
Agricultural machinery — Safety —
Part 16:
Portable agricultural grain augers

Matériel agricole — Sécurité —

Partie 16: Tarières à grain agricoles portatives

STANDARDSISO.COM : Click to view the full PDF of ISO 4254-16:2018



STANDARDSISO.COM : Click to view the full PDF of ISO 4254-16:2018



COPYRIGHT PROTECTED DOCUMENT

© ISO 2018

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Safety requirements and/or protective/risk reduction measures	3
4.1 General	3
4.2 Rotating power component guarding and shielding	3
4.3 Fixed hopper flighting guarding	3
4.3.1 General	3
4.3.2 Grating-style guards	3
4.3.3 Baffle-style guards	3
4.4 Intake guarding	3
4.5 Lateral stability	4
4.6 Tube restraint	4
4.7 Winch	4
4.7.1 Winch drum	4
4.7.2 Hand winch	4
4.7.3 Electric winch	5
4.8 Wire ropes and cables	5
4.9 Pulleys	5
4.10 Hydraulic requirements	5
4.10.1 Hydraulic components and fittings	5
4.10.2 Hydraulic lifting systems	5
4.11 Transport on public roads	5
4.11.1 Lighting and marking	5
4.11.2 Speed indication sign	5
4.12 Electrical requirements	6
4.12.1 Electrical equipment	6
4.12.2 Grounding	6
5 Verification of the safety requirements and/or protective/risk reduction measures	6
6 Information for use	7
6.1 Operator's manual	7
6.1.1 General	7
6.2 Safety signs	8
6.2.1 General	8
6.2.2 Flighting hazard and modification or removal of the intake guard	8
6.2.3 Retractable intake guards	8
6.2.4 High pressure	8
6.2.5 Power line contact	9
6.2.6 Upending	9
6.2.7 Instructional signs	9
Annex A (informative) Example illustrations of portable agricultural grain conveying equipment	10
Annex B (informative) List of significant hazards	12
Bibliography	14

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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*, Subcommittee SC 3, *Safety and comfort*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

A list of all parts in the ISO 4254 series can be found on the ISO website.

Introduction

This document is a type-C standard as stated in ISO 12100.

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

- machine manufacturers (small, medium and large enterprises);
- health and safety bodies (regulators, accident prevention organisations, market surveillance, etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

- machine users/employers (small, medium and large enterprises);
- machine users/employees (e.g. trade unions, organizations for people with special needs);
- service providers, e.g. for maintenance (small, medium and large enterprises);
- consumers (in the case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this document.

The machinery and systems concerned and the extent to which hazards, hazardous situations or hazardous events are covered are indicated in the Scope of this document.

When requirements of this type-C standard are different from those which are stated in type-A or -B standards, the requirements of this type-C standard take precedence over the requirements of the other standards for machines that have been designed and built according to the requirements of this type-C standard.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this document. These hazards are specific to portable agricultural grain augers.

Significant hazards that are common to all the agricultural machines (self-propelled ride-on, mounted, semi-mounted and trailed) are dealt with in ISO 4254-1.

STANDARDSISO.COM : Click to view the full PDF of ISO 4254-16:2018

Agricultural machinery — Safety —

Part 16: Portable agricultural grain augers

1 Scope

This document, intended to be used together with ISO 4254-1, specifies the safety requirements and their verification for the design and construction of portable agricultural grain augers.

This document covers conventional and swing-away portable agricultural augers designed primarily for conveying agricultural materials on farms.

This document does not deal with the design or safety aspects of:

- drag augers;
- bin sweeps;
- other augers that do not have wheels suitable for towing.

NOTE Examples of covered equipment are shown in [Annex A](#).

When provisions of this document are different from those which are stated in ISO 4254-1, the provisions of this document take precedence over the provisions of ISO 4254-1 for machines that have been designed and built according to the provisions of this document.

This document, taken together with ISO 4254-1, deals with all the significant hazards (as listed in [Table 1](#)), hazardous situations and events relevant to portable agricultural grain augers, when they are used as intended and under the conditions foreseen by the manufacturer (see [Annex B](#)).

This document is not applicable to machines manufactured before the date of its publication.

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.

ISO 3600, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Operator's manuals — Content and format*

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

ISO 5673-1, *Agricultural tractors and machinery — Power take-off drive shafts and power-input connection — Part 1: General manufacturing and safety requirements*

ISO 11684, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Safety signs and hazard pictorials — General principles*

ISO 12100, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 13857:2008, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs*

ISO 16154, *Tractors and machinery for agriculture and forestry — Installation of lighting, light signalling and marking devices for travel on public roadways*

ISO 20383, *Tractors and machinery for agriculture and forestry — Speed Identification Sign (SIS)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12100, ISO 4254-1 and the following apply.

