

## **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. In compliance with metrication law “Batas Pambansa Bilang 8” enacted on January 1, 1983, some data are converted to International System of Units (SI).

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:

American Society of Agricultural Engineers (ASAE) EP 399.1:1985 – Preferred Metric Dimensions for Agricultural Implement Disk Blades.

A web page document on *Disc Plough* by Albert Boers. Last updated: July 4, 2001. Wageningen University.

Stevens G.N. *Equipment Testing and Evaluation*. Overall Division, National Institute of Agricultural Engineering (NIAE), Wrest Park, Silsoe Bedford England. 1982.

Regional Network for Agricultural Machinery (RNAM) Test Codes And Procedures for Farm Machinery. Technical Series No. 12 :1983.

**Agricultural Machinery – Disc Plow – Specifications**

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**1 Scope**

This standard specifies the requirements for disc plows used for four-wheel tractor.

**2 References**

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

ISO 730-1:1994/Cor 1:1995, Agricultural Wheeled Tractors – Rear-mounted three-point linkage – Categories 1, 2, 3 and 4

**3 Definitions**

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

**3.1****concave disc**

circular concave steel plate used for cutting and inverting the soil

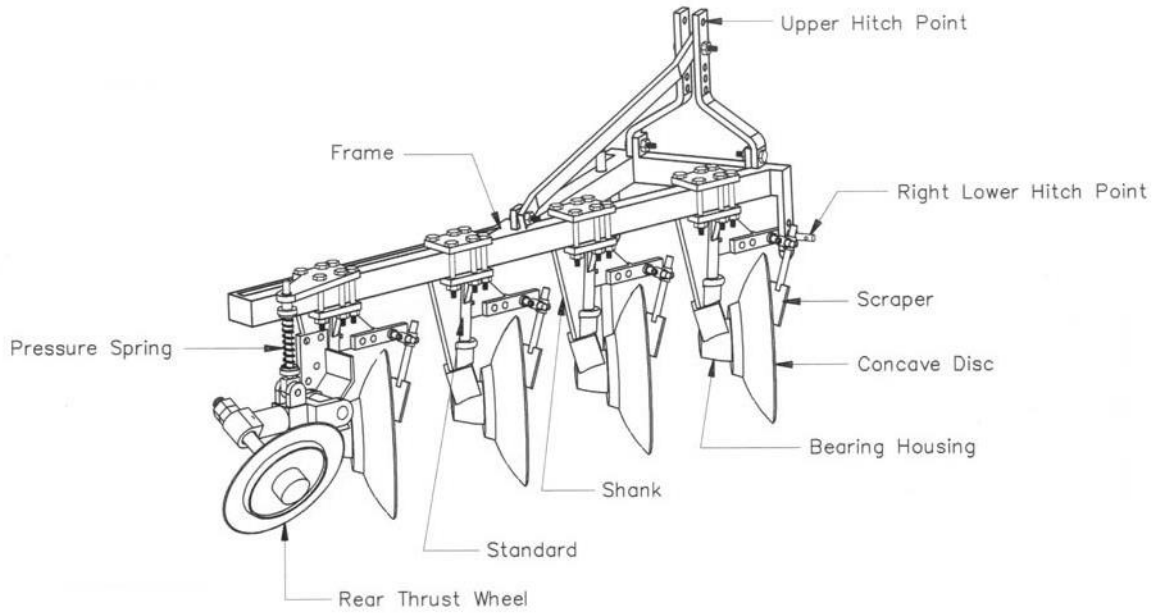
**3.2****concavity**

vertical distance measured from the lowest point to the center of the disc when its concave side is placed on a flat surface

**3.3****disc plow**

implement with individually mounted concave disc blades which cut, partially or completely invert soil slices to bury surface material, and pulverize the soil

**NOTE** Blades are attached to the frame in a tilted position relative to the frame and to the direction of travel for proper penetration and soil displacement.



