

## **Foreword**

The formulation of this national standard was initiated by the Agricultural Machinery Testing and Evaluation Center (AMTEC) through the project “Multicrop Processing Machines for `Commercialization” funded by the Department of Science and Technology (DOST) through its Technology Innovation for Commercialization (TECHNICOM) Program and monitored by the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD).

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:

AMTEC Test and Evaluation Report VISCA – PRCRTC Motor-Operated Root Crop Washer/Peeler

Bautista, O.K. and H. B. Aycardo. Ginger: Its Production, Handling, Processing and Marketing with Emphasis on Export. Department of Horticulture, College of Agriculture, University of the Philippines Los Baños. 1979.

Ginger Crop Guides: Postharvest Handling of Ginger.  
<http://www.agribusinessonline.com/crops/gingerph.asp>

Malinis, Arnulfo P., et al. Development of the Integrated Multi-Crop Processing System (Zero waste Ginger Processing Technology). 2004

Plotto, Anne. Post-Production Management for Improved Market Access for Herbs and Spices. [http://www.fao.org/inpho/content/compend/text/ch27/ch27\\_02.htm](http://www.fao.org/inpho/content/compend/text/ch27/ch27_02.htm)

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**Agricultural Machinery – Multicrop Washer-Peeler – Specifications**

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**1 Scope**

This standard specifies the fabrication and performance requirements for multicrop washer-peeler used for ginger, sweet potato, potato, arrow root, radish and carrot.

**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 233:2008 Agricultural Machinery: Multicrop Washer-Peeler – Methods of Test

**3 Definitions**

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

**3.1****clean**

practically free from dirt, stains, other foreign materials or absence of caked dirt on the rhizome or between segments of the rhizome and other crops

**3.2****multicrop washer-peeler**

machine that peels outer skin, or cleans and removes undesirable debris of ginger rhizomes, sweet potato, potato, arrow root, radish and carrot (*See Fig 1*)

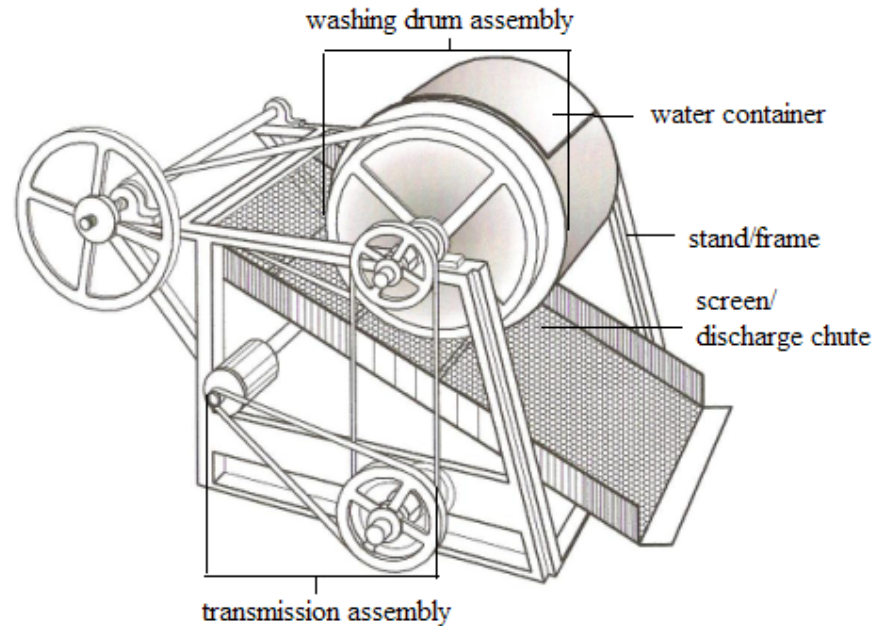


Figure 1. Typical design of multicrop washer-peeler

### 3.3

#### **prime mover**

electric motor or internal combustion engine used to drive the multicrop washer-peeler

### 3.4

#### **rhizome**

horizontally elongated subterranean stem, which forms roots on the lower side and shoots on the upper side of the nodes

### 3.5

#### **effective capacity**

#### **washing-peeling capacity**

the amount of washed and peeled crops per unit time during the actual washing-peeling operation time, expressed in kilogram per hour

### 3.6

#### **washing drum assembly**

a cylinder encased in a water container and rotating in a horizontal axis where crops are being loaded for the washing and peeling operation (*See Fig. 2*)

