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Radiofrequency identification of animals —

Part 2: Evaluation of conformance of RFID transceivers with ISO 11784 and ISO 11785

Identification des animaux par radiofréquence —
Partie 2: Évaluation de la conformité des émetteurs-récepteurs RFID à l'ISO 11784 et à l'ISO 11785

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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 on 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 the following URL: 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 19, *Agricultural electronics*.

This second edition cancels and replaces the first edition (ISO 24631-2:2009), which has been technically revised.

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

— a check has been included that the reading of the manufacturer/country code and the identification code is not affected by the RUDI bit (see 7.3).

A list of all parts in the ISO 24631 series can be found on the ISO website.

Introduction

ISO has appointed a registration authority (RA) competent to register manufacturer codes used in the radiofrequency identification (RFID) of animals in accordance with ISO 11784 and ISO 11785.

The registration authority for ISO 11784 and ISO 11785 can found under http://www.iso.org/iso/home/standards_development/list_of_iso_technical_committees/maintenance_agencies.htm.

This document deals with the conformance of RFID transceivers.

Radiofrequency identification of animals —

Part 2:
Evaluation of conformance of RFID transceivers with ISO 11784 and ISO 11785

1 Scope

This document provides the means of evaluating the conformance with ISO 11784 and ISO 11785 of radiofrequency identification (RFID) transceivers used in the individual identification of animals. It also specifies the procedure for applying for a transceiver test registration and the associated rights and obligations of the parties involved.

This document includes a wireless synchronization test applicable to mobile transceivers; however, it contains no provision for evaluating the wired synchronization of stationary transceivers.

The test procedures specified in this document are recognized by the Federation of European Companion Animals Veterinary Association (FECAVA) and World Small Animal Veterinarian Association (WSAVA) and, as such, can be applied also to companion animals.

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 11784, *Radio frequency identification of animals — Code structure*

ISO 11785:1996, *Radio frequency identification of animals — Technical concept*

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 http://www.iso.org/obp

3.1
accreditation
third-party attestation related to a conformity assessment body conveying formal demonstration of its competence to carry out specific conformity assessment tasks

[SOURCE: ISO/IEC 17000:2004, 5.6]

3.2
registration reference number
number issued to the *manufacturer* (3.6) of a registered *transceiver* (3.12) by the *registration authority* (3.11)

EXAMPLE ISO 24631-2 2017-02-001

Note 1 to entry: It comprises the reference of the International Standard for which registration is made, the year of issue (4 digits), the type of device tested ("02" for transceivers according to this document) and the running number (3 digits) referencing the transceivers tested successfully during that year.

3.3
country code
three-digit numeric code representing a country in accordance with ISO 3166-1

3.4
ISO 11784 and ISO 11785 transceiver
transceiver (3.12) that reads at least both FDX-B and HDX transponders as defined in ISO 11784 and ISO 11785

3.5
ISO 11784 and ISO 11785 transponder
radiofrequency identification (RFID) device that transmits its *transponder code* (3.14) according to ISO 11784 and ISO 11785 when activated by a *transceiver* (3.12)

3.6
manufacturer
company that submits an application for testing *transceivers* (3.12) for conformance with ISO 11784 and ISO 11785

3.7
manufacturer code
MFC
three-digit number granted by the RA to a *manufacturer* (3.6) under the conditions set forth in ISO 24631-1:2017, Annex E, whose range and placement within the code structure are in accordance with ISO 11784

Note 1 to entry: Only one manufacturer code is granted to the same manufacturer.

3.8
RA-recognized test centre
accredited test centre meeting the criteria of the *registration authority* (3.11)

3.9
RA-registered transponder
transponder (3.13) registered by the *registration authority* (3.11)

3.10
reference transponder
transponder (3.13) used to test a *transceiver* (3.12), selected from the different *RA-registered transponder* (3.9) types

3.11
registration authority
RA
entity that approves test laboratories and issues and registers *manufacturer* (3.7) and product codes

3.12
transceiver
device used to communicate with the *transponder* (3.13)

3.13
transponder
radiofrequency identification (RFID) device that transmits its stored information when activated by a *transceiver* (3.12) and that may be able to store new information

Note 1 to entry: See ISO 24631-1 for definitions of the main types.

3.14
transponder code
code programmed in the *transponder* (3.13), as defined in ISO 11784 and in ISO 11785

4 Conformance

The procedure in this document includes option of RA registration of transceiver equipment, the procedures in this document shall be followed if a company wants RA registration of a transceiver.

Test centres recognized by the registration authority (RA) shall perform transceiver testing using the procedures specified in Clause 7 and shall report the test results to the RA. These tests are in accordance with the technical requirements of ISO 11784 and ISO 11785. The manufacturer shall apply for transceiver testing by completing and submitting to the RA the application form provided in Annex A. Registration of the transceiver product depends on it having passed the tests in Clause 7. A registration reference number is issued to a transceiver that is registered by the RA. The conditions attached to use of this registration by the manufacturer are laid down in Annex B.

5 Abbreviated terms

CRC cyclic redundancy check

FDX-B full duplex communication protocol (conforming to ISO 11785, excluding the protocols mentioned in ISO 11785:1996, Annex A)

HDX half duplex communication protocol

MFC manufacturer code

RA registration authority

RF radio frequency

RFID radiofrequency identification

6 Application

6.1 The manufacturer may apply for a conformance test for an ISO 11784 and ISO 11785 transceiver.

6.2 The application submitted to the RA shall consist of a covering letter together with the application form presented in Annex A. The RA shall confirm receipt of the application to the manufacturer within 2 weeks. By signing the application form, the manufacturer agrees to fulfil the provisions of this document.

6.3 Test centres that are ISO/IEC 17025-accredited for the measurements defined in this document can be recognized by the RA.