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

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

3.1

auger

conveyor with a screw-type flighting in a tubular enclosure, and its auxiliary accessories, designed to convey materials by rotating the flighting in relation to the enclosure and whose accessories include a suitable support system that provides mobility

3.1.1

conventional portable auger

auger (3.1) that has wheels suitable for towing and in which the intake and discharge are in line at opposite ends of a single tube

Note 1 to entry: See [Figure A.1](#).

3.1.2

swing-away portable auger

auger (3.1) with a powered hopper that swings to one or both sides to clear a driving lane through the normal operating position

Note 1 to entry: See [Figure A.2](#).

3.2

flighting

screw-type device rotating inside the *auger* (3.1) enclosure

Note 1 to entry: See [Figure 1](#), key 2.

3.3

hopper

device for receiving and directing material into a rotating intake flighting

3.3.1

fixed hopper

hopper (3.3) which is permanent fastened to or integrated into an auger or can be removed only by using a tool

3.4

intake

area where material to be conveyed enters a machine

4 Safety requirements and/or protective/risk reduction measures

4.1 General

4.1.1 Machinery shall comply with the safety requirements and/or protective/ risk reduction measures of this clause.

4.1.2 In addition, the machine shall be designed according to the principles of ISO 12100 for relevant but not significant hazards which are not dealt with by this document.

4.1.3 Except otherwise specified in this document, the machine shall be in accordance with ISO 4254-1 and with ISO 13857:2008, Tables 1, 3, 4 and 6.

4.2 Rotating power component guarding and shielding

Power take-off (PTO) shafts and their connecting points shall be guarded in accordance with ISO 5673-1.

4.3 Fixed hopper flighting guarding

4.3.1 General

Means shall be provided to guard against unintentional contact with the flighting.

4.3.2 Grating-style guards

The largest dimension of an opening in a grating-style guard shall be not greater than 121 mm. The area of such an opening shall be not greater than 6 450 mm² and not closer than 64 mm to the flighting.

4.3.3 Baffle-style guards

Slotted openings in baffle-style guards shall be not wider than 38 mm and not closer than 89 mm to the exposed flighting.

4.4 Intake guarding

4.4.1 The intake shall be guarded or otherwise designed to prevent accidental contact with the rotating flighting.

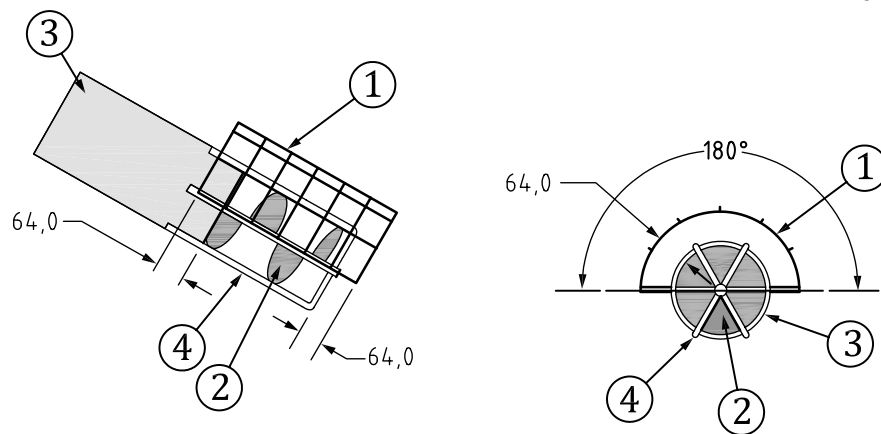
4.4.2 The guard (see [Figure 1](#)) shall cover the top 180° of the inlet area and extend a minimum of 64 mm above and below the exposed flighting.

4.4.3 The largest dimension of an opening in the guard for the free flow of material shall not be greater than 121 mm. The area of each opening shall be not greater than 6 450 mm².

4.4.4 The guard shall not be closer to the rotating flighting than 64 mm and of sufficient strength to support a 123 kg person without permanent deformation.

4.4.5 The guard may be of a fixed or retractable design. If retractable, it shall be connected to or secured to the machine (e.g. by hinges, slides, or cables).

Dimension in millimetres



Key

- 1 intake guard
- 2 flighting
- 3 flighting tube
- 4 bearing support rod

Figure 1 — Intake guarding

4.5 Lateral stability

The wheel tread width of an auger shall be sufficient to prevent static side tipping on slopes below 20° when the auger is in the lowest transport position.

