

# PHILIPPINE NATIONAL STANDARD

PNS/BAFS 414:2025  
ICS 65.060.20

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## Field Cultivator — Specifications



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## Foreword

The Department of Agriculture (DA)-Bureau of Agriculture and Fisheries Standards (BAFS) was mandated under Section 21 (Standards Development and Enforcement) particularly Rule 21.2 of the Implementing Rules and Regulations (IRR) for Republic Act (RA) No. 10601 (Agricultural and Fisheries Mechanization [AFMech] Law) to update existing standards under the Philippine Agricultural Engineering Standards (PAES) in collaboration with concerned agencies.

In 2022, the DA-Bureau of Agricultural and Fisheries Engineering (BAFE) formally endorsed a list of aged PNS/PAES/PABES with concerns to the DA-BAFS to be considered for revision/amendment. The list was subjected to a prioritization assessment by the DA-Philippine Council for Agriculture and Fisheries (PCAF)-National Sectoral Committee on Agriculture and Fishery Mechanization (CAFMech) and was subsequently endorsed to the DA-BAFS. Further assessment was conducted by the DA-BAFS to identify the priority list for CY 2025, which was then presented during the PCAF-CAFMech Regular Meeting held on October 30, 2024. Accordingly, PAES 147:2010 (Agricultural Machinery — Field Cultivator — Specifications) was included in the 2025 priority list for standardization to update its provisions in line with evolving industry practices and enhance clarity, consistency, and usability for stakeholders.

To expedite the review of these aged standards, the Bureau conducted a Table Review Assessment and Writeshop. This initiative aimed to reevaluate and validate whether the provisions of these existing standards remain relevant and reflective of current regulatory and industry practices, as well as harmonized with related regional and international standards. Moreover, this enables the Bureau to check and, if applicable, revise or amend the standards, especially those that pose a risk to end-users' safety and are potential trade barriers.

The revision was guided by the Technical Working Group (TWG) officially created under Special Order (SO) No. 745, series of 2025 (Composition of TWG and Project Management Team (PMT) for the Development of the Philippine National Standards (PNS) for the Agricultural and Fishery Products and Machinery). The TWG was composed of representatives from relevant government agencies, academe/research institutions, private sector organizations, and civil society organizations (CSO). The draft PNS underwent a series of TWG writeshops and a stakeholder consultation conducted via online platforms and hybrid setup before its endorsement to the DA Secretary for approval.

This Standard includes the following significant changes compared to the previous version:

- a) Omission of the provision for "Principle of Operation";
- b) Removal of the design dimensional requirements from the Manufacturing

Requirements;

- c) Deletion of the specific provisions for the welded parts;
- d) Replacement of the clause “Warranty of Construction” with “ After-sales Service Requirements”;
- e) Removal of the multiple provisions on the performance requirements; and
- f) Addition of a clause for sampling.

This document cancels and replaces PAES 147:2010, which has been technically revised. This document was written in accordance with the formatting and editorial rules of the Standardization Guide (SG) No.1 (Writing the PNS) and SG No. 5 (Writing the PNS for Agricultural and Fishery Machinery and Infrastructures) developed by the Standards Development Division (SDD) of the DA-BAFS.

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## **1 Scope**

This Standard specifies the manufacturing and performance requirements for two-wheel tractor driven and four-wheel tractor driven field cultivators.

## **2 Normative References**

The following documents are referred to in the text in such a way that some or all their contents constitute the requirements of this document. The latest edition of the referenced document (including any amendments) applies:

American Welding Society (AWS). (2000). Structural Welding Code — Steel (AWS D1.1:2000)  
<https://law.resource.org/pub/us/cfr/ibr/003/aws.d1.1.2000.pdf>

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2020). Production Machinery — Four-Wheel Tractor — Specifications (PNS 301:2020)  
[https://drive.google.com/file/d/1NiUlxCa5qbbAFWSYj\\_XHJ6TpTuYGp\\_KCW/view?usp=sharing](https://drive.google.com/file/d/1NiUlxCa5qbbAFWSYj_XHJ6TpTuYGp_KCW/view?usp=sharing)

