INTERNATIONAL STANDARD

ISO 12003-1

Third edition
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Tractors for agriculture and forestry — Roll-over protective structures on narrow tractors —

Part 1: Front-mounted ROPS

Tracteurs agricoles et forestiers — Structures de protection contre le retournement (ROPS) pour tracteurs à voie étroite —

Partie 1: ROPS montées à l'avant

Reference number
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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 2, *Common tests*.

This third edition cancels and replaces the second edition (ISO 12003-1:2008), which has been technically revised.

The main changes compared to the previous edition are as follows:

— the main title has been changed, referencing type of tractor, from “Agricultural and forestry tractors” to “Tractors for agriculture and forestry”;

— seat anchorage test procedures of OECD in ISO 12003 have been added as optional testing;

— ergonomic folding ROPS test procedures of OECD in ISO 12003 have been added as optional testing;

— definitions for unballasted mass, plane, track width, maximum permissible mass have been added;

— tractor mass limits for unballasted tractor has been specified;

— permitted mass ratio has been specified (1,75);

— reference mass limits have been added;

— tractor lashings method of lashing has been changed;

— seat position during test has been updated to include seats with adjustable backrest;

— clearance zone has been updated for clarity and information for reversible seat has been added;

— Figure 17 has been updated to be harmonize with OECD Code 6; specifically, a new key “g” has been added to indicate failure at any stage when load drops below $0{,}8F_{max}$;

— cold weather embrittlement test has been added;

— reversible seat operator seat zones and formulae have been updated to be harmonized with OECD Code 6;

— non-continuous rolling test methods has been added.

A list of all parts in the ISO 12003 series can be found on the ISO website.

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.

Introduction

Testing of roll-over protective structures (ROPS) for narrow tractors for agriculture and forestry intends to minimize the likelihood of driver injury resulting from accidental overturning during normal operation (e.g. field work) of the tractor. The strength of the front-mounted ROPS is tested by applying either static or dynamic (impact) loads to simulate actual loads which may be imposed on the front-mounted ROPS when the tractor overturns either to the rear or to the side without free fall. The tests allow observations to be made on the strength of the front-mounted ROPS and the attachment brackets to the tractor and also of the tractor parts that may be affected by the load imposed on the front-mounted ROPS. This document includes optional testing for seat anchorage points and folding efforts of front-mounted roll-over protective structure designed to fold.

Tests made using special rigs are intended to simulate such loads as are imposed on a protective structure, when the tractor overturns. These tests enable observations to be made on the strength of the protective structure and any brackets attaching it to the tractor and any parts of the tractor which transmit the test load.

Provision is made to cover both tractors with the conventional forward-facing driving position only and those with a reversible driving position, which is in agreement with the relevant OECD test code practice (see Reference [4]). For tractors with a reversible driving position, a clearance zone is defined to be the combined clearance zones for the two driving positions.

It is recognized that there can be designs of tractors, such as lawn-mowers, and certain forestry machines such as forwarders, for which this document is not appropriate.

NOTE For regular tractors, see ISO 3463[2] (dynamic test) and ISO 5700[3] (static test).

Tractors for agriculture and forestry — Roll-over protective structures on narrow tractors —

Part 1: Front-mounted ROPS

1 Scope

This document specifies procedures for both the static and dynamic strength testing of roll-over protective structures (ROPS) front-mounted on narrow tractors. It defines the clearance zone and acceptance conditions for rigid or tiltable, front, two-post ROPS, including any associated rear fixtures, and is applicable to tractors so equipped having the following characteristics:

— a ground clearance of not more than 600 mm beneath the lowest points of the front- and rear-axle housings (not considering lower points on the axle differential);

— a fixed or adjustable minimum track width of one of the two axles of less than 1 150 mm;

NOTE It is understood that the axle mounted with the wider tyres is set at a track width of not more than 1 150 mm. Tyre track width is adjustable so that the outer edges of the narrower tyres do not extend beyond the outer edges of the tyres of the other axle. Where the two axles are fitted with rims and tyres of the same size, the fixed or adjustable track width of the two axles is less than 1 150 mm.

— a mass greater than 400 kg but less than 3 500 kg, unballasted, including the ROPS and tyres of the largest size recommended by the manufacturer;

— fitted with roll-over protective structures of the dual-pillar type mounted only in front of the seat index point (SIP) and characterised by a reduced clearance zone attributable to the tractor silhouette.

This document also specifies optional testing procedures for both seat anchorage points and folding efforts of front-mounted ROPS designed to fold.

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 630-1, *Structural steels — Part 1: General technical delivery conditions for hot-rolled products*

ISO 630-2, *Structural steels — Part 2: Technical delivery conditions for structural steels for general purposes*

ISO 630-3, *Structural steels — Part 3: Technical delivery conditions for fine-grain structural steels*

ISO 630-4, *Structural steels — Part 4: Technical delivery conditions for high yield strength quenched and tempered structural steel plates and wide flats*

ISO 2408, *Steel wire ropes — Requirements*

ISO 3776-2, *Tractors and machinery for agriculture — Seat belts — Part 2: Anchorage strength requirements*

ISO 5353, *Earth-moving machinery, and tractors and machinery for agriculture and forestry — Seat index point*

ISO 12934, *Tractors and machinery for agriculture and forestry — Basic types — Vocabulary*

ISO 13854:2017, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

ISO 80000-1, *Quantities and units — Part 1: General*

ASTM A370, *Standard Test Methods and Definitions for Mechanical Testing of Steel Products*

ASAE[1)] S313, *Soil Cone Penetrometer*

ASAE[1)] EP542, *Procedures for Using and Reporting Data Obtained with the Soil Cone Penetrometer*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12934 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 https://www.electropedia.org/

3.1
roll-over protective structure
ROPS
framework protecting drivers of agricultural tractors, which minimizes the likelihood of driver injury resulting from accidental overturning during normal field work

Note 1 to entry: The ROPS is characterized by the provision of space for a clearance zone, either inside the envelope of the structure or within a space bounded by a series of straight lines from the outer edges of the structure to any part of the tractor that might come into contact with the ground; it is capable of supporting the tractor in an overturned position.

3.2
front-mounted ROPS
two-post *roll-over protective structure* (3.1) mounted on the tractor in front of the driver and with a reduced clearance zone

Note 1 to entry: Compare with rear-mounted ROPS described in ISO 12003-2.

3.3
unballasted mass
mass of the tractor in working order with tanks and radiators full, *roll-over protective structure* (3.1) with cladding and any track equipment or additional front-wheel drive components required for normal use

Note 1 to entry: Not included are the operator, optional ballast weights, additional wheel equipment, special equipment and loads.

[SOURCE: ISO 5700:2013, 3.2]

3.4
maximum permissible mass
m_{max}
maximum mass of the tractor stated by the manufacturer to be technically permissible and declared on the vehicle's identification plate and/or in the operator's handbook

1) American Society of Agricultural Engineers, now known as American Society of Agricultural and Biological Engineers.