INTERNATIONAL STANDARD

ISO 15003

Second edition
2019-11

Agricultural engineering — Electrical and electronic equipment — Testing resistance to environmental conditions

Génie agricole — Matériel électrique et électronique — Essais de résistance aux conditions environnementales

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 15003:2019
https://standards.iteh.ai/catalog/standards/sist/d4f633ff-7133-4a19-ae77-53259c0d703f/iso-15003-2019

Reference number
ISO 15003:2019(E)

© ISO 2019

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 15003:2019
https://standards.iteh.ai/catalog/standards/sist/d4f633ff-7133-4a19-ae77-53259c0d703f/iso-15003-2019

COPYRIGHT PROTECTED DOCUMENT

© ISO 2019

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

© ISO 2019 – All rights reserved

Contents

Page

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 15003:2019
https://standards.iteh.ai/catalog/standards/sist/d4f633ff-7133-4a19-ae77-99239c0d795f/iso-15003-2019

© ISO 2019 – All rights reserved

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 15003:2019
https://standards.iteh.ai/catalog/standards/sist/d4f633ff-7133-4a19-ae77-53259c0d703f/iso-15003-2019

© ISO 2019 – All rights reserved

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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

This document was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 19, *Agricultural electronics*.

ISO 15003:2019
https://standards.iteh.ai/catalog/standards/sist/d4f633ff-7133-4a19-ae77-

This second edition cancels and replaces the first edition (ISO 15003:2006), which has been technically revised.

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

— integration of editorial corrections;

— updates to the list of normative references and guidance on the application of the normative references;

— removal of the dates of the normative references;

— correction in the Bibliography.

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.

© ISO 2019 – All rights reserved

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 15003:2019
https://standards.iteh.ai/catalog/standards/sist/d4f633ff-7133-4a19-ae77-53259c0d703f/iso-15003-2019

Agricultural engineering — Electrical and electronic equipment — Testing resistance to environmental conditions

1 Scope

This document provides design requirements and guidance for the manufacturers of electrical and electronic equipment for use in all kinds of mobile (including hand-held) agricultural machinery, forestry machinery, landscaping and gardening machinery [referred to hereafter as machine(s)]. The term machinery covers tractors and implements. This document gives tests for specific environmental conditions and defines severity levels for tests which relate to the environmental extremes that can be experienced in practical operation of the equipment.

This document is intended to be used in determining the suitability of the equipment of these machines, for use in a specified range of environmental conditions.

NOTE The severity levels given are general guidelines and not guaranteed worst-case exposure levels.

2 Normative references

iTeh STANDARD PREVIEW
(standards.iteh.ai)

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 15003:2019
https://standards.iteh.ai/catalog/standards/sist/...
53259c0d703f/iso-15003-2019

ISO 14982, *Agricultural and forestry machinery — Electromagnetic compatibility — Test methods and acceptance criteria*

ISO 16750 (all parts), *Road vehicles — Environmental conditions and testing for electrical and electronic equipment*

IEC 60068-1:2013, *Environmental testing — Part 1: General and guidance*

IEC 60068-2-5:2018, *Basic environmental testing procedures — Part 2: Tests — Test Sa: Simulated solar radiation at ground level*

IEC 60068-2-6, *Environmental testing — Part 2: Tests — Test Fc: Vibration (sinusoidal)*

IEC 60068-2-11, *Basic environmental testing procedures — Part 2: Tests — Test Ka: Salt mist*

IEC 60068-2-13, *Basic environmental testing procedures — Part 2: Tests — Test M: Low air pressure*

IEC 60068-2-14, *Basic environmental testing procedure — Part 2: Tests — Test N: Change of temperature*

IEC 60068-2-27, *Basic environmental testing procedures — Part 2: Tests — Test Ea and guidance: Shock*

IEC 60068-2-30, *Basic environmental testing procedures — Part 2: Tests — Test Db and guidance: Damp heat, cyclic (12 + 12-hour cycle)*

IEC 60068-2-47, *Environmental testing — Part 2: Tests — Mounting of specimens to vibration, impact and similar dynamic tests*

IEC 60068-2-64, *Environmental testing — Part 2: Test methods — Test Fh: Vibration, broad-band random (digital control) and guidance*

IEC 60068-2-78, *Environmental testing — Part 2-78: Tests — Test Cab: Damp heat, steady state*

IEC 60512-1, *Connectors for electronic equipment — Tests and measurement — Part 1: General*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

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:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
display device
device displaying alpha-numeric characters or graphical symbols designed to be read and interacted with by operative or service personnel to adjust and control operation of *equipment* (3.2)

3.2
equipment
self-contained electronic system containing electric, electronic and mechanical components which is electrically connected to other machinery (including power sources) by means of connectors