BAFS-DA. (2024). Operator's Manual for Agricultural and Biosystems Power and Machinery — Guidelines (PNS/BAFS 390: 2024)  
<https://drive.google.com/file/d/1V0j10815Yy-o9qvcGLiiBOWMDHYgitb/view>

BAFS-DA. (2024). Methods of sampling for agricultural and biosystems power and machinery — Guidelines (PNS/BAFS 391:2024)  
[https://drive.google.com/file/d/1U942cHfs\\_mHJuqUu7BFk-58Zm3sySnns/view?usp=sharing](https://drive.google.com/file/d/1U942cHfs_mHJuqUu7BFk-58Zm3sySnns/view?usp=sharing)

BAFS-DA. (2025). Field Cultivator — Methods of Test (PNS/BAFS 415:2025)

BAFS-DA. (2025). Soil Tillage Machinery — Terminologies (PNS 411:2025)

## **3 Terms and Definitions**

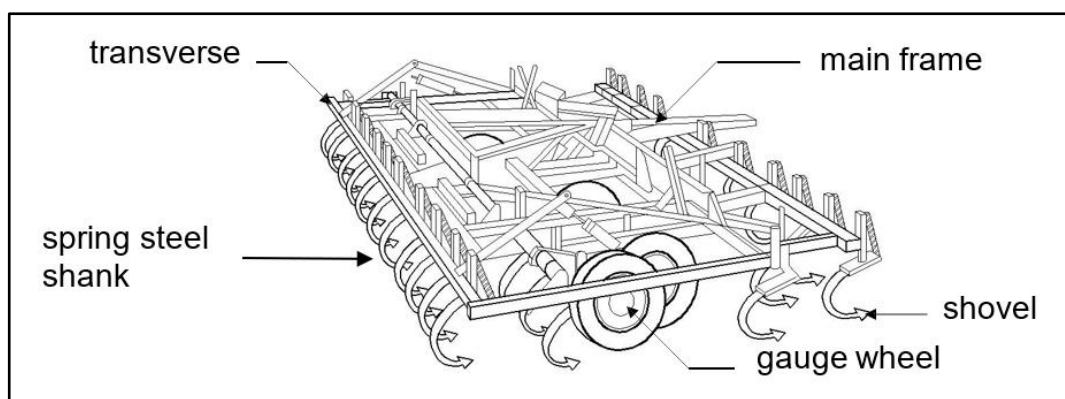
For the purpose of this Standard, the following definitions below apply. The preferred terms are written in bold type after the Clause number while admitted terms are listed in italicized type after the definition, which could be interchangeably used in interpreting the provisions of this Standard

**3.1****field cultivator**

secondary tillage implement for seedbed preparation, weed eradication, or fallow cultivation subsequent to some form of primary tillage, equipped with spring steel shanks (AMTEC-UPLB, 2010, *modified*)

**NOTE 1** It is equipped with spring steel shanks or teeth (generally spaced 150 to 230 mm in a staggered pattern) which has an integral forged point or mounting holes for replaceable shovel or sweep tools.

**NOTE 2** See Figure 1.



**Figure 1.** Field cultivator (AMTEC-UPLB, 2010)

**3.2****gauge wheel**

auxiliary component of the field cultivator that helps maintain uniform depth of cultivation and eliminate the need to set the tension with the three-point hitch every time you set a cultivator down as shown in Figure 1 (AMTEC-UPLB, 2010)

*admitted term: depth wheel*

**3.3****ground clearance**

minimum vertical distance between the soil surface and a potentially obstructing machine element (AMTEC-UPLB, 2010)

**3.4****main frame**

part of the field cultivator that holds the transverse toolbars and gauge wheels together (AMTEC-UPLB, 2010)

**NOTE** See Figure 1.

**3.5****primary tillage**

tillage operation that displaces and shatters soil to reduce soil strength and to bury or mix plant materials, crop care inputs in the tillage (ASABE, 2006)

**NOTE** The depth of tillage operations may reach a depth of 150 mm to 900 mm, depending on the specific site conditions (BAFE, 2021, *modified*)

**3.6****secondary tillage**

tillage operation that prepares the soil to a shallower depth than primary tillage implements, providing soil pulverization, mixing crop care inputs into the soil, leveling and firming the soil, closing air pockets, and eradicating weeds with its equivalent depth of tillage (ASABE, 2006, *modified*)

**NOTE** The depth of tillage operations may reach a depth of 70 mm to 150 mm depending on the specific site conditions (BAFE, 2021, *modified*).

