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Methods of Sampling for Agricultural and Biosystems Power and Machinery — Guidelines



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Foreword

In 2013, the Department of Agriculture (DA)-Bureau of Agriculture and Fisheries Standards (BAFS) in collaboration with concerned agencies was prescribed to update existing standards under the Philippine Agricultural Engineering Standards (PAES) as stated under Rule 21.2 of Implementing Rules and Regulations (IRR) for Republic Act No. 10601 otherwise known as the “Agricultural and Fisheries Mechanization (AFMech) Law”.

In 2024, the DA-BAFS conducted a Table Review of PAES 103:2000 (Agricultural machinery — Methods of sampling). It intends to re-evaluate and validate if the provisions of the aged standard (i.e., at least five years since its approval) for methods of sampling are still relevant and reflective to the current regulatory and industry requirements. The Table Review verified if the standard is technically up to date and aligned with the current recommendations and interpretations regarding quality and usability of methods of sampling. Based on the Table Review, the Technical Working Group (TWG) deemed it necessary to revise the standard given the significant updates in specific provisions.

In response, the DA-BAFS officially created a TWG to develop the PNS under the Special Order (SO) No. 905, series of 2024 (Addendum to SO No. 305, series of 2024 entitled, “Creation of TWG and Project Management Team [PMT] for the Development of PNS for Agricultural and Fishery Products and Machinery”).

The TWG was composed of relevant stakeholders from the government sector, academe/research institutions, private sector organizations, and Civil Society Organizations (CSO). The draft PNS underwent an extensive series of TWG writeshops and stakeholder consultations, facilitated through physical and online platforms, from May to November 2024 prior to its endorsement to the DA Secretary for approval.

This Standard includes the following significant changes compared to the PAES 103:2000:

1. Modification on the title and scope to specify its applicability to agricultural and biosystems power and machinery;
2. Updating of Terms and Definitions to include additional terminology;
3. Inclusion of additional method to be used for random sampling;
4. Exclusion of routine tests to remove this type of test; and
5. Modification of test requirements for the AMTEC and ATC test.

This Standard cancels and replaces PAES 103:2000 which has been technically revised. This document was written in accordance with the formatting and editorial rules of the Standardization Guide No. 1 (Writing the PNS) developed by the Standards Development Division (SDD) of the DA-BAFS.

1 Scope

This Standard prescribes the procedures for sampling agricultural and biosystems power and machinery and its components, unless specified in the respective product specification, for the purpose of conformity such as Agricultural Machinery Testing and Evaluation Center (AMTEC) testing Accredited Testing Center (ATC) testing, field test, and acceptance test with the exception of system test. This applies to the finished products in the production line.

2 Normative References

There are no normative references in this document.

3 Terms and Definitions

For the purpose of this Standard, the following definitions shall apply:

3.1

acceptance test

a testing undertaken by government procuring entity as part of the procurement process to verify the acceptability of delivered machine in terms of quality and compliance to set specifications (Bureau of Agricultural and Fisheries Engineering [BAFE]-DA, 2023, *modified*)

3.2

conformity test

determination of the characteristics of a machine and the evaluation thereof against the requirements of a standard such as but not limited to, specifications and methods of test. This includes AMTEC test, ATC test, and field test (International Organization for Standardization [ISO], 2022, *modified*)
admitted terms: type test

3.2.1

Agricultural Machinery Testing and Evaluation Center (AMTEC) test

an objective and systematic assessment conducted by University of the Philippines Los Baños (UPLB)-AMTEC in accordance with Philippine National Standards (PNS)/Philippine Agricultural and Biosystems Engineering Standards (PABES) or other standard test procedures to determine the actual characteristics, specifications, and functional performance of the machine under laboratory and/or actual field conditions (BAFE-DA, 2023, *modified*)

3.2.2

Accredited Testing Center (ATC) test

an objective and systematic assessment conducted by the accredited testing center in accordance with PNS/PABES or other standard test procedure to determine the actual characteristics, specifications, and functional performance of the machine under laboratory and/or actual field conditions (BAFE-DA, 2023, *modified*)

3.2.3

field test

an on-farm testing of machine to be undertaken by the UPLB-AMTEC and ATC to ensure consistent quality of units (BAFE-DA, 2023, *modified*)

3.3

lot

a defined quantity of machines of the same model, size, and design, manufactured from the same batch and materials, categorized as a group (ISO, n.d., *modified*)

