PHILIPPINE NATIONAL STANDARD

PNS/BAFS/PAES 212:2017

Agricultural Machinery – Coffee Huller – Specifications

DEPARTMENT OF AGRICULTURE

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Foreword

The implementation of Republic Act 10601 also known as the Agricultural and Fisheries Mechanization (AFMech) Law of 2013 mandated the Bureau of Agriculture and Fisheries Standards (BAFS) to develop standard specifications and test procedures for agricultural and fisheries machinery and equipment.

The Bureau, in collaboration with the Bureau of Agricultural and Fisheries Engineering (BAFE), concerned Department of Agriculture (DA) Bureaus, and attached agencies, Philippine Regulatory Board of Agricultural and Biosystems Engineering (PRB-ABE) and University of the Philippines Los Baños – Agricultural Machinery Testing and Evaluation Center (UPLB-AMTEC), embarked on a project entitled "**Development of Philippine National Standard/ Philippine Agricultural Engineering Standard for Various Agricultural Machinery".** This project covers the development of PNS for Coffee Huller.

In the Philippines, coffee is considered one of the most highly demanded crops. Arabica, Robusta, Excelsa and Liberica are four of the coffee varieties that can be grown in the country because of its climatic and soil condition. Currently, the country is involved in trading various coffee products such as green coffee bean (GCB), ground coffee, unground coffee. These products initially underwent coffee hulling process.

Coffee hulling is one of the primary processes in coffee production. It is the proper removal of hull or husks from the dried parchment coffee or dried coffee cherry which contributes in the production of high quality coffee products. Incorrect calibration or adjustment of coffee hullers may result to damaged or broken beans that will later lead to cup quality loss. The development of standard specifications and test procedures for coffee hullers is thus significant in preserving the overall quality of GCB.

This standard has been technically prepared in accordance with Bureau of Philippine Standards (BPS) Directives Part 3:2003 – Rules for the Structure and Drafting of International Standards.

This standard will serve as reference for Agricultural and Biosystems Engineers (ABEs) in the preparation and evaluation of specifications and test reports for coffee hullers pursuant to Republic Act No. 10915 otherwise known as the Philippine Agricultural and Biosystems Engineering Act of 2016.

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 coffee huller.

2 References

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

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 192:2016	Agricultural Machinery – Guidelines on After-Sales Service
PNS/BAFS/PAES 213:2017	Agricultural Machinery – Coffee Huller – Methods of Test
OSHS Rule 1074:01	Threshold Limit Values for Noise - Occupational Safety and Health Center, Department of Labor and Employment (2013)

3 Definitions

For the purpose of this standard, the following terms shall apply:

3.1
blower loss
ratio of the weight of the green coffee bean (GCB) blown by the huller fan, including the weight of the GCB in the blown unhulled coffee beans, to the input GCB, expressed in percent (%)

3.2
coffee cherry
fresh, complete fruit of the coffee tree

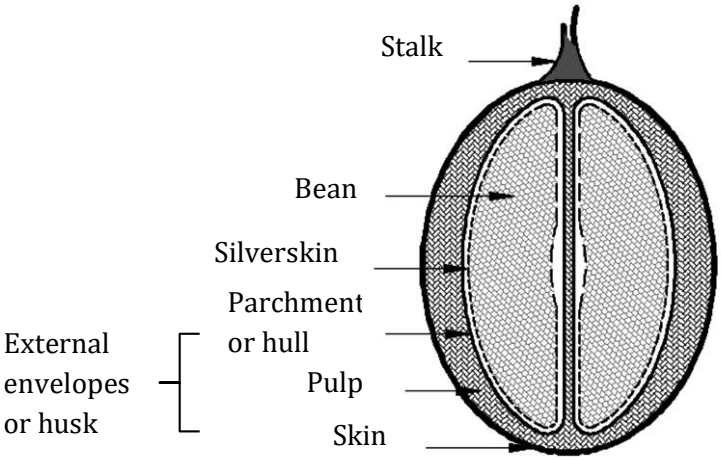

Figure 1. Parts of a coffee cherry

3.3
coffee huller
machine which removes the hull or husk from dried parchment coffee or dried coffee cherry to obtain GCB