**Figure 1 – Disc Plow and its Components**

**3.4**

**frame**

structure on which the standards are fitted (see Figure 1)

**3.5**

**hitch**

portion of an implement designed to connect the implement to a power source (see Figure 1)

**3.6**

**scraper**

component which scrapes the soil adhering to the concave side of the disc (see Figure 1)

**3.7**

**side angle**

disc angle

angle, in the soil surface plane, between a tool axis and a line, which is perpendicular to the direction of travel (see Figure 2)

**3.8**

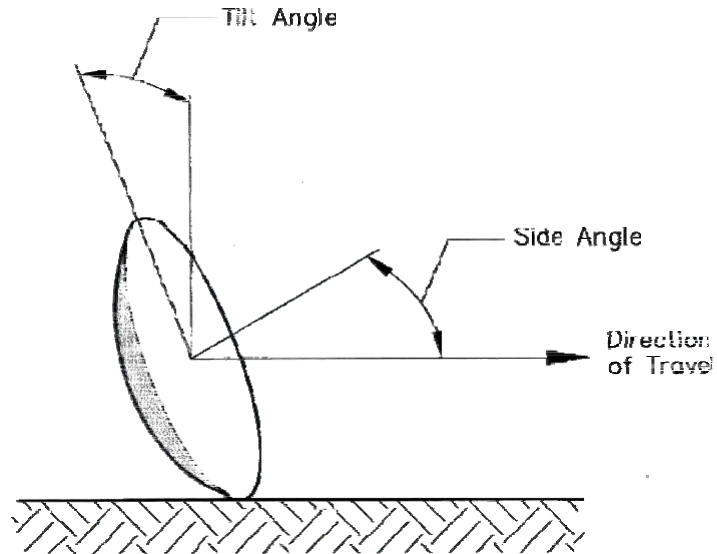
**standard**

beam

upright support which connects the shank to tillage implement frame (see Figure 1)

**3.9****tilt angle**

angle, in a vertical plane perpendicular to the direction of travel, between a tool axis and the soil surface (see Figure 2)



**Figure 2 – Disc and Tilt Angle**

**3.10****width of cut**

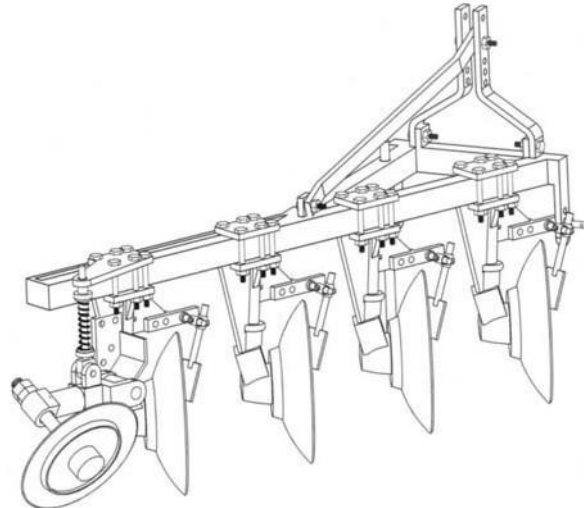
transverse distance between either the top or bottom cutting edges of the end discs

NOTE For measuring the width of cut, the tilt angle shall be set at 15 to 25 . For non-adjustable plow disc blades, the tilt angle shall be set at 18 to 20 .

## 4 Classification

### 4.1 One-way Disc Plow

Tractor-mounted or integral one-way disc plows are attached to the tractor by three-point hitch linkages and are fully carried by the tractor during transport.