6.4 The RA maintains a list of recognized test centres, from which the manufacturer may choose the centre that will test his transceiver product.

6.5 The manufacturer shall send a transceiver and all necessary accessories to the RA-recognized test centre. The manufacturer shall ensure that the equipment is able to display or store the transponder codes during testing.

6.6 The RA-recognized test centre shall verify the transceivers using the test procedures specified in Clause 7. All reference transponders shall be readable by the transceiver under test. The codes read shall match the known codes of the reference transponders.

6.7 The RA-recognized test centre shall prepare a confidential report of the results and shall send two copies (or an electronic version) of the report to the chairman of the RA.

6.8 The RA chairman shall inform the manufacturer of the test results in a letter together with a copy of the report.

6.9 The RA shall issue a registration reference number for each conformant transceiver type and model.

6.10 The tested transceivers shall be kept by the RA-recognized test centre, under the ownership of the RA.

6.11 The RA shall make publicly available a list of conformant transceivers. A photograph of the registered transceiver shall be included in the list.

6.12 The RA shall do everything within its power to protect the integrity of this procedure with regard to ISO 11784 and ISO 11785.

7 Test procedures

7.1 General

The test performed shall be the same for every synchronizing reader. The transceivers tested shall meet the technical criteria.

For documentation purposes, a photograph of the transceiver shall be taken and included in the final test report. Additionally, the mass, dimensions and the serial number of the device under test shall be noted in the test report.

7.2 Activation field frequency

The frequency of the transceiver's activation field shall be measured and shall be within the limits defined in ISO 11785.

7.3 Functional test

Ten reference transponders of the HDX type and 10 reference transponders of the FDX-B type shall be read by the transceiver under test, without code errors. The displayed or stored transponder code shall be compared with the listed known codes of those reference transponders.

In addition, assess the transceiver's conformance against the following code occurrences, using transponders that contain the following corresponding code abnormalities.

a) If bit one of the transponder code (animal bit according to ISO 11784:1996, Table 1) is equal to zero (no animal code), the transceiver shall react in a clear and unmistakable way.

b) The country code and national identification code shall be made available. In addition, retagging counter and user information field may be made available.

c) The reading of the manufacturer/country code and the identification code shall not be affected by the content of the trailer bit flag (bit 16 according to ISO 11784:1996, Table 1) and/or the content of the 24 trailer bits.

d) The reading of the manufacturer/country code and the identification code shall not be affected by the reserved bits (bits 10 to 14 according to ISO 11784:1996/Amd 2:2010, Table 1).

e) The reading of the manufacturer/country code and the identification code shall not be affected by the RUDI bit (bit 15 according to ISO 11784:1996/Amd 2:2010, Table 1).

f) When transponders with a country code above 999 are recognized by the transceiver, the transceiver shall react in a clear and unmistakable way.

g) The transceiver shall correctly perform CRC calculations.

7.4 Timing of activation field

7.4.1 Conformant transceivers shall be capable of reading both FDX-B and HDX transponders according to the dual adaptive timing protocol given in ISO 11785:1996, Clause 6. To verify this, check the activation field timings in the four different cases given in 7.4.2 to 7.4.5: the timings shown in Figure 1 shall be within the tolerance limits $^{+1}_{0}$ ms.

7.4.2 When no transponder has been placed in the activation field, the timing of the ON/OFF switching of the activation field shall be as shown in key 1 in Figure 1. The periods during which the activation field is switched on shall be of a duration of 50 ms. Between these periods, the activation field shall be switched off for 3 ms. Every tenth activation cycle shall have a fixed pattern of 50 ms activation period and a fixed pause of 20 ms.

7.4.3 When an HDX transponder has been placed in the activation field, the transceiver shall switch off the field for 20 ms (see key 2 in Figure 1) and read the identification code. The period during which the activation field is switched on shall remain 50 ms.

7.4.4 When an FDX-B transponder has been placed in the activation field, the period during which the activation field is switched on shall be of a duration of 50 ms, extended to a maximum duration of 100 ms if the transceiver cannot validate the FDX-B signal correctly in the first instance (see key 3 in Figure 1). Both these situations shall be tested using a synchronized noise generator and loop (air coil) antenna capable of generating a noise disturbance high enough to prevent the transceiver under test from reading the transponder. The noise generator shall be synchronized with the transceiver's activation field pattern and may be controlled by the operator. The start moment of the noise signal shall be such that the reading of the transmitted transponder code shall be disturbed after a part of the code is received by the transceiver under test. The period during which the noise signal is present during an activation cycle may be varied by the operator externally, but shall be such that the transceiver under test is challenged to extend the activation period to a maximum of 100 ms. The periods during which the activation field is switched off shall be 3 ms. Every tenth activation cycle shall have a fixed pattern of 50 ms activation followed by a 20 ms pause.

7.4.5 When both HDX and FDX-B transponders have been placed simultaneously in the activation field (see key 4 in Figure 1), the duration of the activation period shall be from 50 ms to 100 ms, dependent on the receiving conditions of the FDX-B signal. The switching-off periods of the activation field shall always be 20 ms. The test using a noise generator given in 7.4.4 shall then be repeated. Every tenth activation cycle shall have a fixed pattern of 50 ms activation followed by a 20 ms pause.

7.5 Wireless synchronization test

This test is applicable only to mobile transceivers. As stated in ISO 11785:1996, Clause 6, a mobile transceiver shall be able to detect the presence of other transceivers through the reception of their activation signals. If another activation signal is present, the mobile transceiver under test shall wait for the rising edge of that next activation signal and only activate during a fixed period of 50 ms.

Using a test generator, generate an activation field of field strength 100 dBμV/m, measured at a distance of 1 m from the test antenna. The timing of the activation field shall be according to the four cases of