## 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 KOLBI Juice Extractor (for Arrowroot)

AMTEC Test and Evaluation Report Simplextractor-Coco Oil Expeller

Bates, R.P., J. R. Morris and P. G. Gandall. Principles and practices of small-and medium scale fruit juice processing. www.fao.org/docrep/005/Y2515E/y2515e00.htm

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.

CIGR Handbook of Agricultural Engineering- Volume IV- Agro-Processing Engineering. Published by American Society of Agricultural Engineers. 1999.

Malinis, Arnulfo P., et al. Development of the Integrated Multicrop Processing System (Zero Waste Ginger Processing Technology). 2004.

PAES 230:2005 Agricultural Machinery – Coconut Oil Expeller – Specifications

Parsons, Robert A. ASHRAE Handbook 1998.

Recommended Code of Practice for Processing and Handling of Muscovado Products

**Agricultural Machinery – Multicrop Juice Extractor– Specifications**

## 1 Scope

This standard specifies the fabrication and performance requirements for multicrop juice extractor used for mechanical extraction of juice from ginger, coconut, carrots, onion, lemon grass, pandan leaves, arrow root, cassava, sweet potato, garlic, herbal plants and vegetables leaves.

## 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 235:2008 Agricultural Machinery: Multicrop Juice Extractor– Methods of Test

## 3 Definitions

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

**3.1**
**extracting chamber**
part of the multicrop juice extractor where juice extraction takes place

**3.2**
**extraction efficiency**
ratio between the total moisture extracted by the machine to the total initial moisture content of the crop

**3.3**
**extraction recovery**
total amount of extracted juice collected based on the extraction losses, expressed in percentage

**3.4**
**meal**
residues of the crop after juice extraction

**3.5**
**moisture content**
weight of water in a crop usually expressed in percentage by weight on the wet basis

**3.6**
**juice**
aqueous liquid expressed or extracted from crops cells or tissues

**3.7**
**multicrop juice extractor**
machine capable of extracting the juice of different crops (*See Fig. 1*)

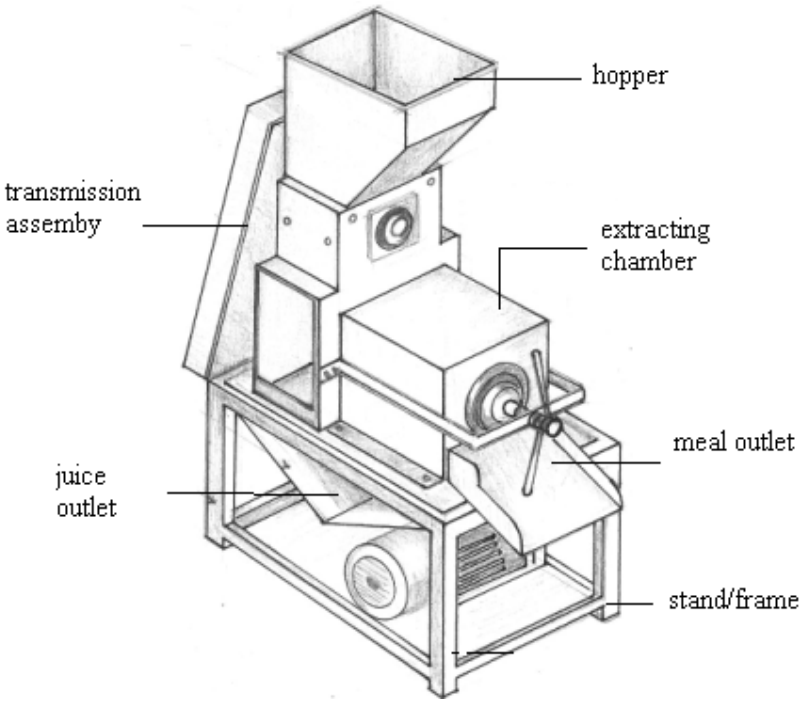


**Figure 1 Typical design of a multicrop juice extractor**

## 4 Classification

The classification of multicrop juice extractor shall be based on the following:

### 4.1 Input Capacity

#### 4.1.1 Household/Small scale
Multicrop juice extractor that has an input capacity of up to 15 kg/h

#### 4.1.2 Medium-scale
Multicrop juice extractor that has an input capacity of 15 kg/h to 40 kg/h

#### 4.1.3 Commercial/Large scale
Multicrop juice extractor that has an input capacity of more than 40 kg/h

## 4.2 Type of Extraction Mechanism

### 4.2.1 Piston press type

Machines that extract juice by squeezing or compressing. Crops are placed between two surfaces and subjected to pressure (*See Fig. 2*).