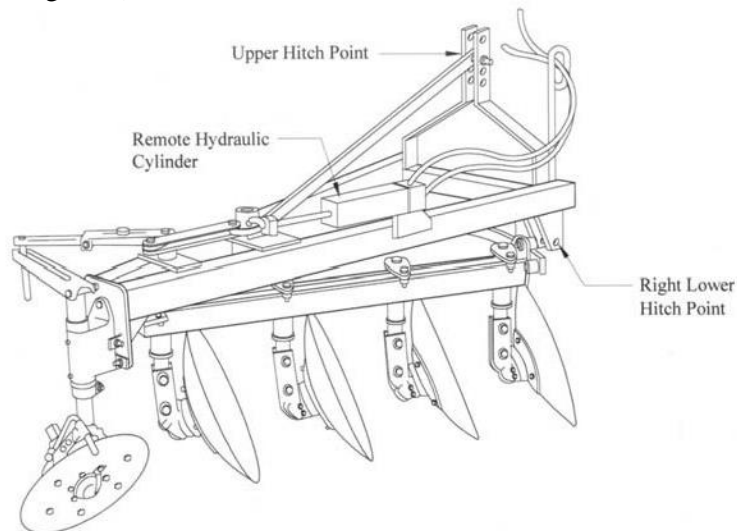


**Figure 3 – Tractor-mounted Disc Plow**

### 4.2 Reversible Disc Plow

#### 4.2.1 Tractor-mounted Reversible Disc Plow

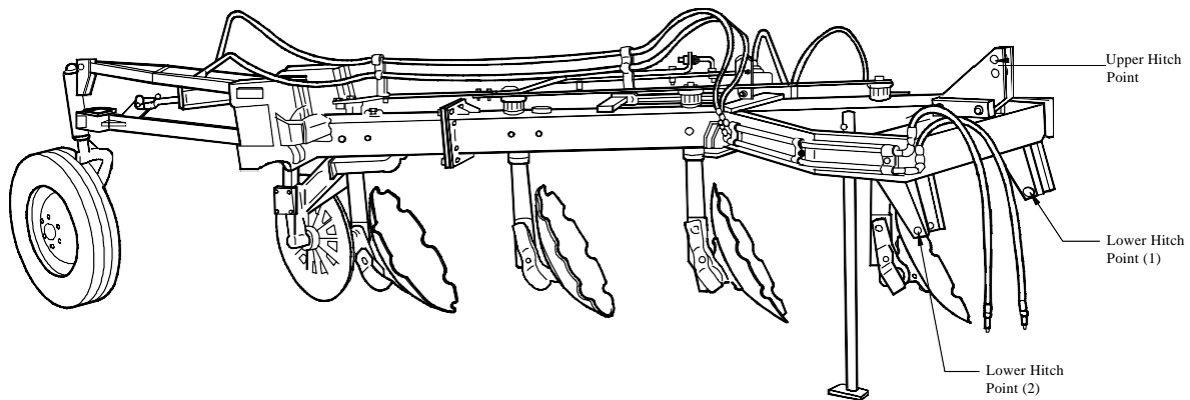
This plow is attached to the three-point hitch and is fully carried by the tractor in transport. This type is usually limited in size (2-4 discs) due to tractor front-end stability and hydraulic-lift capacity. (see Figure 4)



**Figure 4 – Tractor-mounted Reversible Disc Plow**

#### 4.2.2 Semi-mounted Reversible Disc Plow

Semi-mounted or semi-integral reversible disc plow is attached to the tractor's lower hitch points and is raised/lowered by the tractor hitch as well as a remote hydraulic cylinder on the rear transport wheel. On some of these plows, the rear wheel operates on the land and serves as a gauge wheel when plowing and as transport wheel (free to caster) when the plow is raised. The rear wheel is an attachment for converting a fully integral, reversible disc plow to semi-integral operation. (see Figure 5)



**Figure 5 – Semi-mounted Reversible Disc Plow**

## 5 Size

The size of the plow shall be determined by the number and diameter of the discs and the width of cut. For size determination, width of cut shall be calculated by the following formula:

$$W = \frac{0.95NS + 0.3D}{1000}$$

where :

$W$	is the width of cut, m
$N$	is the number of discs
$S$	is the disc spacing, mm
$D$	is the diameter of the disc, mm

## 6 Materials of Construction

- 6.1 Mild steel shall be used in the manufacture of the frame, scraper, thrust wheel and hitch.
- 6.2 Cast iron shall be used in the manufacture of spool.
- 6.3 Carbon steel shall be used in the manufacture of hitch pin.
- 6.4 Carbon steel with at least 80% carbon content (e.g. AISI 1080) or alloy steel with at least 0.0005% boron content shall be used in the manufacture of the disc blades.
- 6.5 High carbon steel shall be used in the manufacture of standard.

