INTERNATIONAL STANDARD

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Radio frequency identification of animals —

Part 5: Procedure for testing the capability of RFID transceivers of reading ISO 11784 and ISO 11785 transponders

Identification des animaux par radiofréquence —

Partie 5: Procédure pour vérifier les capacités des émetteurs-récepteurs à lire des transpondeurs RFID conformes à l'ISO 11784 et à l'ISO 11785

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
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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 (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 (www.iso.org/patents).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword – Supplementary information.

The committee responsible for this document is ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 19, *Agricultural electronics*.

ISO 24631 consists of the following parts, under the general title *Radio frequency identification of animals*:

— *Part 1: Evaluation of conformance of RFID transponders with* ISO 11784 *and* ISO 11785 *(including granting and use of a manufacturer code)*

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

— *Part 3: Evaluation of performance of RFID transponders conforming with* ISO 11784 *and* ISO 11785

— *Part 4: Evaluation of performance of RFID transceivers conforming with* ISO 11784 *and* ISO 11785

— *Part 5: Procedure for testing the capability of RFID transceivers of reading* ISO 11784 *and* ISO 11785 *transponders*

— *Part 6: Representation of animal identification information (visual display/data transfer)*

— *Part 7: Synchronization of* ISO 11785 *identification systems*

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Introduction

ISO has appointed ICAR (International Committee for Animal Recording) as the registration authority (RA) competent to register manufacturer codes used in the radio frequency identification (RFID) of animals in accordance with ISO 11784 and ISO 11785.

ISO 24631 defines means, based upon ICAR test procedures[1], for evaluating and verifying both the conformance and performance of RFID devices in respect of ISO 11784 and ISO 11785. Only those results emanating from RA-approved test centres are recognized.

This part of ISO 24631 deals with the capability of RFID transceivers of reading ISO 11784 and ISO 11785 transponders.

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Radio frequency identification of animals —

Part 5:
Procedure for testing the capability of RFID transceivers of reading ISO 11784 and ISO 11785 transponders

1 Scope

This part of ISO 24631 specifies rules and procedures for verifying the capability of RFID transceivers of reading transponders used in individual animal identification complying to ISO 11784 and ISO 11785. In addition, this part of ISO 24631 specifies how to apply for an approval and the rights and duties to use this approval. This part of ISO 24631 does not set out the procedures for evaluating wireless synchronised mobile transceivers and also this document contains no provision for evaluating wired synchronisation of stationary transceivers.

This test differs from ISO 24631-2, which is intended for testing transceivers with all mandatory features described in ISO 11784 and ISO 11785. The test described here is intended for cost-effective non-synchronising transceivers that are capable of reading transponders complying to ISO 11784 and ISO 11785 but have no synchronisation capability and does not have to support the dual adaptive protocol. Furthermore, the activation field frequency accuracy is more relaxed.

2 Conformance

The procedures of this part of ISO 24631 include the options of RA approval and registration of transceiver equipment. The procedures of this part of ISO 24631 shall be followed if a company wants RA approval and registration of a transceiver.

The test procedures given in Clause 7 of this part of ISO 24631 specify the procedure how to verify RFID-transceivers' capability of reading transponders complying to ISO 11784 and ISO 11785. RA-approved test centres carry out transceiver tests in conformance with these procedures and report the results to the RA. A transceiver test approval is granted to a company whose transceiver product has passed the tests mentioned in Clause 7. Approved transceiver products receive an approval reference number. To apply for an approval reference number, an application form (Annex A) shall be completed, signed, and submitted to the RA. In order to standardize the use of the test approval, the conditions for the right of using this approval are given in Annex B.

3 Normative reference

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes*

ISO 11784:1996, *Radio frequency identification of animals — Code structure*

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

ISO 24631-1:2009, *Radiofrequency identification of animals — Part 1: Evaluation of conformance of RFID transponders with ISO 11784 and ISO 11785 (including granting and use of a manufacturer code)*

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4 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

4.1
approval reference number
number issued to the manufacturer of an approved transceiver by the registration authority

EXAMPLE 24631–5 2009001

Note 1 to entry: It comprises the reference of the International Standard for which approval is made, the year of issue (four digits) and the running number (three digits), referencing the transceivers tested successfully during that year.

4.2
country code
three-digit numeric code representing the name of a country in accordance with ISO 3166-1

4.3
ISO 11784 and ISO 11785 transceiver
transceiver that reads at least both ISO FDX-B and ISO HDX transponders as defined in ISO 11784 and ISO 11785

4.4
ISO 11784 and ISO 11785 transponder
radio frequency identification (RFID) device that transmits its transponder code according to ISO 11784 and ISO 11785 when activated by a transceiver

4.5
manufacturer
company that submitted the application for conformance testing in conformance with ISO 11784 and ISO 11785

4.6
manufacturer code
three-digit number granted by the RA to a manufacturer under the conditions set forth in ISO 24631-1:2009, 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.