3.4

machine

refers to farm power and machinery for the production, harvesting, processing, storage, manufacture, preserving, transporting and distribution of agricultural and biological products/materials and includes, but is not limited to, tractors and their attachments, power tillers, seeders, transplanters, windmills, harvesting machines, crop protection and maintenance equipment, irrigation equipment and accessories, greenhouses and other thermal conditioning equipment, livestock, poultry, fishery and forest equipment, slaughtering equipment, meat/fishery and crop processing equipment, postharvest machines such as milling machines, dryers, threshers, grain and other strippers, agricultural transport machinery and storage (Philippine Agricultural and Biosystems Engineering Act of 2016, 2016)

admitted terms: agricultural and biosystems power and machinery

3.5

system test

a level of testing that validates the performance of a complete and fully integrated several machines or facilities (BAFE-DA, 2023, *modified*)

4 Methods of Sampling

The sample size (**n**) shall be taken according to columns 2 and 4 of Table 1. The sample shall be selected at random from the lot using any of the following procedures:

Table 1. Sample size and permissible number of defectives

Lot size (N)	For visual and dimensional test		For laboratory and performance test	
	Sample size (n)	Permissible number of defectives	Sample size (n)	Permissible number of defectives
Up to 10	1	0	1	0
11 to 25	2	0	2	0
26 to 50	3	0	2	0
51 to 100	5	0	2	0
101 to 300	13	1	3	0
301 to 500	32	3	5	0
501 to 1000	50	5	8	1
1001 to above	80	7	13	1

4.1 Method 1

4.1.1 Determine the value of r using this equation:

$$r = \frac{N}{n}$$

where:

r is the upper limit of the set of numbers which will be used in selecting the components or machinery in the sample

N is the lot size

n is the sample size for a given lot size

4.1.2 Draw any number from 1 to r at random and let this number be denoted as z , representing the first sample starting from any component or machinery in a lot, count them in one order as 1, 2, 3... up to z where the unit corresponding to z will be the first sample.

4.1.3 Then start counting from the next until r . Every r^{th} component or machinery thus counted shall be withdrawn to give the required number of components or machinery in the sample as shown in the example.

Example:

a) For instance, a lot size (**N**) equal to 20 shall have a sample size (**n**) equal to 2 from Table 1. Therefore,

$$r = \frac{N}{n} = \frac{20}{2} = 10$$

- b) Let say from 1 to 10, the number drawn is 8 which is our **z**. Since the component **H** is the 8th component, it shall be the first sample to be considered as shown in row 2 (step b).
- c) Starting from component **I**, count them in order up to 10. The 10th component is component **R**. Therefore, it is the second sample to be considered as shown in row 3 (step c).

Component	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
step b	1	2	3	4	5	6	7	8												
step c									1	2	3	4	5	6	7	8	9	10	1	2

4.2 Method 2

- 4.2.1 Assign a unique ID number, from 1 to **N**, to each one of the units in the lot.
- 4.2.2 Generate **n** numbers from 1 to **N** using any randomization mechanism. These **n** numbers must be distinct.
- 4.2.3 The sample will consist of the unit with the same ID number as the numbers generated in clause 4.2.1.

5 Test Requirements

The samples from each lot shall be tested for ascertaining the conformity of the lot to the requirements of the relevant specification.

5.1 Visual and dimensional test

- 5.1.1 The machines selected shall be examined for visual and dimensional characteristics. The machines failing to satisfy at least one of the specification requirements shall be considered as defective.
- 5.1.2 The lot shall be considered as conforming to the requirements for these characteristics, if the number of defective components or machines in the sample does not exceed the number given in column 3 of Table 1.

5.2 Laboratory and performance test

- 5.2.1 If the lot conforms to the requirements for visual and dimensional aspects, a sub-sample of size given in column 4 of Table 1 shall be taken at random from the machines selected in clause 5.1. Each of the components or machines in the sub-sample shall be taken at random and shall be tested for the requirements of characteristics other than visual and dimensional characteristics.

- 5.2.2** Machines failing to satisfy at least one of the requirements shall be considered as defective. The lot shall be considered as conforming to the requirements if the number of defectives in the sub-sample does not exceed the number given in column 5 of Table 1.
- 5.2.3** If there is no requirement on the laboratory and performance test specified in an individual specification, columns 4 and 5 of Table 1 shall not be considered. In such cases, the lot fulfilling the tests given in clause 5.1 shall be considered as conforming to the requirements of the specification.
- 5.3 Additional requirements for AMTEC and ATC test**
- 5.3.1** The test applicant shall furnish to the testing authority all the serial numbers of the machine currently available in their warehouse that are of identical brand and model that is being applied for testing.
- 5.3.2** The test sample shall be selected using any applicable procedures as shown in clause 4 by the testing authority with agreement of the test applicant. All the requirements regarding the machine along with a detailed specification shall also be furnished by the test applicant.
- 5.3.3** The sample selected shall comply with all the requirements declared by the test applicant in the specification of the machine prior testing. If the sample complies with all the requirements of the specification, the machine shall be considered to be eligible for testing.

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Methods of Sampling for Agricultural and Biosystems Power and Machinery —
Guidelines**

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