**3.7****shovel**

structural member primarily used for attaching a tillage tool to a beam (AMTEC-UPLB, 2010)

**3.8****shovel**

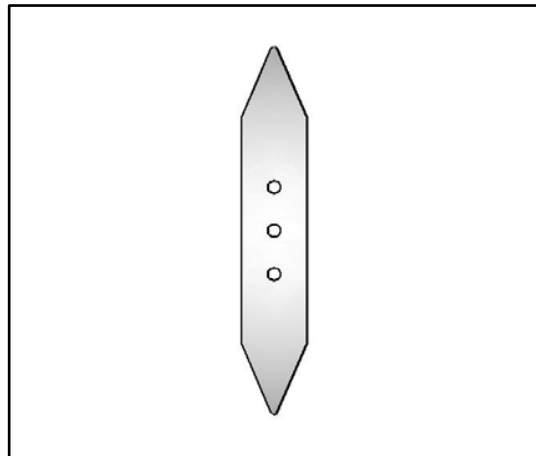
spade-shaped, V-pointed soil working tool, which is used for various plowstocks, cultivators, grain drills, and soil scarifiers (AMTEC-UPLB, 2010)

**NOTE** See Figure 1.

**3.9****spike**

type of shovel used in hard soil conditions and for deeper penetration (AMTEC-UPLB, 2010)

**NOTE** See Figure 2.



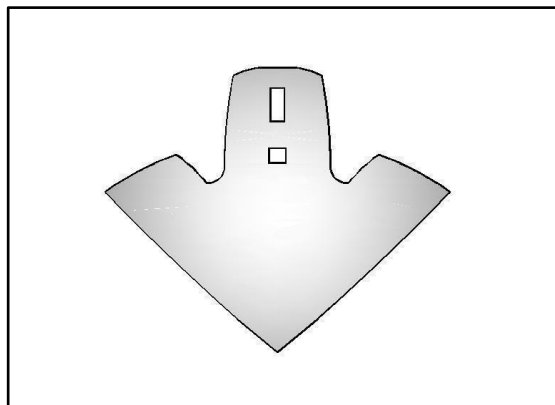
**Figure 2.** Spike type shovel (AMTEC-UPLB, 2010)

**3.10**

**sweep**

type of cultivator shovel which is wing-shaped (AMTEC-UPLB, 2010)

**NOTE** See Figure 3.



**Figure 3.** Sweep type shovel (AMTEC-UPLB, 2010)

**3.11**

**transverse toolbar**

part of the main frame to which shank assemblies are attached (AMTEC-UPLB, 2010)

**NOTE** See Figure 1.

## 4 Classifications

### 4.1 According to the type of driving tractor

#### 4.1.1 Walking-type agricultural tractor (WTAT) driven

Type of field cultivator wherein a WTAT is used to drive the soil tool as shown in Figure 4.

