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**PHILIPPINE AGRICULTURAL ENGINEERING STANDARD PAES 110: 2001**  
**Agricultural Machinery – Walking-type Agricultural Tractor – Specifications**  
**Part 2: Rotary Tilling-type**

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## **Foreword**

The formulation of this national standard was initiated by the Agricultural Machinery Testing and Evaluation Center (AMTEC) under the project entitled "Enhancing the Implementation of AFMA Through Improved Agricultural Engineering Standards" which was funded by the Bureau of Agricultural Research (BAR) of the Department of Agriculture (DA).

This standard has been technically prepared in accordance with PNS 01-4:1998 (ISO/IEC Directives Part 3:1997) – Rules for the Structure and Drafting of International Standards.

The word "shall" is used to indicate requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted.

The word "should" is used to indicate that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that certain course of action is preferred but not necessarily required.

In the preparation of this standard, the following documents/publications were considered:

AMTEC Test Reports on Walking-type Agricultural Tractors (tilling-type)

A research paper on Power Tiller by S.H. Mahmud. Taxila, Pakistan. 1979

International Organization for Standardization (ISO) 3789-2:1982 – Tractors, machinery for agriculture and forestry, powered lawn and garden equipment – Location and method of operation of operator's controls- Part 2: Controls for Agricultural tractors and machinery.

Republic Act No. 7394 otherwise known as "The Consumer Act of the Philippines" enacted on July 22, 1991.

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**1 Scope**

This standard specifies the minimum requirements for walking-type agricultural tractor which is classified as rotary tilling-type.

**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 107:2000, Agricultural Machinery – Hitch for Walking-Type Agricultural Tractor – Specifications

PAES 108:2000, Agricultural Machinery – Hexagonal Axle and Hub for Walking Type Agricultural Tractor – Specifications

PAES 111:2000, Agricultural Machinery – Walking-Type Agricultural Tractor – Methods of Test

**3 Definitions**

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

**3.1****rotary tilling type**

a type of walking-type agricultural tractor equipped with rotary tiller which cuts, breaks up, and mixes the soil and/or plant residues

**3.2****walking-type agricultural tractor**

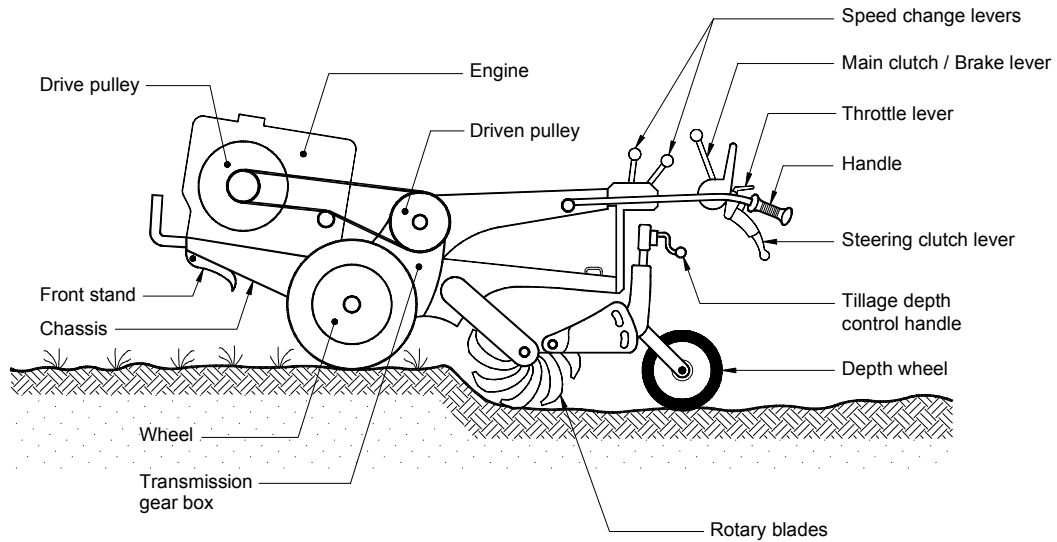
hand tractor

pedestrian tractor

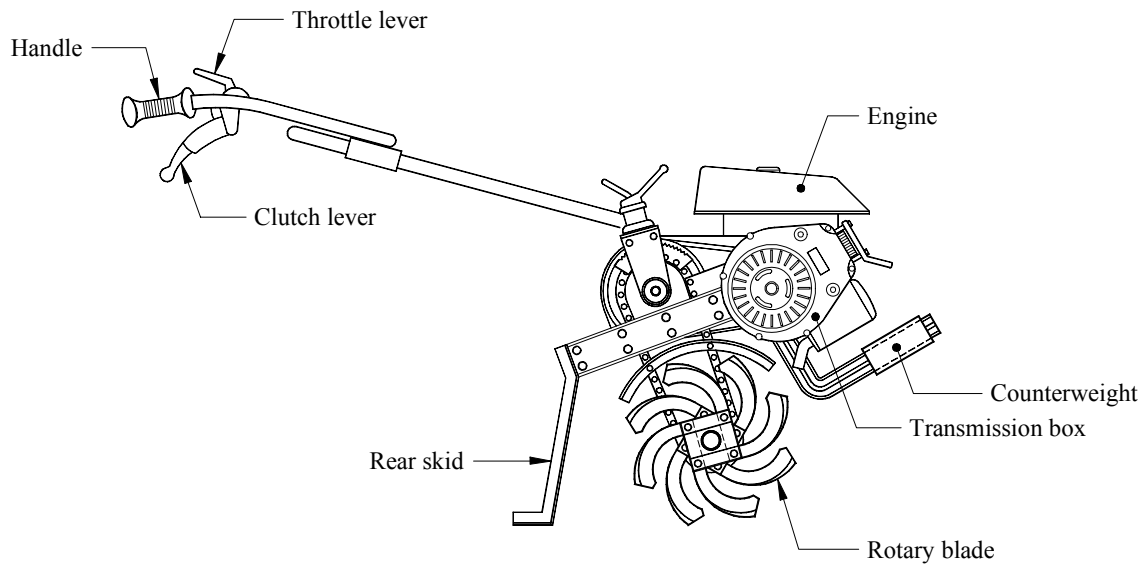
self-propelled machine having a single axle designed primarily to pull and propel trailed or mounted agricultural implements and machinery

