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**भारतीय मानक मसौदा**

**रिजर प्रकार पशु द्वारा चालित आलू खोदने वाला यंत्र — विशिष्टि**

**(आइ एस 11033 का पहला पुनरीक्षण )**

***Draft Indian Standard*****ANIMAL DRAWN POTATO DIGGER, RIDGER TYPE — SPECIFICATION**

*(First Revision of IS 11033)*

**ICS 65.060.20**

Agricultural Machinery and Equipment  
Sectional Committee, FAD 11

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**FOREWORD**

*(Format clause will be added later)*

Potato is one of the important cash crops of our country and for digging potatoes in the fields, animal drawn diggers are widely used by farmers. As the demand of these diggers increased, a need was felt to develop a standard for the manufacturers to produce and users to select good quality potato diggers. Potato diggers are generally of two types i.e., ridger type and sweep type. The standard was published in 1984 and covers the requirements of ridger type potato digger only.

The first revision of the standard has been brought out to update the material requirement for components of digger and to bring it in latest style and format of Indian Standards. Referred Indian Standards wherever applicable has also been updated.

In revision of this standard, assistance has been derived from technical information provided by Agricultural Machinery Manufacturers Association (AMMA-India).

This standard contains **10.2** which call for agreement between the purchaser and the supplier.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2: 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Draft Indian Standard***ANIMAL DRAWN POTATO DIGGER, RIDGER TYPE — SPECIFICATION***(First Revision of IS 11033)***1 SCOPE**

This standard specifies material, constructional performance and other requirements for ridger type animal drawn potato digger.

**2 REFERENCES**

The standards given below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards.

<i>IS No.</i>	<i>Title</i>
IS 210 : 2009	Grey iron castings - Specification (Fifth Revision)
IS 2062 : 2011	Hot rolled medium and high tensile structural steel - Specification (Seventh Revision)
IS 399 : 1963	Classification of commercial timbers and their zonal distribution ( <i>first revision</i> )
IS 1500 (Part 1) : 2019	Metallic materials — Brinell hardness test: Part 1 Test method ( <i>fifth revision</i> )
IS 1570 (Part 2/Sec 1) : 1979	Schedules for wrought steels: Part 2 Carbon steels (unalloyed steels) : Sec 1 Wrought products (other than wires) with specified chemical composition and related properties ( <i>first revision</i> )
IS 7201 (Part 1) : 1987	Methods of sampling for agricultural machinery and equipment: Part 1 Hand – tools and hand – operated / animal drawn equipment ( <i>first revision</i> )

**3 TERMINOLOGY**

For the purpose of this standard, the following definitions shall apply (*see* Fig. 1).

**3.1 Angle of Cut** — The included angle formed by the lines joining point of share and wings of share (*see*  $\alpha$  in Fig. 1).

**3.2 Angle of Penetration or Lift Angle** — The angle of inclination of share in the direction of travel when share is fitted in its working position (*see*  $\beta$  in Fig. 1).

**3.3 Beam** — A rigid member which connects the yoke to the plough bottom.

**3.4 Potato Digger** — An implement to raise potatoes to the surface of the soil.

**3.5 Digger Bottom** — An assembly comprising the share, mould board and sole plate which are attached together with frog.

**3.6 Frog** — The part to which other components of digger bottom are attached.

**3.7 Handle** — The part(s) for controlling and manoeuvring the digger.

**3.8 Mouldboard Wing** — The part which lifts and breaks up the soil and shall be of slat type.

**3.9 Mouldboard Brace(s)** — The adjustable or fixed part (s) which is attached to the back of the mouldboards to provide them support.

NOTE — The adjustment brace(s) also help in controlling the effective width of digging.

