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Chisel ploughs — Specifications and test method

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Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Specifications	3
4.1 Material of chisel plough.....	3
4.2 Hardness.....	3
4.3 Arrangement of tines.....	3
4.4 Finish and workmanship.....	4
5 Requirements	4
5.1 Marking.....	4
5.2 Other requirements.....	4
6 Tests	4
6.1 Laboratory test.....	4
6.1.1 Blade hardness test.....	5
6.1.2 Material test.....	5
6.1.3 Dimension test.....	5
6.2 Field test.....	5
6.2.1 Test condition.....	5
6.2.2 Efficiency and performance test of chisel plough in the field.....	6
7 Test report	6
8 Guide for measuring the depth of the furrow	7
9 Specifications of devices and equipment	8
9.1 Hydraulic components and fittings.....	8
9.2 Pneumatic systems.....	8
Bibliography	9

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, WG 7, *Soil working equipment*.

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Chisel ploughs — Specifications and test method

1 Scope

This Standard specifies the specifications, requirements and test method for tractor-operated chisel ploughs which is applied for 3 point hitch and different working width.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4254-1, *Agricultural machinery — Safety — Part 1: General requirements*

ISO 5713, *Equipment for working the soil — Fixing bolts for soil working elements*

ISO 6506-1:2014, *Metallic materials — Brinell hardness test — Part 1: Test method*

ISO 6507-1:2005, *Metallic materials — Vickers hardness test — Part 1: Test method*

ISO 6508-1:2016, *Metallic materials — Rockwell hardness test — Part 1: Test method*

ISO 8910:1993, *Machinery and equipment for working the soil — Mouldboard plough working elements — Vocabulary*

ISO 18265, *Metallic materials — Conversion of hardness values*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

chisel plough/wedged shaped share

chisel plough is an implement adjustable tint to work and can be used for seed bed preparation and for sowing with seeding attachment, and wedged shaped share is a part of plough, subsoiler or cultivator tine which enters the soil and makes a substantially horizontal cut below the surface

3.2

mounted chisel plough

this is chisel plough which is mounted to 3 points hitch coupler of tractor and it could be lifted and transported by hydraulic power (see [Figure 1](#))

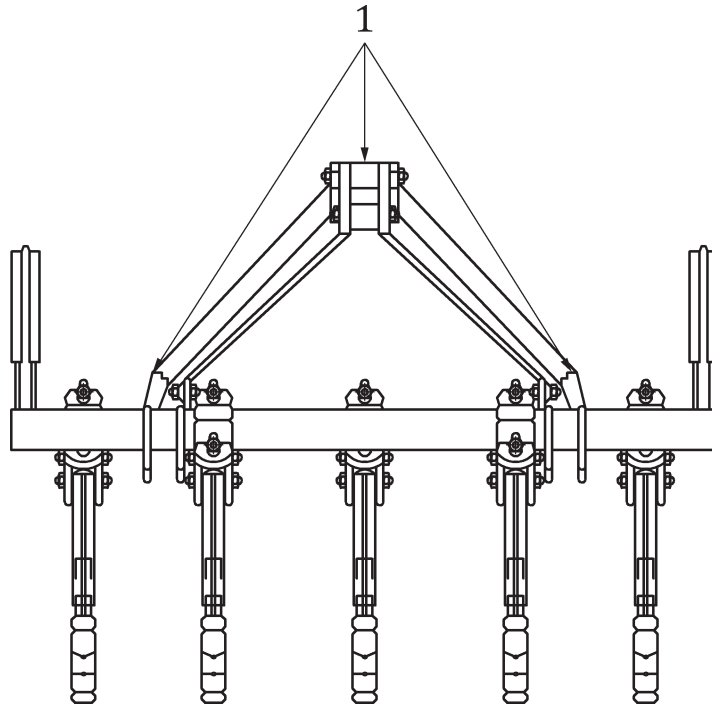


Figure 1 — Mounted chisel plough
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3.3 depth of furrow

the depth of chisel plough that is penetrated in the soil

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3.4 furrow widths
effective width of one blade

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3.5 working widths
area of disturbed soil achieved by attached implements

3.6 transportation widths
distance between the outermost parts in transport position perpendicular to driving direction

3.7 power requirements
drawbar power is power measured at the point implements are attached to the tractor, drawbar or 3 point hitch. During tractor testing a load cell is placed between the tractor and a load (chisel plough)

