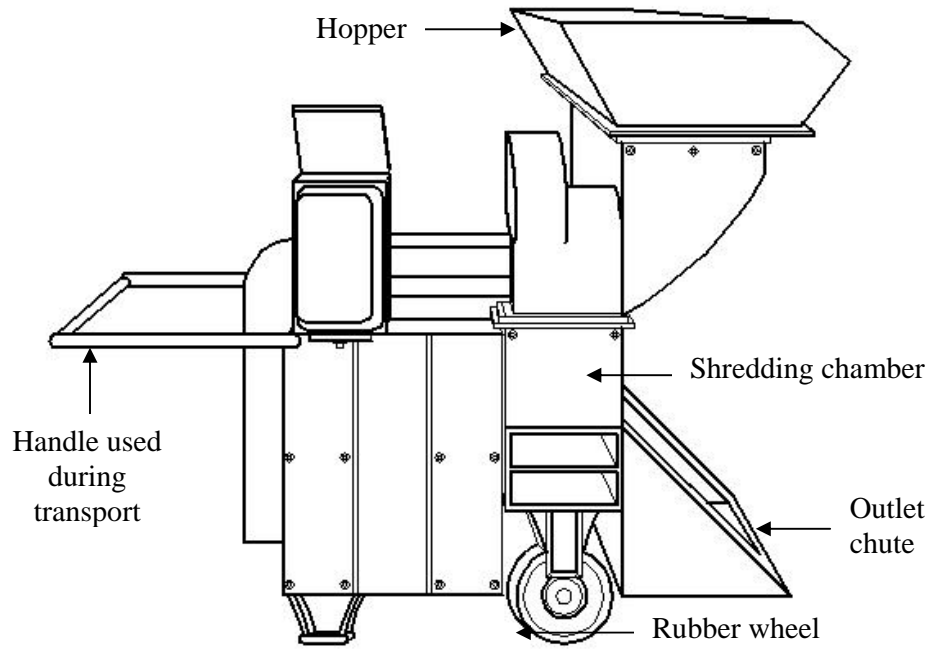


Figure 4. Parts of mobile type biomass shredder

4.2 Orientation of Blade Assembly

4.2.1 Vertical

The blades and shaft assembly rotates with respect to the vertical axis. (see Figure 5)

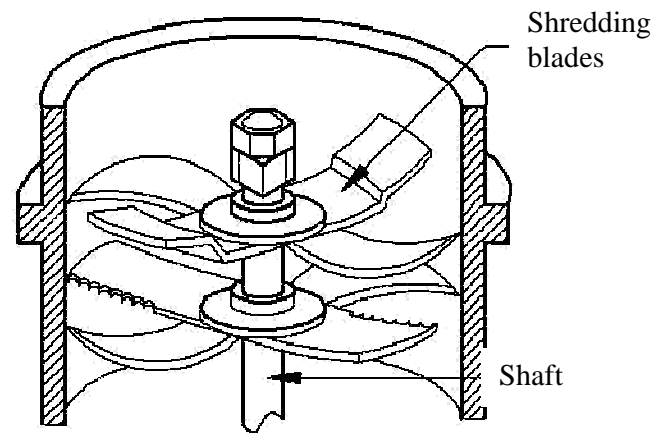


Figure 5. Vertically assembled blades

4.2.2 Horizontal

The blades and shaft assembly rotates with respect to the horizontal axis.
(see Figure 6)

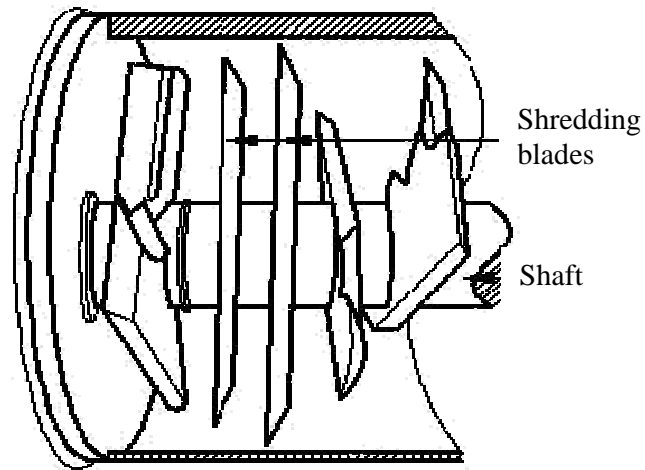


Figure 6. Horizontally assembled blades

4.3 Main shaft

4.3.1 Open cylinder

Blades are connected and arranged to an open cylinder main shaft. (see Figure 7)