## 7 Construction Requirements

7.1 The disc plow shall conform to the following requirements:

**Table 1 – Construction Requirements for Disc Plow**

Items	Requirements
Type of disc	plain or notched
Number of disc	2 to 8
Diameter of discs, mm	560 to 810
Working width, mm	500 to 2000
Working depth, mm	200 to 400
Frame height, mm	650 to 800
Disc spacing, mm	500 to 750
Weight per disc*, kg	150 to 250
Drawbar power requirement per disc, kW	15 to 20

\* It is the total weight of the plow divided by the number of discs.

7.2 The thickness of the disc varies with the disc diameter, as shown in Table 2.

**Table 2 – Disc Diameter and its Thickness**

Disc diameter mm	Thickness mm
560	4 to 6
610	4 to 6
660	5 to 6.5
710	6.5 to 7.5
760	8 to 10
810	8 to 12

7.3 The concavity of the disc varies with the disc diameter, as shown in Table 3.

**Table 3 – Disc Diameter and its Concavity**

Disc diameter mm	Concavity mm
560	60 to 92
610	60 to 106
660	69 to 124
710	82 to 140
760	89 to 137
810	104 to 144

## **8 Performance Requirements**

**8.1** The maximum depth of cut of the plow specified by the manufacturer shall be attained.

**8.2** During operation, the plow shall produce good quality of work such as: quality of inversion (ease of burying plant residues) and uniformity of soil clods, especially between successive passes.

## **9 Other Requirements**

**9.1** Each disc shall be fastened securely to the hub with four or five plow bolts which are hammered while the nuts are drawn securely.

**9.2** The frame shall be rigid and durable.

**9.3** The adjustable scrapers shall be set in such a way that they shall not touch the face of disc and shall be able to scrape the soil effectively.

**9.4** Grease points for lubrication of bearings shall be provided. The bearings shall be properly aligned and provided with special dirt seals.

**9.5** The hitch of the disc plow shall be compatible with the hydraulic system and the three-point hitch of the tractor specified in PAES 118.

**9.6** The plow shall be easy to operate such as:

- a. hitching to and unhitching from tractor;
- b. adjusting the depth of cut;
- c. changing the position of the plow with respect to the line of pull of the tractor;
- d. moving the standards laterally on the frame;
- e. maneuverability during operation;
- f. clearing blockages;
- g. changing from transport to work position and vice versa; and
- h. adjustment of the scrapers.

## **10 Workmanship and Finish**

**10.1** The disc plow shall be free from manufacturing defects that may be detrimental to its operation.

**10.2** Except for disc blades, other uncoated metallic surfaces shall be free from rust and shall be painted properly.



**10.3** The disc plow, except for disc blades, shall be free from sharp edges and surfaces that may injure the operator

## **11 Warranty for Construction and Durability**

**11.1** Warranty against defective materials and workmanship shall be provided for parts and services except for consumable maintenance parts such as discs, bearings and seals within six (6) months from the purchase of the disc plow.

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

## **12 Maintenance and Operation**

**12.1** A set of tools required for adjustment during field operations shall be provided.

**12.2** An operator's manual which conforms to PAES 102 shall be provided.

## **13 Marking and Labeling**

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

**13.1** Registered trademark of the manufacturer

**13.2** Brand

**13.3** Model

**13.4** Type and size

**13.5** Serial number

**13.6** Production date (optional)

**13.7** Name and address of manufacturer

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

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

**13.10** Safety/precautionary markings