

This is a preview of "ISO 12003-1:2021". [Click here to purchase the full version from the ANSI store.](#)

Third edition  
2021-06

---

---

# 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  
ISO 12003-1:2021(E)

© ISO 2021

This is a preview of "ISO 12003-1:2021". Click [here](#) to purchase the full version from the ANSI store.



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2021

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  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

This is a preview of "ISO 12003-1:2021". Click here to purchase the full version from the ANSI store.

## Contents

	Page
<b>Foreword</b> .....	<b>v</b>
<b>Introduction</b> .....	<b>vii</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>2</b>
<b>4 Symbols</b> .....	<b>6</b>
<b>5 Test apparatus and equipment</b> .....	<b>7</b>
5.1 Apparatus for both dynamic and static testing.....	7
5.1.1 Clearance zone framework.....	7
5.1.2 Apparatus for crushing tests.....	7
5.1.3 Rear hard fixture test rig.....	8
5.2 Apparatus for dynamic testing.....	9
5.2.1 Device to strike a blow against the front-mounted ROPS.....	9
5.2.2 Pendulum supports.....	10
5.2.3 Means of lashing the tractor to the ground.....	10
5.2.4 Wheel beam.....	11
5.2.5 Wheel prop.....	11
5.2.6 Props and lashings for articulated tractors.....	13
5.2.7 Tyre pressures and deflection.....	13
5.2.8 Device to measure elastic deflection.....	13
5.3 Apparatus for static testing.....	14
<b>6 Preparation of tractor and ROPS for testing</b> .....	<b>15</b>
<b>7 ROPS deflection preliminary tests</b> .....	<b>16</b>
7.1 General requirements.....	16
7.2 Lateral stability test.....	16
7.3 Non-continuous rolling test.....	17
7.3.1 General.....	17
7.3.2 Demonstration of non-continuous rolling behaviour by means of the overturning test.....	17
7.3.3 Demonstration of non-continuous rolling behaviour by calculation.....	18
<b>8 ROPS deflection test procedures</b> .....	<b>18</b>
8.1 General requirements.....	18
8.2 Test methods.....	18
8.3 Test sequence.....	18
8.4 Rear fixture test procedure.....	19
8.5 Dynamic (impact) test procedures for front-mounted ROPS.....	19
8.5.1 Rear impact test procedure.....	19
8.5.2 Front impact test procedure.....	20
8.5.3 Side impact test procedure.....	21
8.5.4 Additional impact tests.....	22
8.6 Static test procedures for front-mounted ROPS.....	22
8.6.1 Test preparation.....	22
8.6.2 General requirements for horizontal loading test procedures.....	23
8.6.3 Rear loading.....	23
8.6.4 Front loading.....	23
8.6.5 Side loading.....	24
8.7 Vertical crushing test procedure.....	24
8.8 Additional vertical crushing tests.....	24
8.9 Observations during testing.....	24
8.9.1 Fractures and cracks.....	24
8.9.2 Clearance zone.....	24

This is a preview of "ISO 12003-1:2021". [Click here to purchase the full version from the ANSI store.](#)

8.9.3	Recording permanent deflection.....	25
<b>9</b>	<b>Determination of seat index point (SIP), seat location and adjustment for test.....</b>	<b>25</b>
9.1	General.....	25
9.2	Seat location and adjustment for tests.....	25
<b>10</b>	<b>Clearance zone.....</b>	<b>25</b>
10.1	General.....	25
10.2	Clearance zone for tractors with a non-reversible seat.....	25
10.3	Clearance zone for tractors with a reversible driving position.....	27
10.4	Optional seats.....	28
<b>11</b>	<b>Tolerances.....</b>	<b>28</b>
<b>12</b>	<b>Acceptance conditions.....</b>	<b>29</b>
12.1	General.....	29
12.2	Clearance zone.....	29
12.3	Seat anchorage performance.....	29
12.4	Folding ROPS performance.....	29
12.5	After impact loads.....	29
12.6	After static horizontal loads.....	30
12.7	Additional conditions.....	30
12.8	Cold weather embrittlement.....	33
<b>13</b>	<b>Seatbelt anchorage test procedures.....</b>	<b>33</b>
<b>14</b>	<b>Folding ROPS.....</b>	<b>33</b>
<b>15</b>	<b>Labelling.....</b>	<b>34</b>
<b>16</b>	<b>Extension to other models.....</b>	<b>34</b>
16.1	Administrative extension.....	34
16.2	Technical extension.....	34
16.2.1	General.....	34
16.2.2	Extension of the structural test results to other models of tractors.....	35
16.2.3	Extension of the structural test results to modified models of the protective structure.....	35
16.2.4	Type extension limits.....	35
16.2.5	Increase of the declared reference mass.....	36
<b>17</b>	<b>Test report.....</b>	<b>36</b>
<b>Annex A (normative) Requirements for providing resistance to brittle fracture of front-mounted ROPS at a reduced operation temperature.....</b>		<b>37</b>
<b>Annex B (informative) Folding ROPS test procedures.....</b>		<b>39</b>
<b>Annex C (normative) Test report for front-mounted ROPS.....</b>		<b>47</b>
<b>Annex D (normative) Non-continuous rolling test procedure — Calculation method.....</b>		<b>57</b>
<b>Bibliography.....</b>		<b>61</b>

This is a preview of "ISO 12003-1:2021". Click here to purchase the full version from the ANSI store.

## 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](http://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](http://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](http://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;

## ISO 12003-1:2021(E)

This is a preview of "ISO 12003-1:2021". [Click here to purchase the full version from the ANSI store.](#)

- 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](http://www.iso.org/members.html).

This is a preview of "ISO 12003-1:2021". [Click here to purchase the full version from the ANSI store.](#)

## 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<sup>[2]</sup> (dynamic test) and ISO 5700<sup>[3]</sup> (static test).