#### 4 Construction

The basic construction and components of the tractor is shown in Figure 1.



**a) PTO-driven rotary tiller**



**b) Axle-driven rotary tiller**

**Figure 1 – Walking-type Agricultural Tractor (rotary tilling-type)**

## **5 Materials of Construction**

**5.1** The tractor shall be generally made of steel materials.

**5.2** Chain and sprocket and/or gears shall be used to transmit power from the transmission drive shaft to the axle.

**5.3** The handle bar shall be made of steel pipe with a minimum wall thickness of 3 mm and with a minimum outside diameter of 25 mm.

## **6 Controls**

### **6.1 Throttle Lever**

**6.1.1** This shall be accessible to the operator's right-hand side of the handle bar.

#### **6.1.2 Types of throttle lever**

##### **6.1.2.1 Vertical type**

For this type, the throttle lever is pushed forward to increase engine speed and pulled rearward to decrease engine speed.

##### **6.1.2.2 Horizontal Type**

For this type, the throttle lever is pulled to the left to increase engine speed and to the right to decrease engine speed.

### **6.2 Main Clutch Lever**

**6.2.1** This shall be accessible to the operator's left-hand side of the handle bar.

**6.2.2** In the case of a vertical lever, the lever shall be pushed forward to operate the tractor and shall be pulled rearward to stop the tractor.

**6.2.3** In the case of a horizontal lever, the lever shall be pushed upward to operate the tractor and shall be pulled downward to stop the tractor.

### **6.3 Steering Clutch**

**6.3.1** In the case of right-hand steering clutch lever, the lever shall be gripped toward the handle to disengage the right-hand clutch and stop the right-hand driving wheel, causing the tractor to turn to the right. Releasing the lever will re-engage the right-hand wheel.

**6.3.2** In the case of left-hand steering clutch lever, the lever shall be gripped toward the handle bar to disengage the left-hand clutch and stop the left-hand driving wheel, causing the tractor to turn toward the left. Releasing the lever will re-engage the left-hand wheel.

## **7 Performance Requirements**

The tractor when tested in accordance with PAES 111 shall conform to the following requirements:

- 7.1 The peak transmission efficiency of the axle-driven rotary tiller shall be at least 80%.
- 7.2 The manufacturer's specified minimum field capacity of the tractor shall be attained.
- 7.3 The noise emitted by the tractor measured 50 mm away from the operator's ear level shall not be more than 92 db (A).\*
- 7.4 The tractor shall have no breakdowns/malfunctions (i.e. failure of components, etc) during 5-hour continuous running test.

## **8 Other Requirements**

- 8.1 For operator's safety, the following shall be provided:
  - 8.1.1 Belt guard or cover
  - 8.1.2 Mud guard
  - 8.1.3 Rubber hand grip
- 8.2 Mechanism for transmission belt adjustment shall be provided.
- 8.3 Mechanism for handle bar height adjustment shall be provided.
- 8.4 Mechanism for automatic disengagement of power transmission shall be provided.
- 8.5 Mechanism that minimize/reduce vibration shall be provided.

## **9 Workmanship and Finish**

- 9.1 The tractor shall be free from manufacturing defects that may be detrimental to its operation.
- 9.2 Any uncoated metallic surfaces shall be free from rust and shall be painted properly.
- 9.3 The tractor shall be free from sharp edges and surfaces that may injure the operator.

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

## **10 Warranty for Construction and Durability**

**10.1** Warranty against defective materials and workmanship shall be provided for parts and services except for consumable maintenance parts such as belts within six (6) months from the purchase of the tractor.

**10.2** The construction shall be rigid and durable without breakdown of its major components within six (6) months from purchase by the first buyer.

## **11 Maintenance and Operation**

**11.1** Each tractor unit shall be provided with the following basic hand tools: three (3) pieces open wrenches; one (1) piece each of Philips and flat screw driver; and one (1) piece adjustable wrench.

**11.2** An instruction manual, which conforms to PAES 102, shall be provided.

## **12 Sampling**

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

## **13 Testing**

Sampled tractor shall be tested in accordance with PAES 111.

## **14 Marking and Labeling**

Each tractor shall be marked in English language with the following information using a plate, stencil or by directly punching it at the most conspicuous place:

**14.1** Registered trademark of the manufacturer

**14.2** Brand

**14.3** Model

**14.4** Serial number

**14.5** Name and address of the manufacturer

**14.6** Name and address of the importer, if imported (optional)

**14.7** Country of manufacture (if imported) / "Made in the Philippines" (if manufactured in the Philippines)

**14.8** Power requirement, kW

**14.9** Safety/precautionary markings