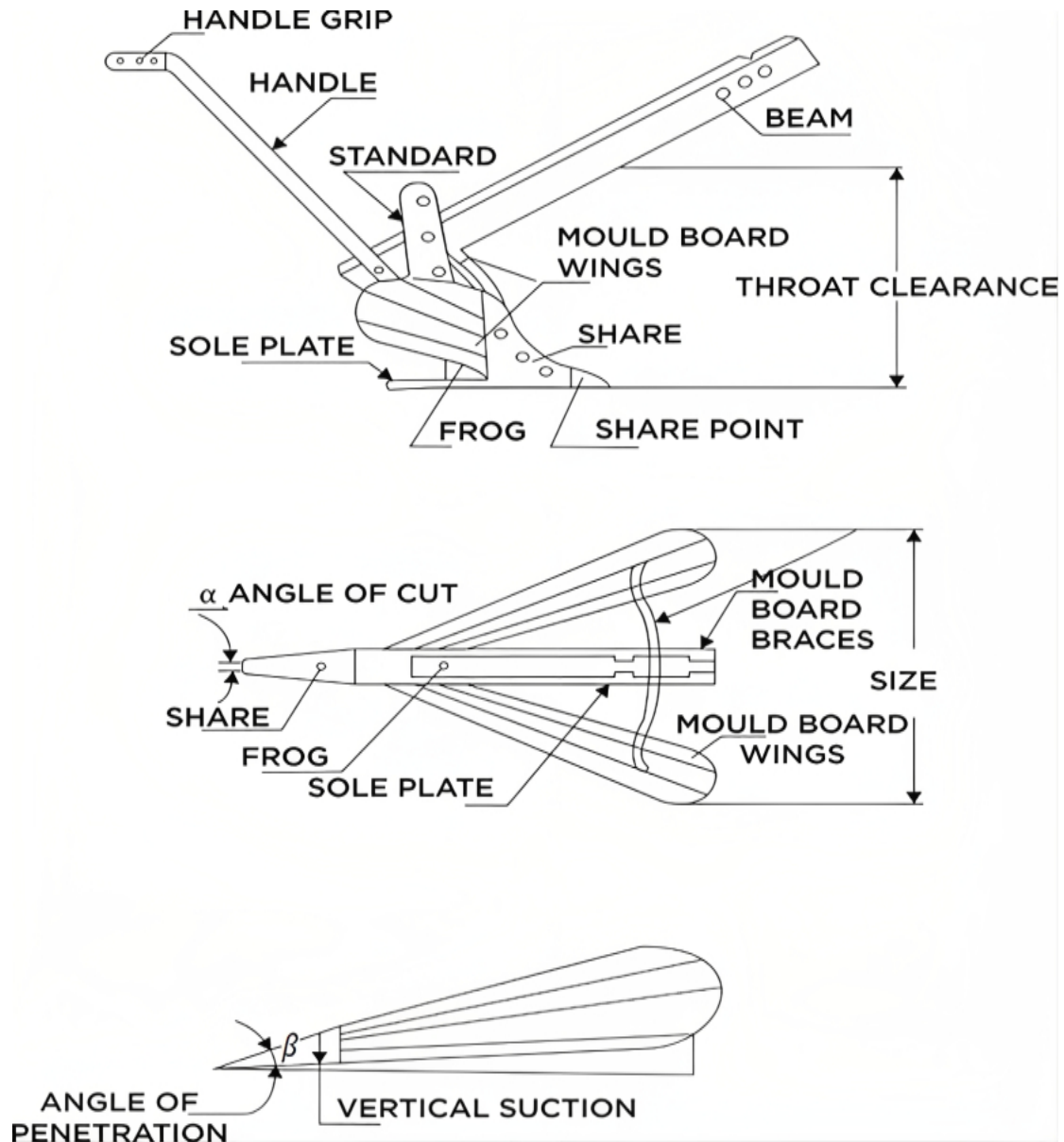


FIG. 1 POTATO DIGGER, RIDGER TYPE

**3.10 Share** — The part which penetrates the soil and makes cut below the surface.

**3.10.1 Cleavage Edge** — The rear edge of the share which joins mouldboard and share.

**3.10.2 Cutting Edge** — The front edge of the share which cuts the soil.

**3.10.3 Edge Clearance** — The maximum clearance between the cutting edge and the straight line joining the point of share and wing of share.

**3.10.4 Point of Share** — The leading end of the cutting edge which facilitates the penetration of share into the soil. This may be integral or detachable.

**3.10.5 Wing of Share** — The rear end of the cutting edge of the share.

**3.11 Working Width** — The horizontal distance between the outside ends of the mouldboards, expressed in mm.

NOTE — In case of mouldboards fitted with adjustable brace (s) the maximum and minimum width shall be indicated.

**3.12 Sole Plate** — The part which slides against the bottom providing stability to it during operations. This is also known as sliding shoe.

**3.13 Throat Clearance** — The perpendicular distance between point of share and lower side of beam.

**3.14 Standard or Shauk** — The part connecting the digger bottom to the beam.

**3.15 Vertical Suction** — The maximum clearance under the land side and horizontal surface when the digger is resting on a horizontal surface in the working position (Fig. 1).

**3.16 Handle Hook** — A hook attached to the handle for tying rope.

## 4 MATERIAL

**4.1** The material of construction of share body, share and land side shall be chilled cast iron (*see 5.2*) or high carbon steel conforming to Grade C75 [*see IS 1570 (Part 2/Sec 1)*] or boron steel of Grade 27MnCrB5.

**4.1.1** Any other material having characteristics equivalent to or better than above may also be used.

**4.2** The material of construction for components other than those specified in **4.1** shall be cast iron preferably conforming to Grade FG 200 (*see IS 210*) or mild steel, preferably conforming to IS 2062. Well-seasoned hard timber (*see IS 399*) may also be used for beam, handle and handle grip.

**4.3** The components along with their material of construction shall be declared by the manufacturer.

## 5 HARDNESS

**5.1** Cast iron used for different components, other than share body, share and land side, shall have the hardness in range of 160 to 220 HB [*see IS 1500 (Part 1)*].

