Foreword

The formulation of this national standard was initiated by the Agricultural Machinery Testing and Evaluation Center (AMTEC) with funding from the Department of Agriculture.

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:

Clement, Scott and Herman Purutyan. Particle Size Reduction. www.cepmagazine.org. 2002.

Henderson, S.M. and R. L. Perry. Agricultural Process Engineering. 3rd Ed. Westport, Connecticut, 1976.

Particle Size Reduction Equipment, Standards No. 38. Baking Industry Sanitation Standards Committee, Sanitation Standards for the Design and Construction of Bakery Equipment and Machinery.

Agricultural Machinery – Hammer Mill – Specifications

1 Scope

This standard specifies the requirements for construction and performance of hammer mill used for milling grains and other agricultural products.

2 References

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

PAES 102: 2000 Agricultural Machinery – Operator's Manual – Content and Presentation

PAES 103:2000 Agricultural Machinery – Method of Sampling

PAES 217:2004 Agricultural Machinery – Hammer Mill – Methods of Test

PAES 311:2001 Engineering Materials – Bolts and Nuts for Agricultural Machines – Specifications and Applications

PAES 313:2001 Engineering Materials – Screws for Agricultural Machines – Specifications and Applications

3 Definitions

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

3.1
fineness modulus
classification system that indicates the uniformity of grind in the resultant product; sum of the weight fractions retained above each sieve divided by 100

3.2
hammer mill
device use for grinding which is a result of the impact between the particles and hammers, which are mounted on a shaft rotating along a horizontal axis

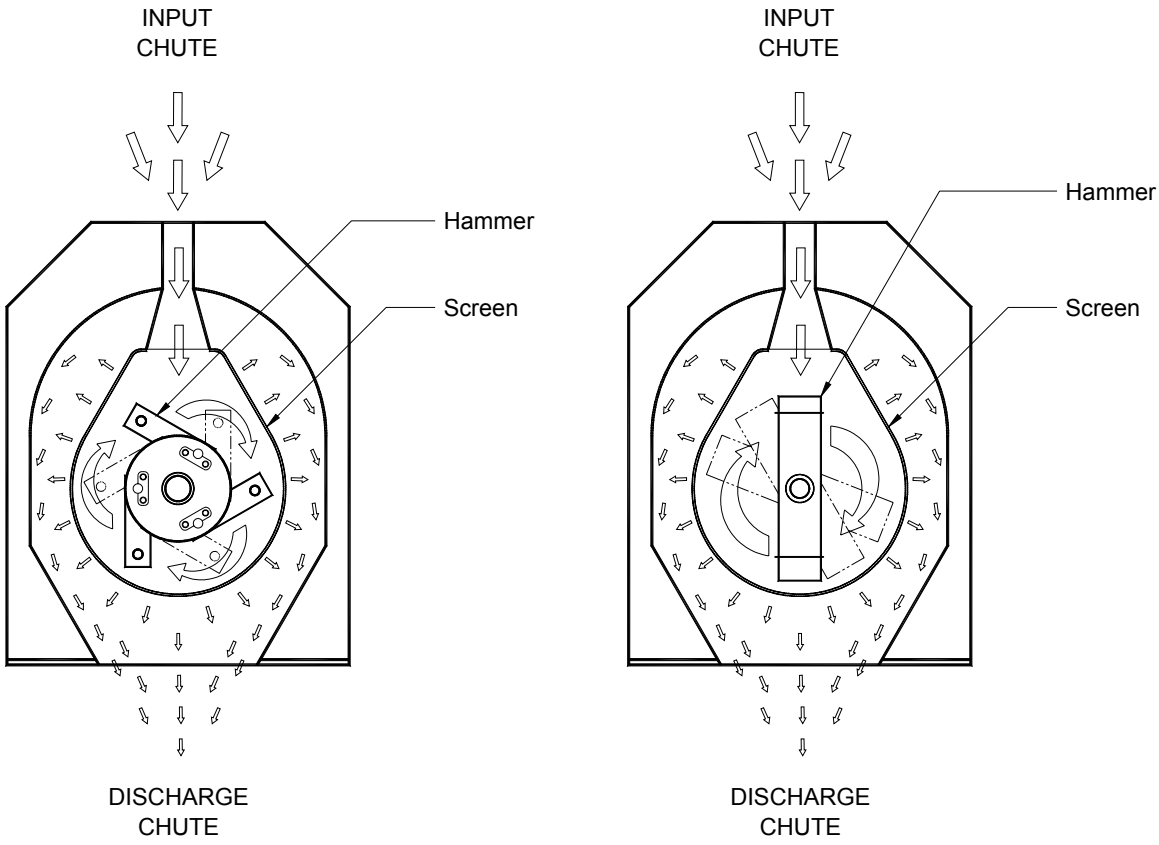
3.3
reduction ratio
ratio of the average size of input to the average size of the product