4.7
RA-approved test centre
accredited test centre meeting the criteria of the registration authority

Note 1 to entry: Accreditation: third-party attestation related to a conformity assessment body conveying formal demonstration of its competence to carry out specific conformity assessment tasks (see Reference [2]).

4.8
RA-approved transponder
transponder approved by the registration authority

4.9
reference transponder
transponder that is used to test a transceiver, selected from the different RA-approved transponder types

4.10
registration authority
RA
entity that approves test laboratories and issues and registers manufacturer and product codes

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4.11
transceiver
device used to communicate with the transponder

4.12
transponder
radio frequency identification (RFID) device that transmits its stored information when activated by a transceiver and that may be able to store new information

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

4.13
transponder code
code as programmed in the transponder and defined in ISO 11784:1996, Table 1 and ISO 11785

5 Abbreviations

CRC	cyclic redundancy check
FDX-B	full duplex communication protocol (conforming to ISO 11785, excluding protocols mentioned in ISO 11785:1996, Annex A).
HDX	half duplex communication protocol
MFC	manufacturer code
RA	registration authority
RF	radio frequency
RFID	radio frequency identification

6 Application

6.1 The manufacturer can apply for a conformance test for a transceiver capable of reading ISO 11784 and ISO 11785 transponders.

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 two weeks. By signing the application form, the manufacturer agrees to fulfil the provisions of this part of ISO 24631.

6.3 The test centres shall be approved by the RA.

6.4 The RA maintains a list of approved 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 the necessary accessories to the RA-approved test centre. The manufacturer shall ensure that the equipment is able to display or store the transponder codes during the test.

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

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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 an approval reference number for each conformant transceiver type and model.

6.10 The tested transceivers shall be kept by the 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 approved 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

The test procedure that shall be applied is the same for every transceiver capable of reading ISO 11784 and ISO 11785 transponders. Transceivers shall meet the technical criteria.

This type of transceivers shall be named: “transceivers capable of reading transponders conforming to ISO 11784/11785”.

IMPORTANT — As there may be electronic interference between transceivers, this type of transceiver shall not be operated within a distance of 10 m from any ISO transceiver. The non-synchronising transceiver shall be marked as such by a label, clearly designating the transceiver as a non-synchronising transceiver and shall carry the warning mentioned above.

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

7.1 Frequency of activation field

The frequency of the transceiver’s activation field shall be measured. This shall be within the limits ±0,1 % of the nominal carrier frequency of 134,2 kHz.

7.2 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.

Additionally, the transceiver’s conformance shall be assessed against all of the next code occurrences:

a) If bit one of the transponder code (animal bit, in ISO 11784:1996, Table 1) is equal to zero (no animal code), the transceiver shall react in a clear and unmistakable way (e.g. display the wording ‘NON ANIMAL CODE’).

b) It is mandatory to make available (display and or communicate over a communication link) the manufacturer/country code and the (national) identification code. In addition, the retagging counter and user information field can be made available as an option for applications where this information is needed.

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, in 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 15, in ISO 11784:1996, Table 1).

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e) When transponders with a manufacturer/country code above 999 are recognized by the transceiver, the transceiver has to react in a clear and unmistakable way (e.g. display the wording 'INVALID MANUFACTURER/COUNTRY CODE').

f) The transceiver shall be tested for correct CRC calculation.

All these tests shall be carried out by presenting the transceiver under test with special transponders containing a code abnormality according to the cases described above.

7.3 Timing of the activation field

Since an ISO transceiver shall be capable of reading both FDX-B and HDX ISO 11785 transponders, the timings of the activation field shall be set in an appropriate manner. The non-synchronised transceiver shall be capable of reading any ISO 11784 and ISO 11785 transponder (HDX and FDX-B) within 500 ms.

7.4 Test setup and test equipment

The following test equipment shall be used during the testing of the transceivers:

— 10 FDX-B reference ISO 11784 and ISO 11785 transponders;

— 10 HDX reference ISO 11784 and ISO 11785 transponders;

— test transponders with codes necessary to perform the functional tests as described in 7.2;

— test setup for activation field frequency measurement, maximum tolerable error ±1 Hz;

— test setup for activation field timing measurement, maximum tolerable error ±0.01 ms;

— two channel oscilloscope with a minimum measurement bandwidth of 10 MHz;

— spectrum analyser for measuring the carrier frequency with a maximum tolerable error of ±30 Hz;

— calibrated reference antenna;

— uncalibrated reference antenna or pick up coil;

— activation field test generator, maximum tolerable noise level –20 dBc;

— synchronised noise generator or adequate equipment (used for testing the extension of the FDX listening period, the FDX code is disturbed for a short period before the complete ID-code is transferred), maximum tolerable noise level –20 dBc.