Not drawn to scale

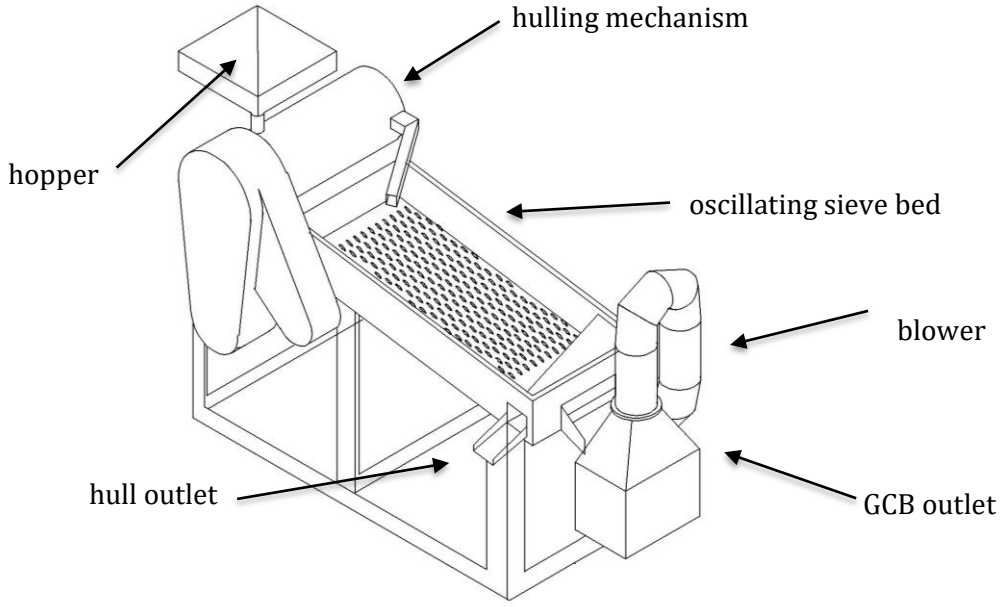

Figure 2. Coffee huller and its essential components

3.4
GCB outlet
hulled coffee outlet
part of machine where GCB is discharged

3.5
green coffee bean (GCB)
commercial term designating the dried seed of the coffee plant, disengaged from their external envelopes

3.6
hull
dried parchment
dried endocarp of the parchment coffee

3.7
hulling
dehusking
primary processing step to separate the dried pericarp (in dry method) or the dried parchment and silver skin (in wet method) from the green coffee beans.

3.8
hulling capacity
the ratio of the weight of dried parchment coffee or dried coffee cherry fed into the huller to the total operating time, expressed in kilogram per hour (kg/h)

3.9
hulling efficiency
ratio of the total weight of the cleaned GCB collected at all outlets to the input GCB, expressed in percent (%)

NOTE Cleaned GCB refers to the recovered GCB less unhulled coffee bean in kilograms (kg)

3.10
hulling recovery
ratio of the weight of GCB collected in the GCB outlet to the weight of input dried parchment coffee or dried coffee cherry, expressed in percent (%)

3.11
husk
dried cherry pulp
assembled external envelopes (pericarp) of the dried coffee fruit

3.12
input capacity
weight of dried parchment coffee or dried coffee cherry fed into the huller per unit input time, expressed in kilogram per hour (kg/h)

3.13
input GCB
theoretical amount of GCB in the input dried parchment coffee or coffee cherry, expressed in kilogram (kg)

3.14
mechanically damaged GCB
broken bean and/or scratched as a result of hulling operation

3.15
output capacity
weight of the cleaned GCB collected at the GCB outlet per unit output time, expressed in kilogram per hour (kg/h)

3.16
parchment coffee
coffee beans wrapped in the endocarp (parchment)

3.16
purity
amount of GCB free from foreign matter to the total weight of uncleaned GCB, expressed in percent (%)

3.18
unhulled coffee bean
GCB which fully or partially retains its hull/husk after passing through the hulling mechanism

4 Classification

The classification of coffee huller should be according to the following:

4.1 Hulling Mechanism

4.1.1 Steel Huller

Not drawn to scale

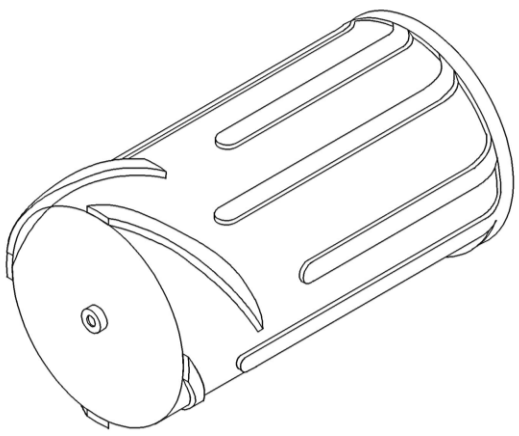

Figure 3. Steel Huller

4.1.2 Rubber Roll Huller

Rubber roll huller shall be used for wet processed coffee beans.