4 Classification

The classification of hammer mill shall be based according to its design (see Figure 1):

4.1 Swinging type

4.2 Fixed type



a. Swinging type **b. Fixed type**

Figure 1 – Typical design of hammer mill

5 Materials of Construction

5.1 Steel bars and heavy-duty mild steel shall be generally used for the manufacture of the different components of the hammer mill.

5.2 Hammers shall be made of AISI 1080 to AISI 1085 or its ISO equivalent.

5.3 Bolts and screws to be used shall conform with the requirements of PAES 311 and PAES 313.

6 Performance Requirements

The hammer mill when tested in accordance with PAES 217 shall conform to the following requirements:

6.1 Fineness modulus for classifying ground feeds is specified in Table 1.

Table 1 – Fineness Modulus for Classifying Ground Feeds

Material	Whole Grain	Grind			
		Coarse	Medium	Fine	Very Fine
Ear corn		4.80	3.60	2.40	1.80
Shelled corn	6.00	4.80	3.60	2.40	1.80
Barley	5.00	4.10	3.20	2.30	1.50
Oats	4.50	3.70	2.90	2.10	1.40
Soybeans	6.00	4.80	3.60	2.40	1.80
Wheat	5.00	4.10	3.20	2.30	1.50
Corn fodder	-	5.50	4.20	2.90	-
Hay	-	4.00	3.10	2.20	1.40

Source: Henderson, S.M. and R. L. Perry. Agricultural Process Engineering. 3rd Ed. Westport, Connecticut, 1976.

6.2 The hammer mill should be used for the desired product having a reduction ratio of at least 50:1.

6.3 The noise emitted by the hammer mill shall not be more than 96 db (A). *

7 Design, Workmanship and Finish

7.1 Hammers and perforated screen shall be accessible and replaceable.

7.2 Hubs and spacing collars shall have matching diameters and faces to afford a tight fit and to eliminate the formation of shoulders.

7.3 All components shall be dynamically balanced for stable running with low noise levels.

7.4 There shall be provision to prevent metallic materials from entering the milling chamber.

7.5 Sealed type bearings shall be used in the product zone.

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

7.6 The hammer mill shall be free from manufacturing defects that may be detrimental to its operation.

7.7 Any uncoated metallic surfaces shall be free from rust and shall be painted properly.

7.8 The hammer mill shall be free from sharp edges and surfaces that may injure the operator.

7.9 Belt cover or guard and provisions for belt tightening and adjustments shall be provided.

8 Warranty for Construction 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 six months from the purchase of the hammer mill.

8.2 The construction shall be rigid and durable without breakdown of its major components (i.e. milling assembly, etc) for at least six months from purchase by the first buyer.

9 Maintenance and Operation

9.1 Each hammer mill 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.

10 Sampling

The hammer mill shall be sampled for testing in accordance with PAES 103.

11 Testing

Sampled hammer mill shall be tested in accordance with PAES 217.

12 Marking

12.1 Each hammer mill shall be marked in English with the following information using a stencil or by directly punching it in a plate and shall be positioned at the 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 (based on corn input)

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 weather resistant and under normal cleaning procedures, it shall not fade, discolor, crack or blister and shall remain legible.