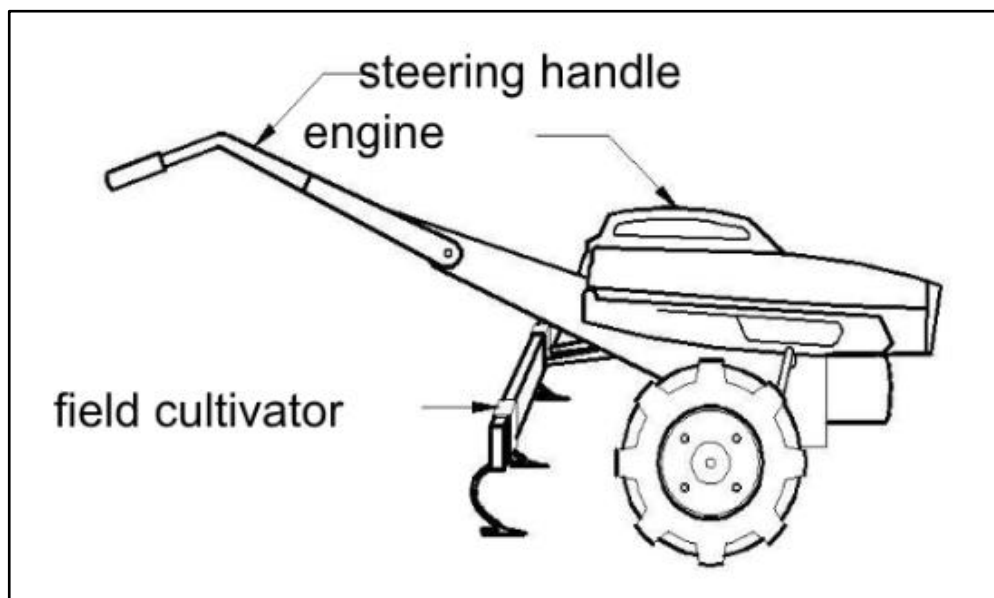


Figure 4. WTAT driven field cultivator (AMTEC-UPLB, 2010)

#### 4.1.2 Four-wheel tractor driven

Type of field cultivator wherein a four-wheel tractor is used to drive the soil tool as shown in Figures 5 to 7.

### 4.2 According to the type of mounting

#### 4.2.1 Rear-mounted

Type of field cultivator wherein the implement is mounted behind the tractor.

##### 4.2.1.1 Drawn type cultivator

Type of field cultivator wherein main frame is mounted far behind the tractor. Guide wheels are necessary for transport as shown in Figure 5.

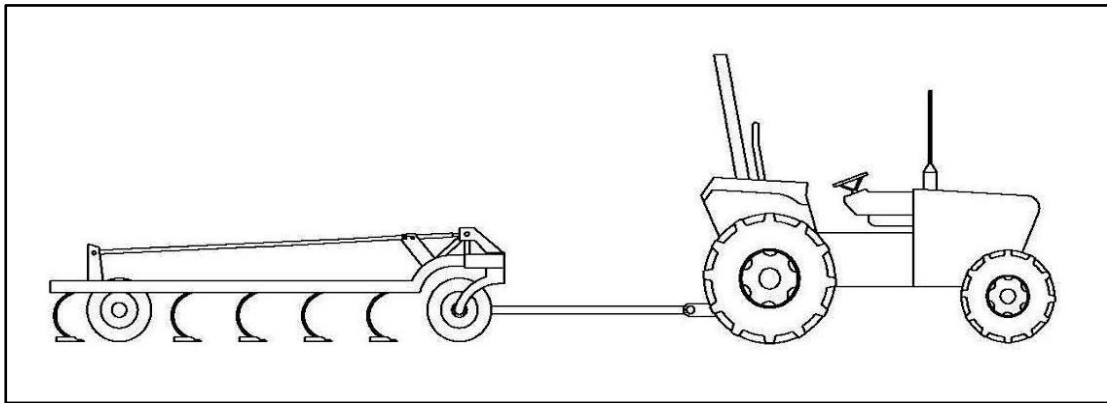
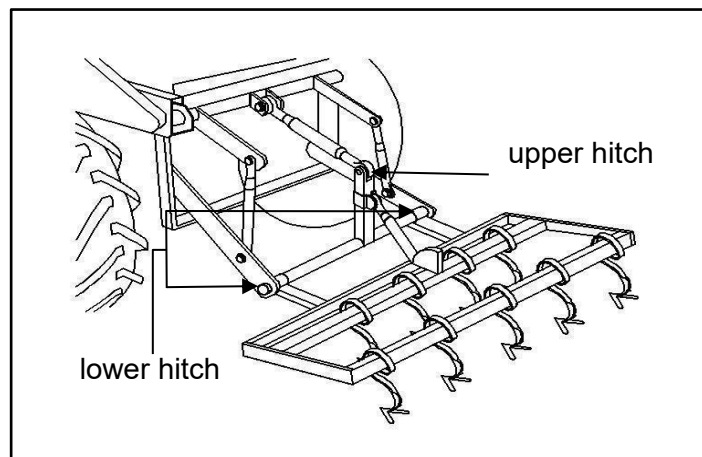