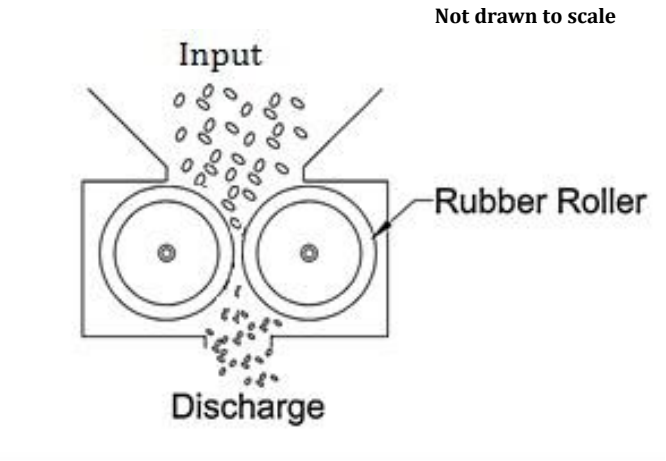

Figure 4. Rubber Roll Type Huller

4.2 Mode of Installation

4.2.1 Stationary type

4.2.2 Mobile type

4.3 Cleaning component

4.3.1 Huller with blower(s) only

4.3.2 Huller with sieve(s) only

4.3.3 Huller with blower(s) and sieve(s)

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 coffee huller. Parts that are in direct contact to the dried parchment coffee or dried coffee cherry such as the huller mechanism and the hulling chamber 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 coffee huller assembly during operation.

5.3 Bolts and nuts, screws, bearings, bushing and seals to be used shall conform to the food safety requirements, PAES or other international standards.

5.4 There should be provision of magnets to prevent metallic materials from entering the hulling chamber.

6 Performance and Other Requirements

The coffee huller, when tested, shall conform to the following requirements:

6.1 Hulling capacity shall meet the manufacturer's specification.

6.2 The performance criteria for coffee huller shall be specified in Table 1.

Table 1. Performance Criteria for Coffee Huller

CRITERIA	PERFORMANCE DATA
Hulling Recovery, percent (%), minimum	Dried parchment coffee: 80 Dried coffee cherry: 40
Hulling Efficiency, percent (%), minimum	95
Purity, percent (%), minimum	97
Mechanically damaged bean, percent (%), maximum	10

6.3 The noise level (Table 2) shall comply with the requirements of Occupational Safety and Health Center, Department of Labor and Employment depending on the daily duration of operation. (OSHS Rule 1074:01)

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
1 ½	102
1	105
½	110
¼	115

***** Occupational Safety and Health Center, Department of Labor and Employment (2013)

7 Safety, Workmanship and Finish

7.1 Coffee huller shall be free from any manufacturing defects that may be detrimental to its operation.

7.2 The base of the coffee huller shall be rigid and durable without any noticeable cracks and weak joints.

7.3 The rotating components of coffee huller shall be statically and dynamically balanced.

7.4 All metal surfaces shall be free from rust.

7.5 The external and internal part of the coffee huller shall be free from sharp edges and rough surfaces. Warning notices shall be provided in accordance with PAES 101:2000 – Agricultural Machinery – Technical Means for Ensuring Safety – General

7.6 Mechanism for immediate load disengagement of power or emergency stop shall be provided.

7.7 All moving parts shall be provided with safety features.

7.8 The coffee huller shall be compliant with the Good Manufacturing Practices (GMP).

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 procuring entity of the coffee huller. General requirements of the warranty shall conform to PNS/BAFS/PAES 192:2016 – Agricultural Machinery – Guidelines on After-Sales Service.

9 Maintenance and Operation

9.1 Each unit of coffee huller shall be provided with a set of manufacturer's standard tools required for maintenance.

9.2 Operator's manual shall be provided (PAES 102:2000 - Agricultural Machinery – Operator's Manual – Content and Presentation) including maintenance schedule and a list of the warrantable parts of the coffee huller shall be provided.

9.3 The coffee huller shall be easy to clean and operate.

10 Sampling

Coffee huller shall be sampled for testing in accordance with PAES 103:2000 – Agricultural Machinery – Method of Sampling.

11 Testing

Coffee huller shall be tested in accordance with PNS/BAFS/PAES 213:2017 – Agricultural Machinery – Coffee Huller – Methods of Test.

12 Marking and Labeling

12.1 Each unit of coffee huller 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 Serial Number

12.1.5 Name, address and contact number of the manufacturer/importer/distributor

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

12.1.7 Hulling capacity, kg/h

12.1.8 Recommended hulling shaft speed, rpm

12.1.9 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 durably 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.

13 Bibliography

ISO 3509:2005 Coffee and Coffee Products – Vocabulary

PAES 221:2004 Agricultural Machinery – Peanut Sheller – j Methods of Test

PNS/BAFS 169:2015 Code of Good Agricultural Practices for Coffee

PNS/PAES 252:2011 Agricultural Machinery – Coffee Pulper – Specifications

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