**5.2** The chilled cast iron parts shall have hardness in range of 360 to 400 HB when tested in accordance with IS 1500 (Part 1) up to a distance of 50 mm from cutting edge.

NOTE — Depth of chilling shall be not less than 1.5 mm.

**5.3** The steel share including detachable share point and sole plate knife shall have hardness in range of 350 to 450 HB when tested in accordance with IS 1500 (Part 1) up to a distance of 50 mm from the cutting edge.

## 6 DIMENSIONS

**6.1** The working width of the digger shall be adjustable between 450 to 600 mm.

NOTE — The adjustment of the diverging wings or curved bars attached to the mouldboard for separation and exposure of potatoes may be varied as per requirement.

**6.2** The vertical suction shall be declared by the manufacturer.

**6.3** When the digger is set at its working position, the throat clearance shall be in the range of 250 to 500 mm.

**6.4** When the digger is set at its working position, the vertical distance between the ground and the centre of the grip shall be adjustable. The distance shall lie between 900 and 1100 mm.

**6.5** The handle grip shall be circular or oval in cross section. The diameter or minor axis shall be between 25 and 30 mm. The length of the grip shall be not less than 125 mm. The angle between the grip and the handle shall be from 100° to 105°.

**6.6** The cutting edge of the share shall be bevelled to a distance between 5 and 10 mm. The thickness of the cutting edge should be from 0.5 to 2 mm. The variation in edge thickness in a share shall be not more than  $\pm 0.05$  mm.

**6.7** The angle of cut and angle of penetration shall be in range of 5° to 15° and 15° to 30° respectively. The variation from the declared angle shall be not more than  $\pm 3^\circ$  subject to the angle remaining within the specified limit.

## 7 PERFORMANCE

When tested in accordance with the method given in Annex A, the digger shall satisfy the following:

- a) Exposure of tubers — 70 percent, *Min*, and
- b) Total damage to the tubers — 5 percent, *Max*.

NOTE — This requirement shall be tested as type test.

## 8 REQUIREMENTS

**8.1** All the components should preferably be detachable for ease of replacement.

**8.2** The fasteners coming in contact with soil should have coarse thread. The head of the fasteners, coming in contact with soil, shall be flush with the working surface. As far as possible bolt of 10 mm size should be used for all fastenings to facilitate the use of minimum number of tools. Each bolt should have spring or flat washer of appropriate size for better contact.

**8.3** The digger shall be symmetrical on both sides along the longitudinal central axis of the digger bottom.

**8.4** The mass of the digger including beam (if provided) shall be not more than 20 kg.

**8.5** When the digger is set at its working position and is placed on a plane surface, its bearing points (point of share and wing of share and heel of land side if present) should touch the ground and the digger shall be well-balanced.

## 9 WORKMANSHIP AND FINISH

**9.1** The components of the digger should be free from pits, burrs, cracks and other visual defects. The casting shall be free from blow holes. Welded joints shall not be porous.

**9.2** The surface of the parts of the digger shall be evenly dressed and shall have a protective coating which will prevent surface deterioration in transit and storage.

## 10 MARKING AND PACKING

**10.1 Marking** — Each digger shall be marked on non-wearing surface with the following particulars:

- a) Manufacturer's name or recognized trademark, if any;

- b) Batch or code number;
- c) Type and size; and
- d) Any other markings required under the *Standards of Legal Metrology (Packaged Commodities) Rules, 2011*.

### **10.2 BIS Certification Marking**

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

**10.3 Packing** —The digger shall be packed as agreed to between the purchaser and the supplier. The packing shall ensure safety of the parts in transit.

### **11 SAMPLING AND CRITERIA FOR CONFORMITY**

Unless otherwise agreed to between the purchaser and the supplier, the sampling of the digger for lot acceptance shall be as per IS 7201 (Part 1).

**ANNEX A**

(Clause 7)

**METHOD OF PERFORMANCE TEST OF DIGGER**

**A-1 PROCEDURE**

**A-1.1** Select the field ready for harvesting potatoes.

**A-1.2** Hitch the digger with the animal(s).

**A-1.3** Operate the digger for a preliminary run for a few rows and adjust the width and depth. The blade shall be run below the tuber zone.

**A-1.4** After preliminary run, operate the digger for 20 rows of minimum 20 m length to expose the tubers. From each row, obtain the following for a distance of 10 m in the middle of rows:

- a) Potatoes exposed (collected by picking exposed potatoes)
- b) Total potatoes (by digging manually, if necessary and picking all potatoes)
- c) Damaged potatoes (damaged means cut, broached or scaled potatoes).

**A-2 CALCULATION**

- a) Exposure percentage by mass =  $100 \times \frac{\text{mass of potatoes exposed (collected from all rows)}}{\text{mass of total (collected from all rows)}}$
- b) Damaged percentage by mass =  $100 \times \frac{\text{mass of damaged potatoes (collected from all rows)}}{\text{mass of total (collected from all rows)}}$