

Foreword

The formulation of specifications for corn mill was initiated by the Agricultural Machinery Testing and Evaluation Center (AMTEC) under the project entitled “Standardization of Postharvest Machinery Testing and Evaluation” which was funded by the Bureau of Postharvest Research and Extension (BPRES) of the Department of Agriculture (DA).

This standard was reviewed by the Study Team for the Formulation of Standards for Corn Mill and by the Technical Committee on Postharvest Machinery and was circulated to various private and government agencies/organizations concerned for their comments and reactions. This standard was presented to the Philippine Society of Agricultural Engineers (PSAE) and subjected to a public hearing organized by the National Agriculture and Fisheries Council (NAFC).

This standard has been technically formulated in accordance with PNS 01: Part 4:1998 – Rules for the Structure and Drafting of Philippine National Standards.

The comments and reactions received during the presentation and public hearing were taken into consideration in the finalization of this standard.

In the preparation of this standard, reference was made to Primer on Philippine Grains Standardization Program-National Food Authority, 1998.

Agricultural Machinery – Corn Mill – Specifications

1 Scope

This standard specifies the requirements for corn mill.

2 Reference

The following normative document contains provisions which through reference in this text constitute provisions of this standard:

PAES 211:2000 Agricultural Machinery : Corn Mill – Methods of Test.

3 Definitions

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

3.1**bran**

“tahop”

coarse powder from outer covering of the corn kernel removed during the milling process

3.2**by-product**

refers to corn grit # 20 and # 24, floured corn, germ and bran

3.3**by-product recovery**

ratio of the weight of by-products, to the total weight of corn kernel input, expressed in percent

NOTE

It is calculated as:

$$\% \text{By - Product Recovery} = \frac{\text{Wt. of the by - product, kg}}{\text{Total weight of input, kg}} \times 100$$

3.4**corn kernels**

shelled corn of either dent or flint varieties

3.5**corn grits**

milled corn kernels where the outer covering and germs have been removed and with particle size of not less than 0.86 mm

3.5.1

grit #10

milled corn kernels with particle size between 1.8 mm to 2.0 mm

3.5.2

grit # 12

milled corn kernels with particle size between 1.5 mm to 1.7 mm

3.5.3

grit # 14

milled corn kernels with particle size between 1.2 mm to 1.4 mm

3.5.4

grit # 16

milled corn kernels with particle size between 1.10 mm to 1.19 mm

3.5.5

grit # 18

milled corn kernels with particle size between 0.86 mm to 1.09 mm

3.6

conditioning

rewetting of dried corn kernels to about 18% to 22% moisture content and tempering it to make the pericarp and the germ more pliable and easier to remove

3.7

corn mill

equipment used to produce corn grits using the dry milling process

3.8

degerminator

machine used to remove the germ and pericarp from the corn kernel

3.9

degerminator efficiency

ratio of the weight of degerminated corn kernel sample, to the initial weight of the sample, expressed in percent

3.10

dry milling

process of reducing the corn kernels into pieces of grits, germ and pericarp with or without conditioning

3.11

floured corn

fines

“tiktik”

fine powder by-product of corn milling process

3.12**germ**

“sungo”

embryo of the kernel removed during the degermination process

3.13**grit # 20**

corn grit by-product with particle size between 0.70 mm to 0.85 mm

3.14**grit # 24**

corn grit by-product with particle size smaller than 0.70 mm

3.15**input capacity**

weight of corn kernel per unit loading time into the hopper/intake pit, expressed in kilogram per hour

3.16**main product**

refers to corn grit # 10, #12, #14, #16, and # 18

3.17**main product recovery**

ratio of the weight of corn grits, to the total weight of corn kernel input, expressed in percent

NOTE It is calculated as:

$$\% \text{ Main Product Recovery} = \frac{\text{Wt. of the main product, kg}}{\text{Total weight of input, kg}} \times 100$$

3.18**moisture content**

amount of moisture in the corn kernels expressed as percent of the total weight of the sample, wet basis

NOTE calculated as:

$$\text{Moisture Content, \% w.b.} = \frac{M_0 - M_1}{M_0} \times 100$$

Where:

M_0 = initial mass in grams of the test portion

M_1 = mass in grams of the dry test portion

3.19**roller mill**

major component of the corn mill used to reduce corn kernels into corn grits.

4 Materials of Construction

Steel bars and metal sheet or plate shall be generally used in the manufacture of the different components of corn mill. For rollers, carbon steel (AISI 4140 or its ISO equivalent) shall be used.

5 Performance and Other Requirements

5.1 The performance criteria for corn mill shall be as specified in Table 1.

Table 1 - Performance Criteria for Corn mill

CRITERIA	PERFORMANCE DATA
Main Product Recovery, percent minimum of the product input	
a) Grit # 10	28
b) Grit # 12	21
c) Grit # 14	7
d) Grit # 16	6
e) Grit # 18	2
Main Product, percent, minimum	64
By-Product, percent, maximum	31
Losses, percent, maximum	5
Grits of other sizes, percent, maximum	7
Degerminator Efficiency, percent, minimum	80
Noise Level, [db (A)], maximum	92*

* Allowable noise level for six (6) hours of continuous exposure based on Occupational Safety and Health Standards, Ministry of Labor, Philippines. 1983.

5.2 There shall be provisions for lubrication of non-sealed type bearings and bushings.

5.3 Provisions for the safety of the operators in the moving components of the corn mill shall be included.

6 Workmanship and Finish

6.1 Corn mill shall be free from manufacturing defects that may be detrimental to its operation.

6.2 All exposed metallic surfaces shall be free from rust and shall be painted properly.

6.3 Corn mill shall be free from sharp edges and surfaces that may hurt the operator.

7 Warranty for Construction and Durability

7.1 The construction shall be rigid and durable without major breakdown of its major components within within six (6) months.

7.2 Warranty shall be provided for parts and services within six (6) months after the purchase of the corn mill, except on easy to wear parts such as belts and sifter screen.

8 Maintenance and Operation

8.1 Each corn mill unit shall be provided with dust masks and the following basic tools: three (3) pieces open wrenches; one (1) piece each of Phillips and flat screw driver and one (1) piece adjustable wrench.

8.2 An instruction manual which conforms to PAES 102:2000 shall be provided.

9 Testing

The sampled corn mill shall be tested in accordance with PAES 211:2000 – Agricultural Machinery: Corn Mill – Methods of Test.

10 Marking and Labeling

Each corn mill shall be marked at prominent place with the following information:

- 10.1** Registered Trademark of the Manufacturer
- 10.2** Brand
- 10.3** Model
- 10.4** Serial number
- 10.5** Name and address of the manufacturer
- 10.6** Name and address of the importer
- 10.6** Country of manufacture/Made in the Philippines
- 10.7** Input capacity, kg/h
- 10.8** Power requirement, kW
- 10.9** Safety/Precautionary markings