4.6 Tube restraint

4.6.1 To avoid inadvertent separation, a positive restraint shall be provided between the auger tube and the undercarriage lifting arm.

4.6.2 Stops that restrict the maximum raised angle and minimum lowered angle shall be provided.

4.7 Winch

4.7.1 Winch drum

The diameter of the winch drum centre shall be not less than 10 times the wire rope diameter.

4.7.2 Hand winch

4.7.2.1 If equipped, a hand winch shall be provided with a control that holds the auger at any angle of inclination and respond only to handle actuation.

4.7.2.2 It shall not be necessary to disengage the control to lower the auger.

4.7.2.3 The force on the handle required to raise or lower the auger manually shall not exceed 222 N.

4.7.3 Electric winch

4.7.3.1 Electric winch controls shall be hold-to-run and conveniently located. The actuating switch or lever shall automatically return to the OFF mode when the operator releases it.

4.7.3.2 Overload protection shall be provided.

4.8 Wire ropes and cables

4.8.1 Wire ropes and cables shall be rust resistant and selected for the intended design load and service.

4.8.2 Wire ropes and cables (and their anchors) for lifting the auger tube into the raised operating position shall be designed with a safety factor (working load compared to breaking strength) of not less than five.

4.8.3 Wire ropes and cables (and their anchors) used as structural supports for the auger tube shall be designed with a safety factor (working load compared to breaking strength) of not less than three.

4.8.4 Wire rope fastening devices shall comply with the wire rope manufacturer's recommendations.

4.9 Pulleys

Wire rope lifting pulleys shall be grooved to fit the wire rope with which they are used. Their pitch diameter shall not be less than 10 times the wire rope diameter. A safety factor (working load to breaking strength) of not less than five shall be used for pulleys and pulley anchors.

4.10 Hydraulic requirements

4.10.1 Hydraulic components and fittings

For hydraulic components and fittings, the provisions of ISO 4254-1:2013, 4.13 apply.

4.10.2 Hydraulic lifting systems

Hydraulic lifting systems shall include a means to control the rate of descent of the auger or arrest the descent of the auger in the event of sudden hydraulic pressure release.

4.11 Transport on public roads

4.11.1 Lighting and marking

Equipment capable of being transported on public roads shall have lighting and marking in accordance with the applicable requirements of ISO 16154.

NOTE National or local requirements can apply.

4.11.2 Speed indication sign

When required by regional or local regulations, a speed identification sign (SIS) meeting the requirements of ISO 20383 shall be visible from the rear of the equipment.

4.12 Electrical requirements

4.12.1 Electrical equipment

For electrical equipment, the provisions of ISO 4254-1:2013, 4.12 apply.

4.12.2 Grounding

4.12.2.1 The path to ground from motors, controls, and electrical enclosures shall:

- be continuous;
- have ample carrying capacity to conduct safely any currents liable to be imposed on it;
- have impedance sufficiently low to limit the potential above ground and to facilitate operation of control and overcurrent devices in the circuit.

4.12.2.2 Where separable connectors are used, the grounding conductor shall be the first to make contact and the last to break contact.

5 Verification of the safety requirements and/or protective/risk reduction measures

Table 1 — List of safety requirements and/or protective/risk reduction measurements and their verification

Subclause	Inspection	Verification measurement	Test	Requirement
4.3.2		X		Largest dimension of an opening in a grating-style guard shall not be more than 121 mm. The area of such an opening shall not be greater than 6 450 mm ² and not closer than 64 mm to the fighting.
4.3.3		X		Slotted openings in baffle-type guards shall not be wider than 38 mm and not closer than 89 mm to the exposed fighting.
4.4.2		X		The guard shall cover the top 180° of the inlet area and extend a minimum of 64 mm above and below the exposed fighting.
4.4.3		X		The largest dimension of an opening in the guard for the free flow of material shall be not greater than 121 mm. The area of each opening shall be not greater than 6 450 mm ² .
4.4.4		X	X	Guard shall not be closer to the rotating fighting than 64 mm and of sufficient strength to support a 123 kg person without permanent deformation.
4.5			X	Wheel tread width of an auger shall be sufficient to prevent static side tipping on slopes below 20° when the auger is in the lowest transport position.
4.7.1		X		Diameter of the winch drum centre shall be not less than 10 times the wire rope diameter.
4.7.2.1			X	If equipped, a hand winch shall be provided with a control that holds the auger at any angle of inclination and respond only to handle actuation.
4.7.2.3			X	The force on the handle required to raise or lower the auger manually shall not exceed 222 N.