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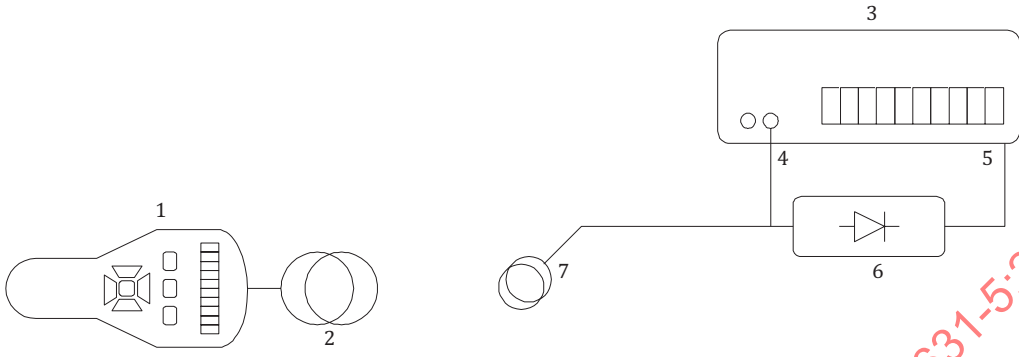
Frequency measurement test setup (Figure 1): Since ISO transceivers produce an intermittent activation field, a frequency counter cannot be used for the frequency measurement or the counter has to be equipped with an external arm. An alternative is a spectrum analyser or an EMI receiver, suitable for making high accuracy carrier frequency measurements.



Key

1 transceiver under test
2 antenna under test
3 universal counter
4 in
5 external arm
6 RF detector
7 pick up antenna

Figure 1 — Test setup frequency measurement

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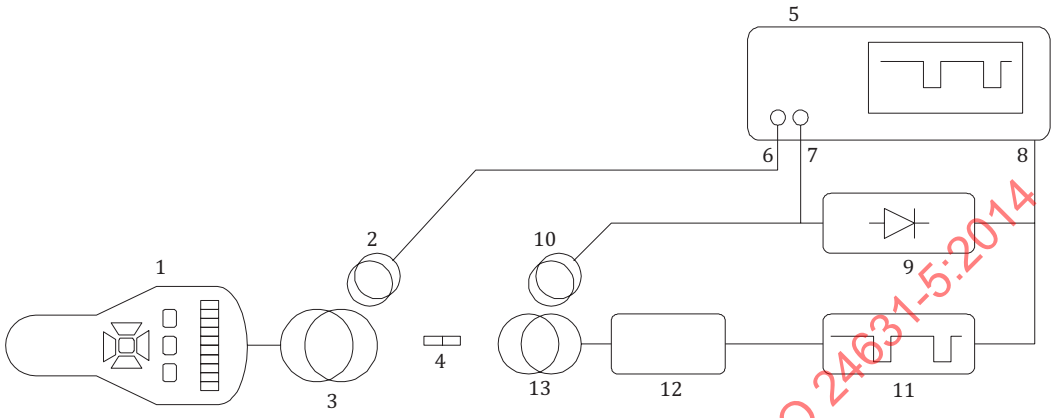
Test setup for activation field timing measurement (Figure 2): The activation field of the transceiver is sensed by a reference antenna and displayed on an oscilloscope screen. The reference antenna shall be placed close to the transceiver antenna to make the emitted RF signal visible on the oscilloscope. By placing transponders in the activation field, the timing of changes (if applicable) can be observed.



Key

1	transceiver under test	8	external sync
2	pick up antenna	9	RF detector
3	antenna under test	10	pick up antenna
4	transponder	11	timing circuit
5	oscilloscope	12	noise generator
6	in	13	antenna
7	in		

Figure 2 — Test setup transceiver activation field timing measurement

7.5 Test conditions

Test conditions to be maintained shall be the following:

— Ambient temperature: minimum 15 °C and maximum 30 °C;

— Ambient humidity: minimum 40 % rH and maximum 80 % rH;

— Ambient noise floor and ambient peak noise: <70 dBµV/m (bandwidth 2.7 kHz, 80 kHz to 200 kHz during measurements).

Special attention shall be given to spurious emissions, which may be emitted, for example, by not sufficiently shielded computer monitors. The electromagnetic test conditions of the measurements shall be checked by doing the measurements with and without a transponder in the field.

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Annex A
(normative)

Test application form

This form is also available on the RA website (http://www.icar.org/).

RA Approval Date:				Date:		
Company Name			Address			
Manufacturers product code:			The possibility of reading additional technologies is evaluated:			
ISO 11784 and ISO 11785 FDX_B transponder technology:		☐		Destron/Fecava		☐
		☐		Datamars		☐
ISO 11784 and ISO 11785 HDX transponder technology:				Trovan		☐
				Other configurations		☐
Mobile transceiver:		☐				
Stationary transceiver:		☐				
Physical characteristics:						
Dimensions (l × w × h):			Weight:			
Separate Antenna:	No	☐	Yes	☐		
Communication (not to be tested):	No	☐	Yes	☐	If yes, provide specs	
Device serial number:						
Photograph of the device:						
The undersigned agrees to abide by all the provisions and conditions of ISO 24631-5						
Date:	***Name:***			***Position:***		

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