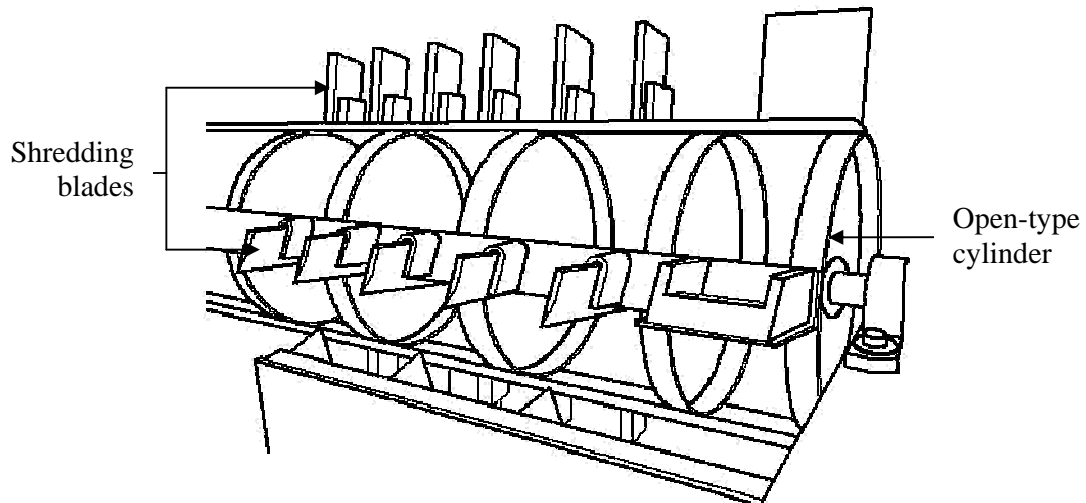


Figure 7. Blades arranged in an open cylinder main shaft

4.3.2 Closed cylinder

Blades are connected and arranged to a closed cylinder main shaft. (see Figure 8)

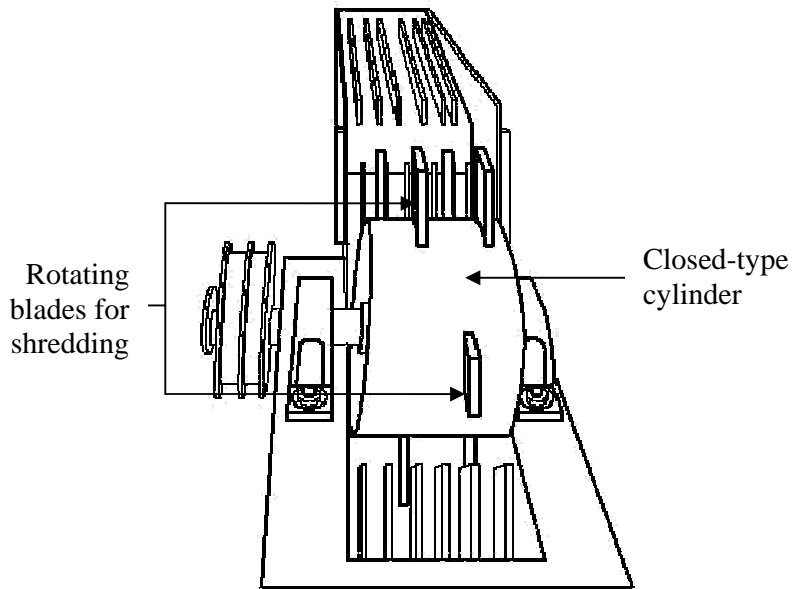


Figure 8. Blades arranged in a closed cylinder main shaft

4.4 Blade action

4.4.1 Shredding only (see Figures 1, 2, 3 and 4)

Machine that is composed of shredding chamber only.

4.4.2 Chipping and shredding (see Figure 9)

Machine that is composed of shredding chamber (cutting biomass materials into small strips) and chipping section (cutting twigs or small branches of trees into small and uniform thickness).