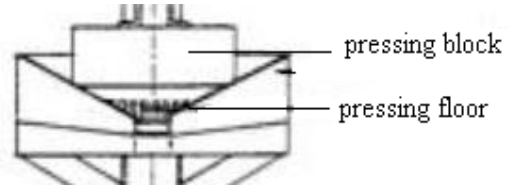


**Figure 2. Extracting chamber of a piston-press type**

### 4.2.2 Screw press type

Machines that extract juice through a tapered, rotating screw that moves and compresses the crops. Extraction takes place by shearing and pressing actions (*See Fig. 3*).

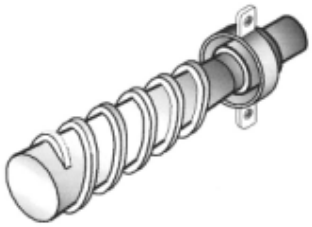

**Figure 3 Sample screw for a screw press type**

### 4.2.3 Roller press type

Machines that extract juice by passing the crops in between rolling plates/disc (*See Fig. 4*).

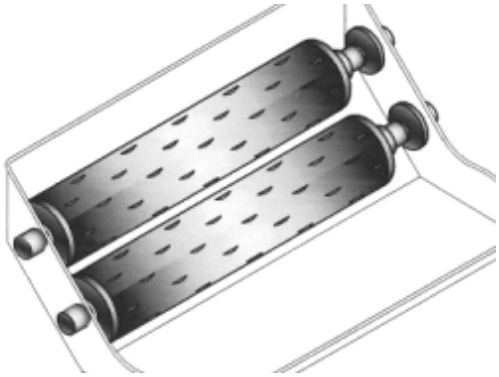

**Figure 4.Rollers with serrated surfaces**

## 5 Fabrication Requirements

Generally, the parts of the multicrop juice extractor shall be readily serviceable. Food grade materials shall be used for parts in direct contact with the crop being processed.

**5.1** The multicrop juice extractor shall mainly consist of hopper, extracting chamber, juice and meal outlet, transmission assembly and stand/frame.

**5.2** The hopper shall be made of non-corrosive and food grade materials, e.g. stainless steel (Grade 304 or higher).

**5.3** In general, the extracting chamber shall be made of non-corrosive and food grade materials. For each type of extraction mechanism the requirements shall be as follows:

**5.3.1** Piston press type

**5.3.1.1** The pressing block and pressing floor shall be made of non-corrosive and food grade materials, e.g. stainless steel (Grade 304 or higher).

**5.3.2** Screw press type

**5.3.2.1** The extracting chamber shall be made of non-corrosive and food grade materials, e.g. stainless steel (Grade 304 or higher) with 3 mm perforations and at least 4 mm clearance from the housing.

**5.3.2.2** Screw of the juice extractor shall be made of non-corrosive and food grade materials, e.g. stainless steel (Grade 304 or higher) with at least 50 mm pitch.

**5.3.3** Roller Press Type

**5.3.3.1** The rollers and its housing shall be made of non-corrosive and food grade material, e.g. stainless steel (Grade 304 or higher).

**5.4** Multicrop juice extractor shall be provided with a frame, e.g. angle bars or channel bars, and that can withstand its load and vibration during operation.

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

## 6 Performance Requirements

The multicrop juice extractor when tested in accordance with PAES 235 shall conform to the following requirements:

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

**6.2** The moisture content of the crops indicates the possible maximum juice recovery of the multicrop juice extractor.

**6.2.1** The minimum juice extraction efficiency shall be 75 % of the initial moisture content of the crop.

**6.2.2** The minimum juice extraction recovery shall be 90 % of the juice extracted.

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

**6.4** The noise emitted by the multicrop juice extractor measured 50 mm away from the operator's ear level 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 with acceptable noise levels.

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

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

**7.4** The multicrop juice extractor shall be free from sharp edges and surfaces that may injure the operator.

**7.5** Protective covers shall be provided for all the rotating components and power transmission

## 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 year from the purchase of the multicrop juice extractor.

**8.2** The fabrication shall be rigid and should endure normal use without breakdown of its major components (i.e. extracting chamber, etc.) for at least one (1) year from the date of original purchase.

## 9 Maintenance and Operation

**9.1** Each multicrop juice extractor unit 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 manufacturers.

**9.3** The multicrop juice extractor shall be easy to clean.

## 10 Sampling

The multicrop juice extractor shall be sampled for testing in accordance with PAES 103.

## 11 Testing

Multicrop juice extractor shall be tested in accordance with PAES 235.

## 12 Marking

**12.1** Each multicrop juice extractor 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** Input capacity, kg/h

**12.1.6** Power requirement, kW

**12.1.7** Name and address of the manufacturer

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

**12.1.9** 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.