Table 1 (continued)

Subclause	Inspection	Verification measurement	Test	Requirement
4.7.3.1			X	Electric winch controls shall be hold-to-run and conveniently located. The actuating switch or lever shall automatically return to the OFF mode when the operator releases it.
4.8.1	X	X		Check wire ropes and cables specifications and verify that they have sufficient strength for the intended design load.
4.8.2		X	X	Compare working load and breaking strength of wire ropes and cables used for lifting auger. Safety factor not less than 5.
4.8.3		X	X	Compare working load and breaking strength of wire ropes and cables used as structural supports for auger. Safety factor not less than 3.
4.8.4	X	X		Inspect fastening devices to verify conformance with wire rope manufacturer's recommendations.
4.9		X	X	Pitch diameter not less than 10 times the wire rope diameter and safety factor for pulleys and pulley anchors not less than 5.
4.12.2.1		X	X	Verify continuity of the electrical path from the motors, controls, and enclosures to the ground and check cable specifications.

6 Information for use

6.1 Operator's manual

6.1.1 General

6.1.1.1 An operator's manual shall be provided. The content and presentation of the operator's manual shall be in accordance with the requirements of ISO 3600.

6.1.1.2 Comprehensive instructions and information on all aspects of the safe use of the machine, including suitable clothing and personal protective equipment requirements and the need for training, if necessary, shall be provided by the manufacturer in the operator's manual.

6.1.1.3 The operator's manual shall include, as a minimum, the following:

- information relating to transport, handling and storage of the machine;
- information relating to installation and commissioning of the machine;
- information relating to the machine itself;
- information relating to the use of the machine;
- information for maintenance;
- information relating to de-commissioning, dismantling and disposal;
- information for emergency situations;
- maintenance instructions provided for skilled persons and those provided for unskilled persons, which should be kept clearly separated from each other;

- i) a suitable safety message warning of the hazard of contact with overhead power lines.

6.1.1.4 The information and items given in ISO 4254-1:2013, 8.2 also apply.

6.2 Safety signs

6.2.1 General

One or more safety signs shall be provided to alert the operator of the equipment and others to the risk of injury during normal operation and servicing. Such signs shall meet the requirements of ISO 11684 and include, as applicable, the following instructions.

- a) Read and understand the manuals before moving, operating, or maintaining the machine.
- b) Ensure that all safety shields and devices are in place and in good condition before operating the machine.
- c) Ensure that everyone is clear before moving, operating, or maintaining the machine.
- d) Keep hands, feet, and clothing away from moving parts.
- e) Shut off power before cleaning or maintaining the machine.
- f) Shut off power before resetting motor overload.
- g) Empty auger before moving to prevent it from upending. (See [6.2.6](#).)
- h) Lower auger to transport position before transporting.
- i) Ensure that electric motors are grounded.
- j) Follow the grain storage structure manufacturer's warnings when unloading with this auger.

6.2.2 Flighting hazard and modification or removal of the intake guard

One or more safety signs shall be provided to identify a rotating flighting hazard and warn against modification or removal of the intake guard.

6.2.3 Retractable intake guards

Portable augers with a retractable intake guard shall have a safety sign that includes, as applicable, the following instructions.

- a) When operating with a retractable guard, additional safety procedures should be taken, including immediate replacement of the intake guard after operation.
- b) Lock the retractable guard in the closed position before using the auger outside of a grain storage structure.
- c) Do not operate the auger when someone is in the grain storage structure.
- d) Perform lockout procedures before entering the grain storage structure.

6.2.4 High pressure

A safety sign shall be provided to identify the possible hazards of high-pressure hydraulic fluid escaping from connectors and pinhole leaks and the safe and proper way to check for such leaks.

6.2.5 Power line contact

On portable agricultural augers that exceed 4 m height during any mode of operation, transport, or preparation for transport, a safety sign shall be provided to identify the possible hazards of overhead power line contact or near contact.

6.2.6 Upending

If required, safety sign shall be provided to identify the possibility of upending during operation, transport, or preparation for transport and the need to support the discharge end or anchor intake end to prevent upending.

6.2.7 Instructional signs

Instructional signs not related to safety should use signal words such as IMPORTANT, NOTICE, or INSTRUCTIONS but not include the safety alert symbols. Their appearance should be noticeably different from that of safety signs.