3.8 soil types
in terms of soil texture, soil type usually refers to the different sizes of mineral particles in a particular sample. Soil is made up in part of finely ground rock particles, grouped according to size as sand and silt in addition to clay, organic material such as decomposed plant matter

3.9 spring loaded tine
a rigid' tine, hinged to the frame and loaded with helical spring so that it swings back when an obstacle is encountered

3.10 frame

rigid structure on which different components are attached

3.11 contact angle

angel of attachment, a chord between the attaching bolt canters, at the attaching surface of the foot piece, shall make an angle with the ground level which provides the desired working angle for standard sweeps (see α in [Figure 2](#))



Figure 2 — Contact angle illustration
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4 Specifications

For control of chisel operation in the soil, determinations of the following items are necessary

- material;
- hardness;
- arrangement; and
- finish and workmanship.

4.1 Material of chisel plough

The materials are taken from the engineering database of chisel plough production system specification drawn by industry. All the properties of material and soil shall be specified by manufacturer. Two types of steel that is used in construction of blade of chisel plough such as: Carbon steel and Silico manganese steel. The steel sheet used in the production of the Chisel plough blade should be free of non-metallic impurities, such as free graphite and other factors that will reduce its resistance. Although, manufacturer can use other materials with equivalent properties.

4.2 Hardness

In the hardness of the chisel blades, the heat treatment must be done in a proportional and uniform manner and the obtained hardness in the blades is corresponded to ISO 18265.

4.3 Arrangement of tines

Arrangement of tines is one of the most important factor in chisel plough manufacturing. There are variety of arrangement of tines which is applied according to heavy clay soils, big size of soil clods, and soil resistance.

4.4 Finish and workmanship

All components of the chisel plough should be free from pits, burrs and other visual defects.

5 Requirements

5.1 Marking

Each chisel plough shall be marked with the following particular:

- a) registered trademark of the manufacturer;
- b) model;
- c) type and size;
- d) serial number;
- e) production date (optional);
- f) name and address of manufacturer;
- g) name and address of importer (optional);
- h) country of manufacture; and
- i) safety/precautionary markings.

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5.1.1 These particulars shall be stamped, engraved or embossed on metallic plate rigidly attached or a non-wearing part of the chisel plough.

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The marking shall be visible, permanent, and strength against climate conditions.

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5.2 Other requirements

5.2.1 In order to fixing soil working elements, refer to standard ISO 5713.

5.2.2 Safety and warning requirements of chisel plough, shall be according to ISO 4254-1.

5.2.3 The hitch of the chisel plough shall be compatible with the hydraulic system and the 3 point hitch of the tractor.

6 Tests

For evaluation of chisel work quality and work capacity and determination of specifications, the following tests are required:

6.1 Laboratory test

- Hardness;
- materials; and
- dimensions.

6.1.1 Blade hardness test

In order to testing hardness, could be used one of the methods is mentioned in the standards as follow:

- ISO 6506-1.2014
- ISO 6507-1.2005
- ISO 6508-1.2016

6.1.2 Material test

Materials different parts of chisel plough that claimed from manufacturer shall to be measured by appropriate method (e.g. X-ray Fluorescence Spectroscopy [XRF]).

6.1.3 Dimension test

Dimensions of chisel plough that claimed from manufacturer shall to be measured by necessary precision.

6.2 Field test

In order to measure of blade wear after sufficient work in the field and determine of elements hardness and evaluation of eventual breaking or fracture.

6.2.1 Test condition

Efficiency and performance types of chisel ploughs are depended upon to land condition, soil type, moisture content percentage, and seed size distribution, percentage of weeds and crop residues in the land and speed of chisel plough. Therefore, in order to accurate comment on quality conditions of execute test should be carefully investigated and reflected in the test report.

6.2.1.1 Condition and specification of filed

- a) Area and shape of Piece of land;
- b) type and texture of soil;
- c) the last harvest crop from the farm land;
- d) the height of the straw remaining from the previous crop;
- e) weed density per unit area;
- f) Ssoil moisture content (based on dry weight); and
- g) special Weight of soil (without disturbing the texture).

6.2.1.2 Condition and specification of chisel plough

- a) The source of supply draw power of Chisel plough;
- b) rated engine power (nominal) and draw power of tractor kilowatt (hp);
- c) setting adjustable parts of chisel plough;
- d) how to furrow on the farm land;
- e) speed of movement kilometer per hour or meter per second (km/hr or m/s);
- f) skill level of operator;