3.3
impaired function
state in which one or more of the functions of the *equipment* (3.2) as stated by the manufacturer are not operative or do not conform to the manufacturer's specification

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 15003:2019
https://standards.iteh.ai/catalog/standards/sist/d4f633ff-7133-4a19-ae77-53259c0d7031/iso-15003-2019

3.4
location
position within machines where the *equipment* (3.2) will normally be operating

3.5
normal mounting configuration
orientation of the *equipment* (3.2) when in normal use

3.6
severity level
severity of the conditions under which an environmental test is undertaken, selected according to the intended *location* (3.4) and application of the *equipment* (3.2)

4 General

4.1 General conditions for testing

Except where otherwise specified for a test, testing shall be carried out under standard reference conditions as specified in IEC 60068-1:2013, Section 4. The severity levels used shall be recorded in the test report. Tests shall be conducted in accordance with IEC 60512-1.

It is desirable to use the same sample of equipment in all tests unless specified otherwise for a test.

It is recommended that a functionality check be done before and after each test and that functionality be monitored during a test when practical.

Combined testing is advisable in cases where equipment is subjected in use to extremes of two or more different environmental factors simultaneously (e.g. temperature and vibration) and recorded as such on the test report.

NOTE Combined testing can be used as a means of reducing overall test time.

© ISO 2019 – All rights reserved

4.2 Test sequence

The electromagnetic compatibility tests shall be carried out last, since electromagnetic emissions and susceptibility can be affected by prior exposure to other tests. The test sequence shall be recorded in the test report.

The tests should be carried out in progressively increasing order of severity.

4.3 Test report

The test report shall, as a minimum, include the following information:

— description of the equipment;

— model number or other identification;

— manufacturer's name and address;

— test lab's name and address;

— test date(s);

— tests to be conducted;

— test equipment used/calibration status and test set up information;

— the order in which the tests were conducted;

— duration of each individual test conducted;

— severity level used for testing;

— test results;

— any additional details regarding the test.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 15003:2019
https://standards.iteh.ai/catalog/standards/sist/d4f633ff-7133-4a19-ae77-53259c0d703f/iso-15003-2019

An example test report is given in Annex A.

4.4 ISO 16750 conformance

Electrical and electronic equipment in accordance with ISO 16750 requirements that correspond to the requirements of this document conforms with this document. Annex C provides a summary of the ISO 16750 parts that contain similar test procedures as specified in this document. It provides a cross reference to assist in the determination whether an electrical and electronic equipment tested in accordance with the relevant part of ISO 16750 meets the requirements of this document or requires additional testing.

5 Tests

5.1 Monitoring for impaired function

Where equipment is to be monitored for impaired function during or after a test, the equipment shall be connected to power and signal input and output lines in accordance with the manufacturer's instructions.

