

# PHILIPPINE NATIONAL STANDARD

PNS/BAFS PAES 249:2018  
ICS 65.060.99

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## Agricultural Machinery- Multicrop Grater - Specifications



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## **Foreword**

The Philippine National Standard (PNS) for Agricultural Machinery – Multicrop Grater – Specifications (PNS/BAFS PAES 249:2018) has been prepared by the Technical Working Group (TWG) for Various Agricultural Machinery as per approved Department of Agriculture Special Order (SO) No. 10451 Series of 2016.

Included in the project is the development of PNS/PAES for Cassava Grater; however, during the series of technical reviews, instead of the development of a standard specific to cassava, the standard shall include in its scope other crops that uses a grating machine for size reduction.

This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2.

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.

## 1 Scope

This standard specifies the fabrication and performance requirements for multicrop grater used in grating of fresh papaya, cassava, carrots, sweet potato, arrow root, and other crops.

## 2 Normative References

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

PAES 101:2000, *Agricultural Machinery – Technical Means for Ensuring Safety – General*

PAES 102:2000, *Agricultural Machinery – Operator’s Manual – Content and Presentation*

PAES 103:2000, *Agricultural Machinery – Method of Sampling*

PNS/BAFS PAES 250:2018, *Agricultural Machinery – Multicrop grater – Methods of Test*

PNS/BAFS/PAES 192:2016, *Agricultural Machinery – Guidelines on After-Sales Service*

## 3 Terms and Definitions

For the purpose of this standard, the following terms and definitions shall apply.

### 3.1

#### **fresh crop**

includes the edible parts of all crops prepared for grating

### 3.2

#### **grated product**

output of the multicrop grater discharged from the product outlet

### 3.3

#### **grating recovery**

ratio between the total weight of grated products collected at the products outlet excluding the partially grated products to the total weight of fresh crop loaded in the hopper of the machine, expressed in percent

**3.4**

**hopper**

part of the machine where fresh crops are loaded

**3.5**

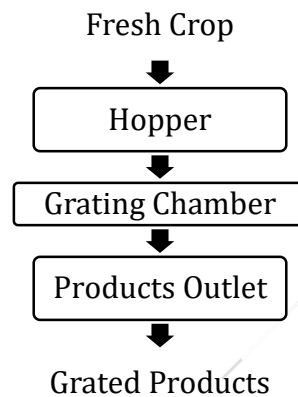
**input capacity**

weight of fresh crops fed into the grater per unit time, expressed in kilogram per hour

**3.6**

**multicrop grater**

machine that reduces the size of the fresh crop into grated products (Figure – 1)



**Figure 1 – Schematic diagram of Multicrop Grater**

**3.7**

**output capacity**

weight of grated products collected at the product outlet per unit time, expressed in kilogram per hour

**3.8**

**partially grated product**

products that passed through the grating mechanism which are ten (10) times larger than the average size of the grated products

**3.9**

**product outlet**

part of machine where grated products are being discharged

## 4 Classification

The classification of multicrop grater should be according to its grating mechanism but not limited to:

### 4.1 Cylindrical-type grater

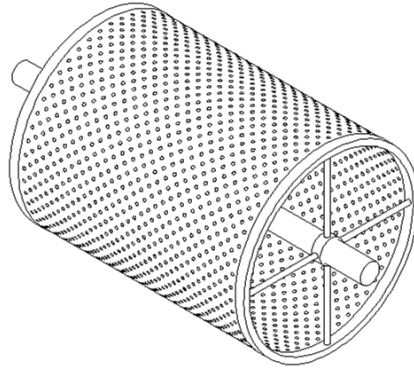


Figure 2 - Cylindrical-type Grater

### 4.2 Conical-type grater

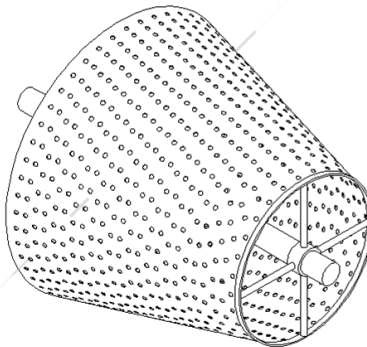


Figure 3 - Conical-type Grater

### 4.3 Disk-type grater

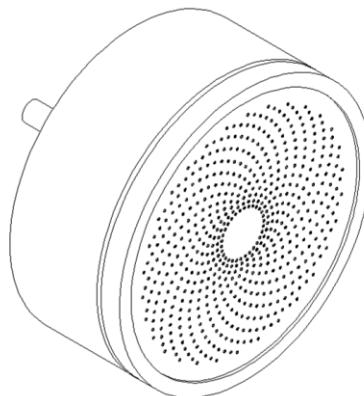


Figure 4 - Disk-type Grater

**5 Fabrication Requirements**

- 5.1 Steel bars, metal sheet or plate and mild steel shall be generally used for the manufacture of the different components of the multicrop grater. However, parts that are in direct contact to the fresh crop and the grated product shall be made of corrosion resistant and food grade materials in compliance to the food safety standards.
- 5.2 Frame and stand shall be able to support the whole multicrop grater assembly during operation.
- 5.3 There shall be safety mechanism preventing users from using their hands to push the fresh crop into the hopper.
- 5.4 Multicrop grater shall be driven by an electric motor.
- 5.5 Bolts and nuts, screws, bearings, bushing and seals to be used shall conform to the food safety requirements, PAES or other international standards.