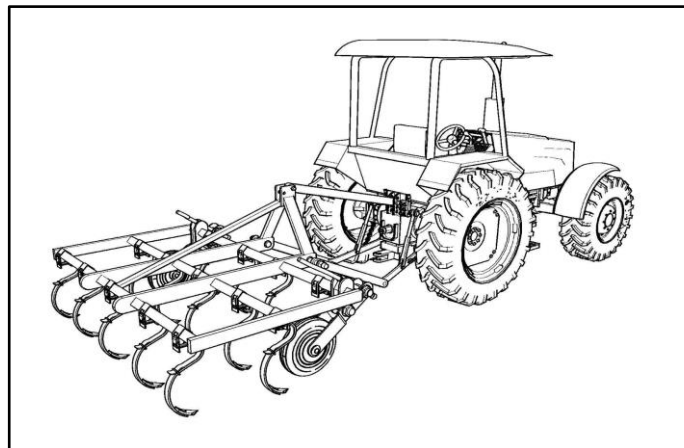
Figure 5. Tractor-drawn type cultivator

#### 4.2.1.2 Three-point hitch mounted

Type of field cultivator wherein main frame is mounted to the rear of the tractor using the three-point hitch linkages as shown in Figure 6.



a) three-point hitch field cultivator (AMTEC-UPLB, 2010)

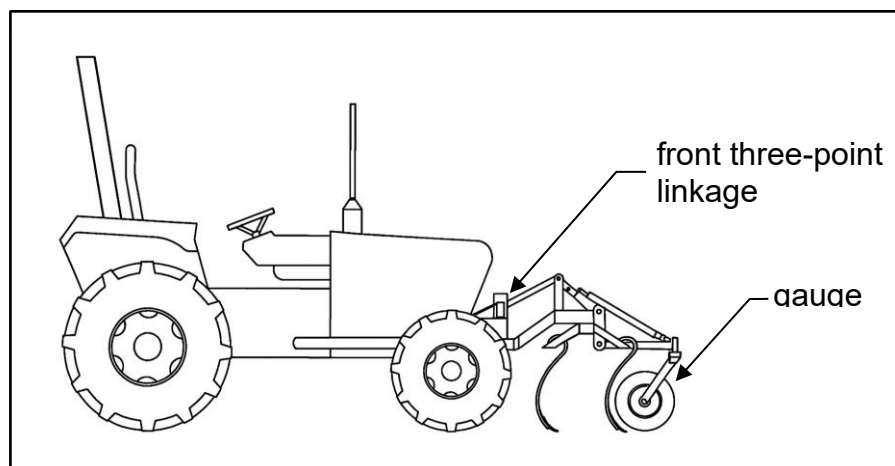


b) three-point hitch field cultivator mounted on a four-wheel drive tractor

**Figure 6.** Three-point hitch-mounted cultivator

#### 4.2.2 Front mounted

Type of field cultivator wherein main frame is mounted on the front of the tractor. For a four-wheel driven type, hydraulic cylinders are required for lowering or lifting of the implement as shown in Figure 7. Gauge wheels are used for adjusting the depth as shown in Figure 7.



**Figure 7.** Four-wheel driven front-mounted cultivator

#### 4.3 According to the type of shank

##### 4.3.1 “C”- shaped shank or C-shank

“C”- shaped shank or C-shank is shown in Figure 8.

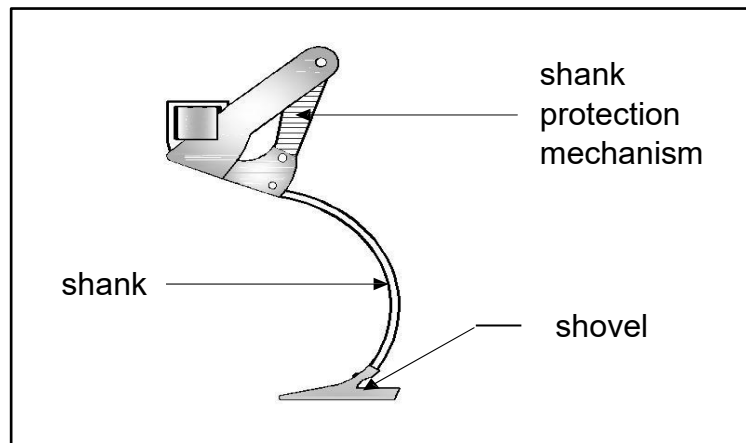


Figure 8. C-shank (AMTEC-UPLB, 2010)

#### 4.3.2 “S” or “K” - tine shank

“S” or “K” - tine shank is shown in Figure 9.