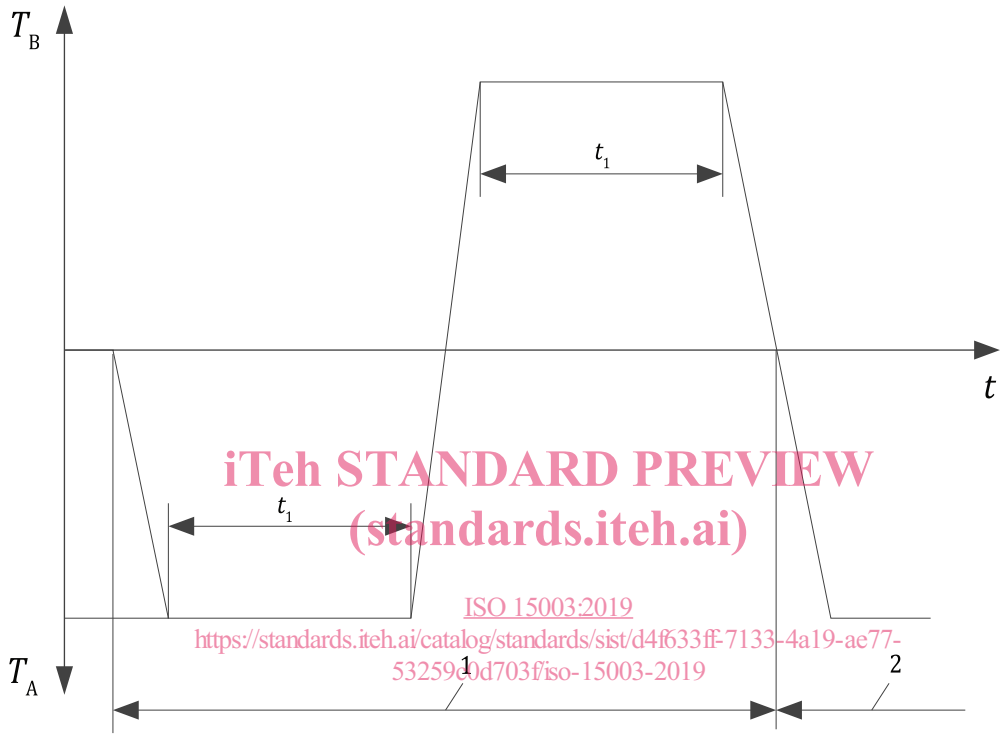
© ISO 2019 – All rights reserved

5.2 Cold and dry heat

5.2.1 Changes of temperature with specified rate of change

5.2.1.1 Test method

A cold and dry heat test shall be conducted in accordance with IEC 60068-2-14, Test Nb, with the exception that testing may be done using one test chamber. The temperature cycle is shown in Figure 1. The steady-state time shall be 3 h; the transition times shall be adjusted to yield three cycles in 24 h.



iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 15003:2019
https://standards.iteh.ai/catalog/standards/sist/d4f633ff-7133-4a19-ae77-5325900d703f/iso-15003-2019

Key

T_A minimum temperature
T_B maximum temperature
t time
t_1 steady-state time = 3 h
1 first cycle
2 second cycle

Figure 1 — Temperature cycle for cold and dry heat test

© ISO 2019 – All rights reserved

5.2.1.2 Test limits

See Table 1.

Table 1 — Test levels for temperatures

Level	T_A °C	T_B °C
1	0	70
2	−20	70
3	−40	85
4	−40	105
5	−40	125
Refer to B.2 for examples of severity levels.		

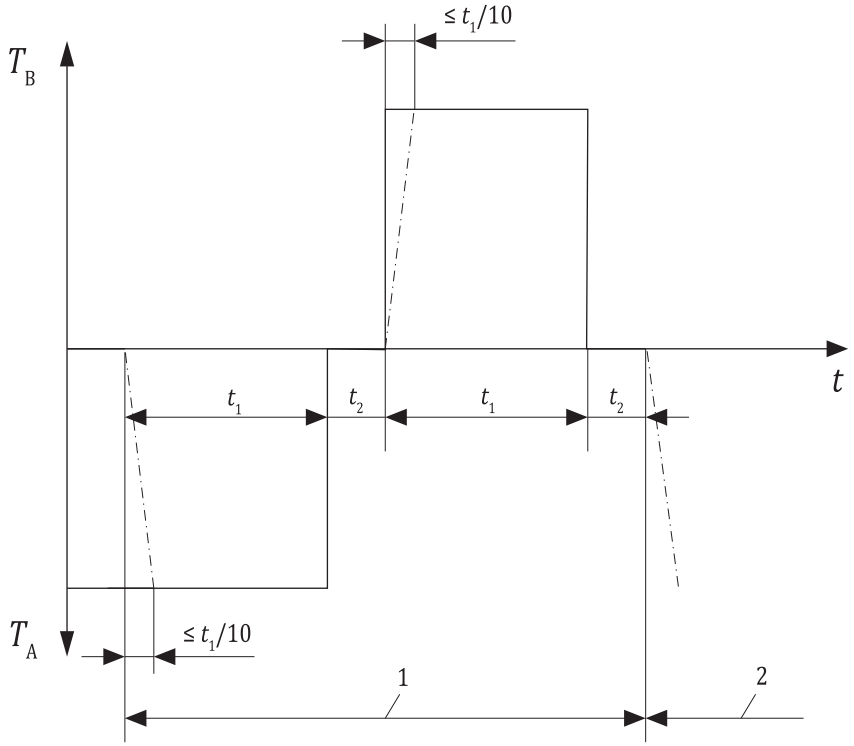
5.2.2 Temperature shock

5.2.2.1 Test method

The temperature shock test shall be conducted in accordance with IEC 60068-2-14, Test Na, with the cycle shown in Figure 2. The steady-state time t_1 shall be 0,5 h, and the transition time $t_2 \leq 1$ min; the number of cycles shall be 10.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 15003:2019
https://standards.iteh.ai/catalog/standards/sist/d4f633ff-7133-4a19-ae77-53259c0d703f/iso-15003-2019

© ISO 2019 – All rights reserved



Key

T_A minimum temperature
T_B maximum temperature
t time
t_1 steady-state time = 0,5 h
t_2 transition time ≤ 1 min
1 first cycle
2 second cycle

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 15003:2019
https://standards.iteh.ai/catalog/standards/sist/d4f633ff-7133-4a19-ae77-53259c0d703f/iso-15003-2019

Figure 2 — Cycle for temperature shock test

5.2.2.2 Test limits

See Table 2.

Table 2 — Test levels for temperatures

Level	T_A °C	T_B °C
1	0	70
2	−20	70
3	−40	85
4	−40	105
5	−40	125
Refer to B.2 for examples of severity levels.		

© ISO 2019 – All rights reserved