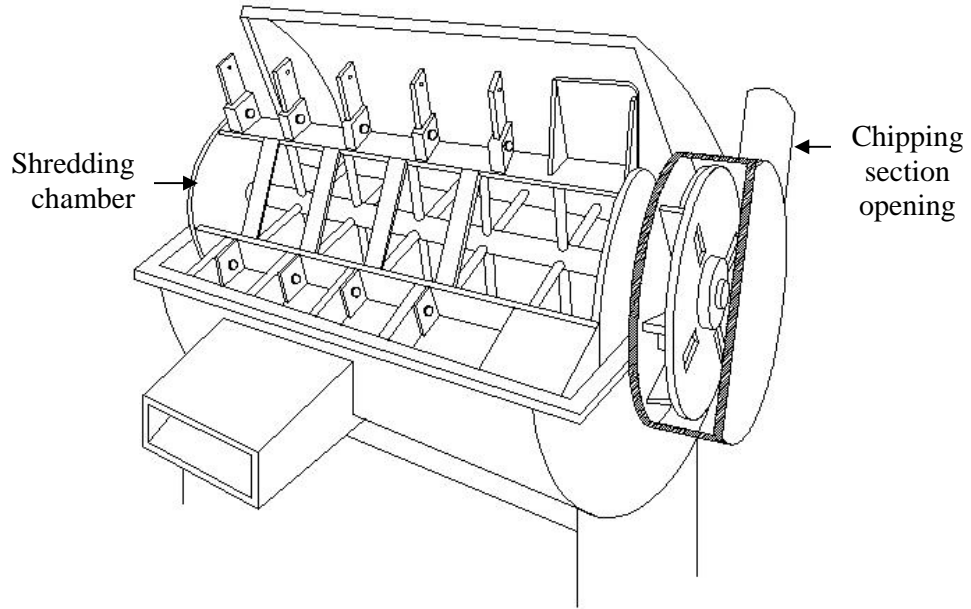


Figure 9a. Shredding and chipping blades on different chambers

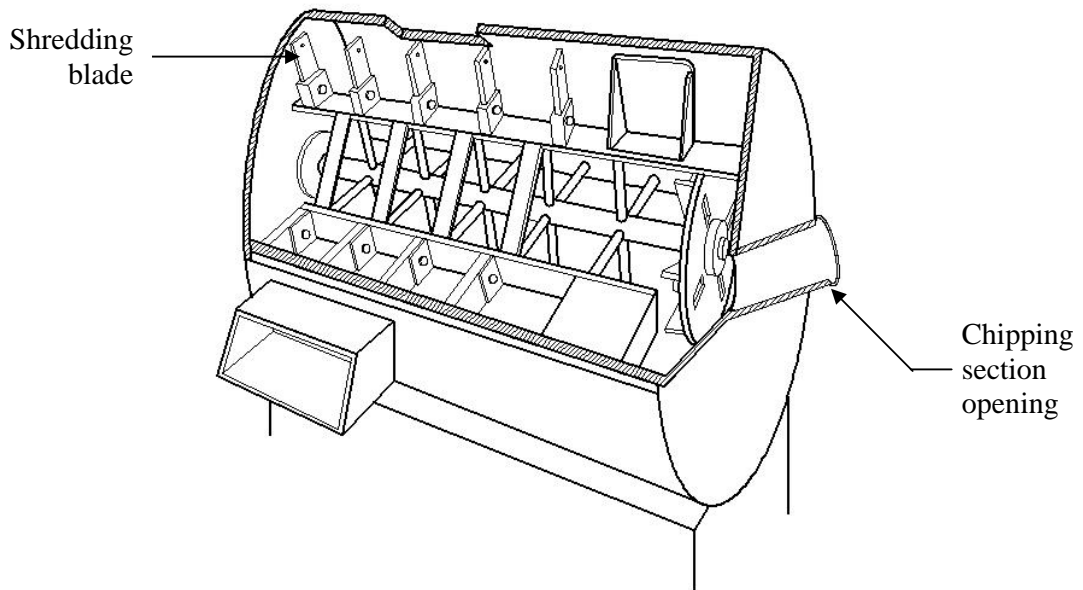


Figure 9b. Shredding and chipping blades on the same chamber (horizontally arranged blades)