### 3.7

#### **water container**

a cylindrical container that holds the water and washing drum assembly

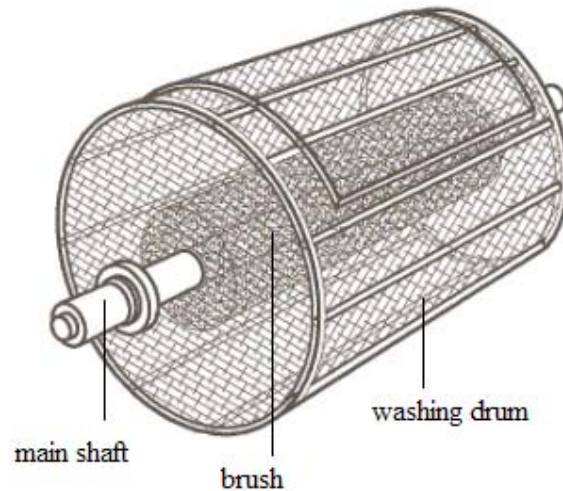


Figure 2. Typical design of a washing drum assembly

#### **4 Classification**

The multicrop washer-peeler shall be classified based on the effective capacity as follows:

##### **4.1 Small-scale**

Multicrop washer-peeler that has an effective capacity of up to 15 kg/h.

##### **4.2 Medium-scale**

Multicrop washer-peeler that has an effective capacity of more than 15 kg/h up to 40 kg/h

##### **4.3 Commercial-scale**

Multicrop washer-peeler that has an effective capacity of more than 40 kg/h

#### **5 Fabrication Requirements**

Generally, the parts of the multicrop washer-peeler shall be readily serviceable. Food grade materials shall be used for parts in direct contact of the crop being processed.

**5.1** The water container shall be made of non-corrosive materials, e.g. 1 mm thick stainless steel or Gage 20 SS.

**5.2** Washing drum shall be made of non-corrosive and does not react unfavorably with the product material with 12 mm perforations.

**5.3** The main shaft shall be made of non-corrosive materials that can withstand the required load, e.g. 25 mm diameter stainless steel for 15 kg/h effective capacity.

**5.4** The brush shall be made of special wear-resistant and food grade quality nylon brush.

**5.5** The multicrop washer-peeler shall be provided with a suitable stand or frame that can withstand the design load, e.g. angle bar or channel bar.

**5.6** The discharge chute shall be made of non-corrosive material with 12 mm perforations and shall be inclined of not less than 45° with respect to the horizontal axis.

**5.7** All welded parts shall conform to AWS D1.1:2000.

## **6 Performance Requirements**

The multicrop washer-peeler when tested in accordance with PAES 233 shall conform to the following requirements:

**6.1** The effective capacity shall be as specified by the manufacturer.

**6.2** The minimum machine efficiency of the multicrop washer-peeler shall be 90%.

**6.3** The water requirement shall not be more than three (3) liters of water for every kilogram of crop.

**6.4** The operation shall conform to Good Manufacturing Practice (GMP) requirements.

**6.5** The noise emitted by the multicrop washer-peeler measured 50 mm away from the operator's ear level at actual working position shall not be more than 96 db (A).

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

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

**7.1** All components shall be dynamically balanced for stable operation.

**7.2** The multicrop washer-peeler shall be free from manufacturing defects that may significantly affect its design capacity and performance.

**7.3** Protective covers shall be provided for all the rotating components and power transmission system.

**7.4** All machine surfaces not in contact with the material shall be coated with a suitable paint material.

**7.5** The multicrop washer-peeler shall be free from sharp edges and surfaces that may injure the operator.

## **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 one (1) year from the purchase of the multicrop washer-peeler.

**8.2** The washer-peeler shall be rigid and should endure normal use without breakdown of its major components (e.g. washing drum assembly, etc.) for at least one (1) year from the date of original purchase.

## **9 Maintenance and Operation**

**9.1** Each multicrop washer-peeler shall be provided with a set of manufacturer's standard tools required for maintenance.

**9.2** An operator's manual, which conforms to PAES 102, shall be provided by the manufacturer.

**9.3** The multicrop washer-peeler shall be easy to clean.

## **10 Sampling**

The multicrop washer-peeler shall be sampled for testing in accordance with PAES 103.

## **11 Testing**

Multicrop washer-peeler shall be tested in accordance with PAES 233.

## **12 Marking**

**12.1** Each multicrop washer-peeler 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:

**12.1.1** Registered trademark of the manufacturer

**12.1.2** Brand

**12.1.3** Model

**12.1.4** Serial number

**12.1.5** Type of crop for which the machine is applicable

**12.1.6** Effective capacity, kg/h

**12.1.7** Power requirement, kW

**12.1.8** Name and address of the manufacturer

**12.1.9** Name and address of the importer, if imported

**12.1.10** Country of manufacture (if imported) / “Made in the Philippines” (if manufactured in the Philippines)

**12.2** 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.

**12.3** The markings shall have a durable bond with the base surface material.

**12.4** The markings shall be water resistant and under normal cleaning procedures, it shall not fade, discolor, crack or blister and shall remain legible.