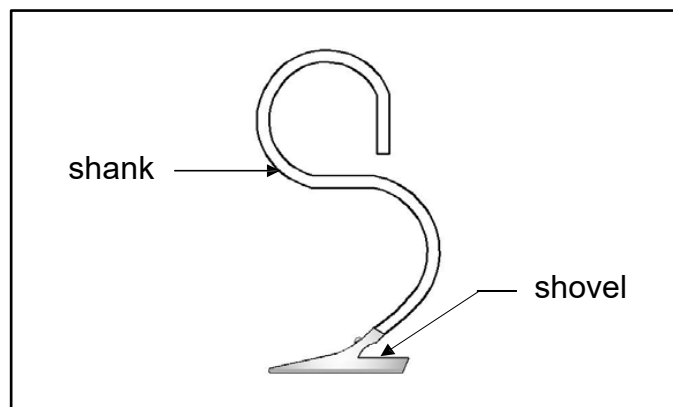
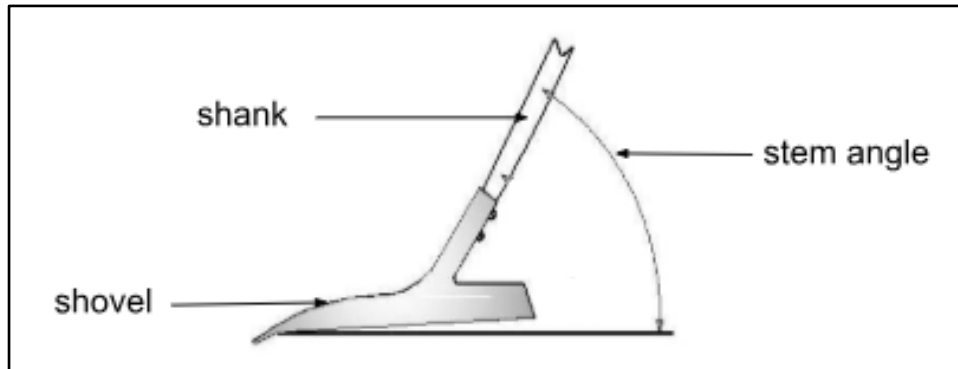


Figure 9. S-tine shank (AMTEC-UPLB, 2010)

### 5 Manufacturing Requirements

- 5.1 The main frame and the transverse toolbars shall be made of mild steel (i.e. AISI 1020).
- 5.2 The main frame shall have a provision for attaching to the tractor as specified in PNS/BAFS 301:2020 Production Machinery — Four-Wheel Tractors — Specifications. Frame sections shall be folded to facilitate ease of transport.
- 5.3 Shanks shall be made of alloy steel (i.e. AISI 5160).

- 5.4 Shank shall have a “C” or “S or K” shape to provide a spring effect when encountering obstructions. It shall have a stem angle of 41 degrees to 52 degrees as shown in Figure 10.



**Figure 10.** Stem angle of a shank

- 5.5 Holes shall be punched at the ends of the shanks where the shovels or spikes shall be attached.
- 5.6 The shovel shall be made of heat-treated carbon (i.e. AISI 1080). It shall be bolted on the end of the shanks to allow replacement. It shall have a thickness of at least 5 mm (3/16"). Sweeps shall have a nose angle of 41 degrees to 52 degrees.
- 5.7 Steel springs shall be connected with the shank assembly to provide protection for the shank during tillage. Shank protection should be provided.
- 5.8 Gauge wheels should have an adjustable axle to allow modification of operating depth.
- 5.9 All welded parts shall be in accordance with the criteria set in AWS D1.1:2000.

## 6 Performance Requirements

- 6.1 The field cultivator shall have an operating depth of 51 mm to 152 mm (2" to 6").
- 6.2 There shall be no major breakdowns during the test and damages after the test.