**6 Performance Requirements**

- 6.1 Grating capacity shall meet the manufacturer’s specification.
- 6.2 The performance criteria for multicrop grater shall be specified in Table 1.

**Table 1 - Performance Requirements**

CRITERIA	PERFORMANCE DATA
Grating recovery, percent, minimum	94
Grating efficiency, percent, minimum	90

**7 Safety, Workmanship and Finish**

- 7.1 The noise level should conform with the provisions given in Annex A.
- 7.2 There shall be ear muffs or other ear protective device provided for the operators to use when 95 db (A) is exceeded during operation.
- 7.3 Multicrop grater shall be free from any manufacturing defects that may be detrimental to its operation.
- 7.4 The rotating components of multicrop grater shall be statically and dynamically balanced. There shall be covers or guards for the rotating parts to protect the operator.

- 7.5** Grating mechanism shall be replaceable when needed. There shall be provisions for the adjustment of the clearance.
- 7.6** No paints shall be used for the parts that are in direct contact with the fresh crop and grated product.
- 7.7** Any surfaces not in contact with the test materials shall be free from rust and shall be painted/coated properly.
- 7.8** The external part of the multicrop grater shall be free from sharp edges and rough surfaces that may injure the operator. Warning notices shall be provided in accordance with PAES 101:2000 – Agricultural Machinery – Technical Means for Ensuring Safety – General
- 7.9** Mechanism for emergency stop shall be provided.
- 7.10** Grating chamber shall be totally enclosed to avoid contamination.
- 7.11** There should be provision of magnets to prevent metallic materials from entering the grating chamber.

## **8 Warranty for Fabrication and Services**

Warranty shall be provided for parts and services except for normal wear and tear of expendable or consumable maintenance parts for at least one (1) year upon the acceptance of the procuring entity of the machinery. General requirements of the warranty shall conform to PAES 192:2016.

## **9 Maintenance and Operation**

- 9.1** Each unit of multicrop grater shall be provided with a set of manufacturer's standard tools required for maintenance.
- 9.2** Operator's manual based on the PAES 102:2000, maintenance schedule and a list of warrantable parts of the multicrop grater shall be provided.
- 9.3** The multicrop grater shall be easy to clean and operate.

## **10 Sampling**

Multicrop grater shall be sampled for testing in accordance with PAES 103:2000 or any other suitable method of selection.

## **11 Testing**

Multicrop grater shall be tested in accordance with PNS/BAFS PAES 250:2018.

## **12 Marking and Labelling**

**12.1** Each unit of multicrop grater shall be marked at the most visible place with the following information.

**12.1.1** Registered trademark of the manufacturer

**12.1.2** Brand

**12.1.3** Model

**12.1.4** Year of Manufacture

**12.1.5** Serial Number

**12.1.6** Name, address and contact details of the manufacturer/importer/distributor

**12.1.7** Country of manufacture/origin (if imported) / "Made in the Philippines" (if manufactured in the country)

**12.1.8** Input capacity, kg/h

**12.1.9** Recommended grating speed, rpm

**12.1.10** Power requirement, kW

**12.2** Safety/Precautionary markings shall be provided. It shall be stated in English and Filipino and printed in red color with a white background.

**12.3** The markings shall be durable bonded to the base surface material. The markings shall be all weather resistant and under normal cleaning procedures. It shall not fade, discolor, peel, crack or blister and shall remain legible.



**ANNEX A**  
(informative)

**Occupational Safety and Health Standard (Rule 1074.01 – 1074.03)**

**A.1 Threshold Limit Values for Noise**

The threshold limit values refer to sound pressure that represents conditions under which it is believed that nearly all workers may be repeatedly exposed without adverse effect on their ability to hear and understand normal speech.

Feasible administrative or engineering controls shall be utilized when workers are exposed to sound levels exceeding those specified in Table 2 hereof when measured on a scale of a standard sound level meter at slow response. If such controls fail to reduce sound within the specified levels, ear protective devices capable of bringing the sound level to permissible noise exposure shall be provided by the employer and used by the worker.

**A.2 Permissible Noise Exposure**

**A.2.1** The values specified in Table 2 apply to total time of exposure per working day regardless of whether this is one continuous exposure or a number of short-term exposures but does not apply to impact or impulsive type of noise.

**Table 2 - Permissible Noise Exposure**

Duration per day, hours	Sound Levels [dB(A)], slow response
8	90
6	92
4	95
3	97
2	100
1½	102
1	105
½	110
¼	115

**A.2.2** If the variation in noise level involves maximum intervals of one (1) second or less, it shall be considered as continuous. If the interval is over one (1) second, it becomes impulse or impact noise.

**A.2.3** When the daily noise exposure is composed of two or more periods noise exposure of different levels, their combined effect should be considered rather than the effect of each.

If the sum of Equation A exceeds one (1), then the mixed exposure should be considered to exceed the threshold limit value. However, the permissible levels found

in the table shall not be exceeded for the corresponding number of hours per day allowed. Noise exposures of less than 90 dBA are not covered by Equation A.

$$X = \frac{C_1}{T_1} + \frac{C_2}{T_2} + \frac{C_3}{T_3} \quad (\text{Equation A})$$

where: X is the sum of the ratios of C and T  
C is the total time of exposure at a specified noise level  
T is the total time of exposure permitted at the level

**A.2.4** Exposures to impulsive or impact noise shall not exceed 140 decibels peak sound pressures level (maximum value).

**Bibliography**

OSHC-DOLE (2016). *Occupational Safety and Health Standard, Rule 1074:01-03 - 2013*

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