Annex A **(informative)**

Example illustrations of portable agricultural grain conveying equipment

A.1 Conventional portable auger

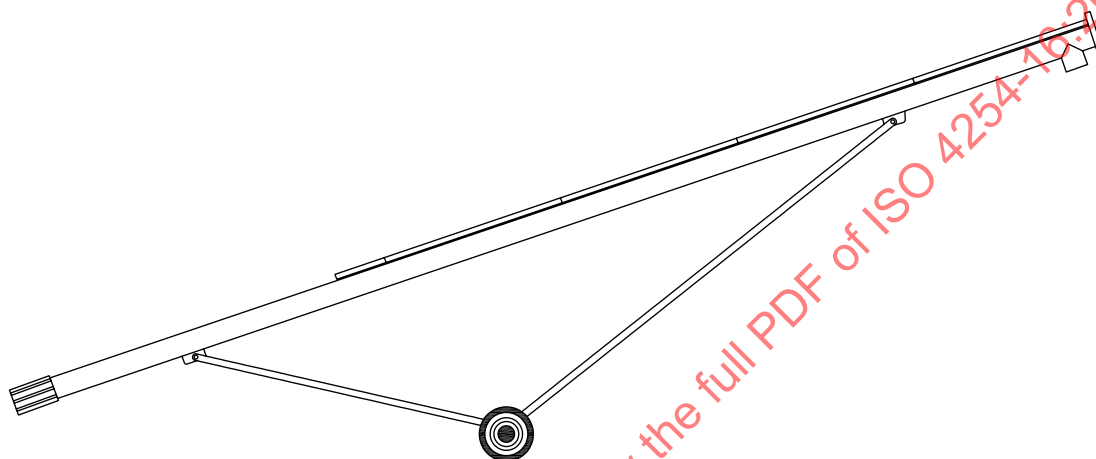


Figure A.1 — Conventional portable auger

A.2 Swing-away portable auger

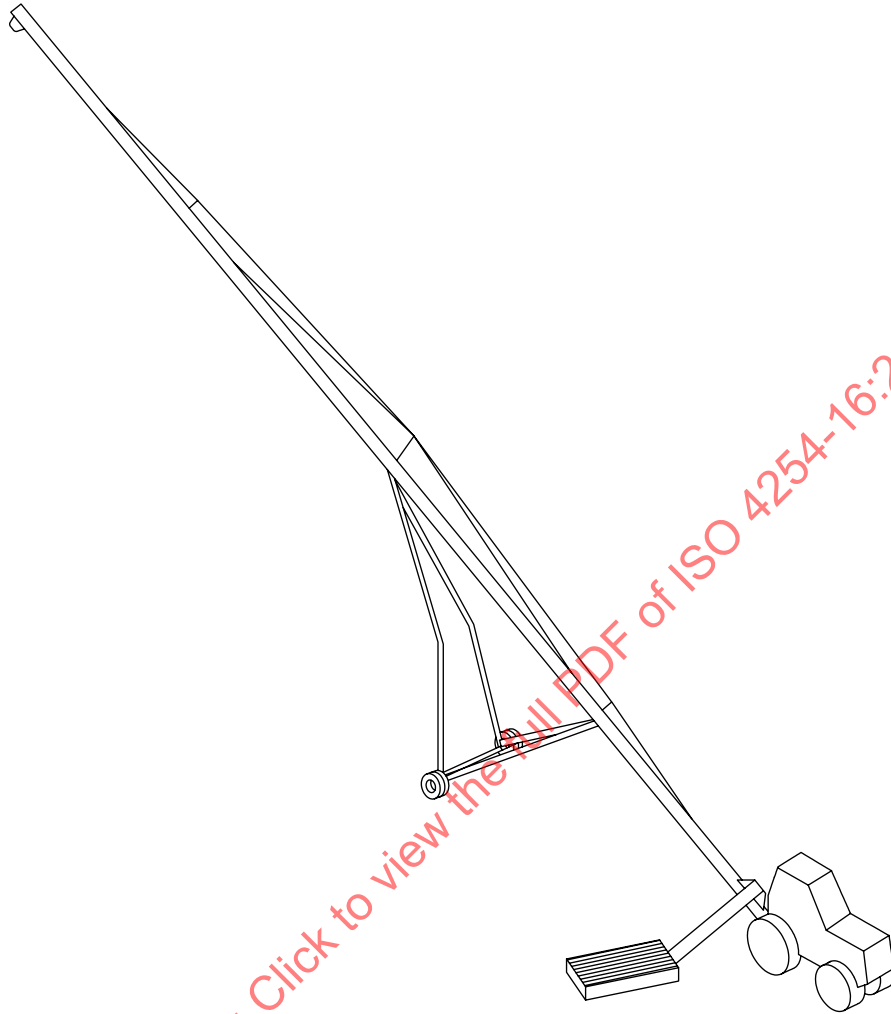


Figure A.2 — Swing-away portable auger