## 7 Safety, Workmanship, and Finish

- 7.1 The machine shall be free from defects that may be detrimental to its use and shall be free from sharp edges and surfaces that may harm the operator. All

metal parts should be machine bent, pressed and cut, and all rough surfaces should be machine finished and smoothed.

- 7.2** Warning notices shall be provided in conformance with PNS/BAFS 330:2022 (Technical means for ensuring safety — Guidelines).
- 7.3** The use of field cultivator in terms of operator's exposure on permissible noise level shall conform to Annex A (Occupational safety and health standards - [Rule 1074.01– 1074.03]).
- 7.4** If the operation exceeds the noise level of 92 db(A), an ear protective device shall be provided by the manufacturer.

## **8 After-sales Service Requirements**

Requirements for after-sales services shall be in conformance with PNS/BAFS 192:2024 (After-sales service — Guidelines).

## **9 Maintenance and Operation**

- 9.1** Each unit of the field cultivator shall be provided with a set of standard tools for operation and basic maintenance as prescribed by the manufacturer.
- 9.2** An operator's manual for the field cultivator shall be provided in conformance with PNS/BAFS 390:2024 (Operator's manual for agricultural and biosystems power and machinery — Guidelines). The operator's manual shall include emphasis on the safety and health hazards especially the use of basic personal protective equipment.

## **10 Sampling**

The field cultivator shall be sampled for testing in conformance with PNS/BAFS 391:2024 (Methods of sampling for agricultural and biosystems power and machinery — Guidelines) or other suitable method of selection validated by the testing authority.

## **11 Testing**

The sampled field cultivator shall be tested in conformance with PNS/BAFS 415:2025 (Field Cultivator — Methods of Test).

**12 Markings and Labeling**

- 12.1** Each unit of field cultivator shall be engraved or embossed with the following information, either on the body or on a metal nameplate/s permanently attached at the most conspicuous place:
- a) Registered trademark of the manufacturer;
  - b) Brand;
  - c) Model;
  - d) Serial number;
  - e) Date of manufacture; and
  - f) Country of manufacture/origin (if imported) / “Made in the Philippines” (if manufactured in the country).
- 12.2** Reflectors shall be attached at the rear of the cultivator for safety during transport.
- 12.3** Other markings and labeling shall comply with the applicable regulations set by the competent authority.

**Annex A**  
(Informative)

**Occupational safety and health standards (Rule 1074.01–1074.03)**

**A.1 Threshold limit values for noise**

- A.1.1** 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.
- A.1.2** Feasible administrative or engineering controls shall be utilized when workers are exposed to sound levels exceeding those specified in Table A.1 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.

**Table A.1.** Permissible noise exposure (OSHC-DOLE, 2020)

<b>Duration per day, h</b>	<b>Sound levels (slow response), dB(A)</b>
8	90
6	92
4	95
3	97
2	100
1½	102
1	105
½	110
¼	115

**A.2 Permissible noise exposure**

- A.2.1** The values specified in Table A.1 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.
- A.2.2** If the variation in noise level involves maximum intervals of one second or less, it shall be considered as continuous. If the interval is over one second, it becomes impulse or impact noise.
- A.2.3** When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered rather than the effect of each.
- A.2.4** If the sum of the fractions in Equation 1 exceeds one, then the mixed exposure should be considered to exceed the threshold limit value. C indicates the total

time exposure at a specified noise level, and T indicates the total time of exposure permitted at the level. However, the permissible levels indicated in Table A.1 shall not be exceeded for the corresponding number of hours per day allowed. Noise exposures of less than 90 dB(A) are not covered by Equation 1.

$$X = \frac{C_1}{T_1} + \frac{C_2}{T_2} + \frac{C_3}{T_3} + \dots + \frac{C_n}{T_n} \quad (1)$$

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.2.5** Exposures to impulsive or impact noise shall not exceed 140 dB(A) peak sound pressure level (ceiling value).

## References

- Agricultural Machinery Testing and Evaluation Center (AMTEC)-University of the Philippines Los Baños (UPLB). (2010). Agricultural machinery — Field cultivator — Specifications (PNS/PAES 147:2010). <https://amtec.uplb.edu.ph/wp-content/uploads/2019/07/pns-paes-147-2010.pdf>
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