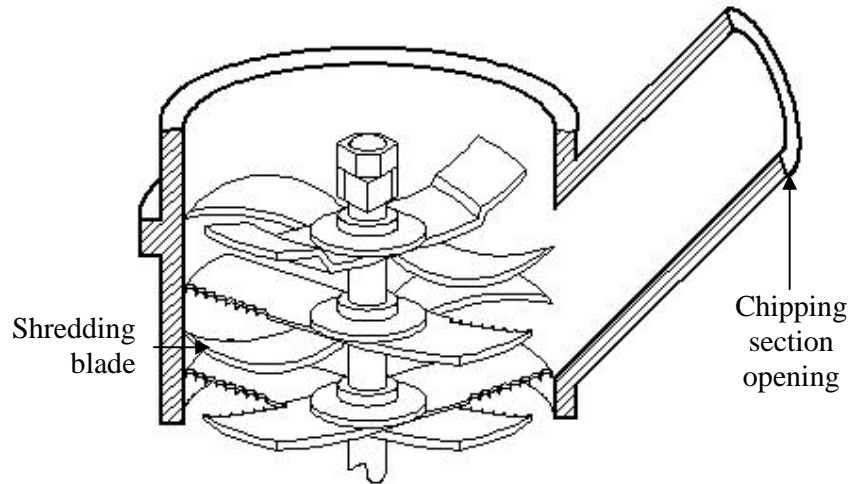


Figure 9c. Shredding and chipping blades on the same chamber (vertically arranged blades)

5 Manufacturing Requirements

- 5.1** Steel bars, metal sheet or plate and heavy-duty mild steel shall be generally used for the different components of the biomass shredder.
- 5.2** Biomass shredder shall be provided with outlet chute.
- 5.3** Knives or cutting mechanisms shall be made of high carbon steel and/or tool steel.
- 5.4** For open cylinder type of shredder, the angle of inclination with respect to horizontal axis for blades or cutting mechanism attached to the cylinder should be 15° to 20° to facilitate conveyance and to avoid clogging of shredded materials inside the shredding chamber.
- 5.5** Clearance between rotating blades and counter blades of the shredding chamber shall be at least 6 mm (1/4 inch).
- 5.6** Cover for the shredding blades shall be made of at least 2.5 mm MS plate and/or BI plate or its equivalent material to provide safety for the operator during shredding operation.
- 5.7** Bolts and screws to be used shall conform to the requirements of PAES 311 and 313.
- 5.8** Sizes of the parts of the biomass shredder shall be based on the specifications of the manufacturer.

6 Performance Requirements

The biomass shredder when tested in accordance with PAES 245 shall conform to the following requirements:

- 6.1** Input capacity shall meet the specifications of the manufacturer.
- 6.2** The noise emitted by the biomass shredder shall not be more than 96 dB(A).
- 6.3** Shredding efficiency shall be at least 90%.

7 Safety, Workmanship and Finish

- 7.1** The base of biomass shredder shall be rigid and its rotating components shall be statically and dynamically balanced for stable operation.
- 7.2** The biomass shredder shall be free from manufacturing defects to ensure safety to its operators.
- 7.3** Cutting mechanism shall be adjustable, replaceable and can be sharpened.
- 7.4** All surfaces shall be free from rust and shall be coated with a suitable paint material.
- 7.5** The biomass shredder shall be free from sharp edges and surfaces other than cutting mechanism that may be unsafe to the operator.
- 7.6** Belt cover or guard and provisions for belt tightening and adjustments shall be provided.
- 7.7** Mechanism for immediate load disengagement between prime mover and biomass shredder shall be provided to protect the prime mover from over loading and the operator in case of accident.
- 7.8** 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.
- 7.9** 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 Manufacturing 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 of the biomass shredder.
- 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 biomass shredder unit shall be provided with a set of standard tools required for maintenance.
- 9.2** An operator's manual which conform to PAES 102, shall be provided.
- 9.3** The biomass shredder shall be easy to clean and operate.

10 Testing

Biomass shredder shall be tested in accordance with PAES 245.

11 Marking

- 11.1** Each biomass shredder 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 (punched)
 - 11.1.5** Input capacity, kg/h (punched)
 - 11.1.6** Recommended shredding blade speed, rpm (punched)
 - 11.1.7** Power requirement, kW (punched)
 - 11.1.8** Name and address of the manufacturer
 - 11.1.9** Name and address of the distributor
 - 11.1.10** Country of manufacture (if imported) / "Made in the Philippines" (if manufactured in the Philippines)
- 11.2** Safety/precautionary markings shall be provided when appropriate. 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. Julieto T. Uriarte
Metal Industry Research and Development Center (MIRDC)
Department of Science and Technology

Engr. Angelito V. Angeles
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
www.dti.gov.ph