INTERNATIONAL STANDARD

ISO 24631-1

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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)

Identification des animaux par radiofréquence —

Partie 1: Évaluation de la conformité des transpondeurs RFID à l'ISO 11784 et à l'ISO 11785 (y compris l'attribution et l'utilisation d'un code de fabricant)

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 24631-1 was prepared by Technical Committee 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 *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)*

— *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*

Introduction

ISO has appointed ICAR (International Committee for Animal Recording) as the registration authority (RA) competent to register manufacturer codes used in the radiofrequency 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 conformance of RFID transponders, of which the four main types used for animal identification are

— injectable transponders,

— electronic ear tag transponders,

— electronic ruminal bolus transponders, and

— tag attachments.

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)

1 Scope

This part of ISO 24631 provides the means of evaluating the conformance with ISO 11784 and ISO 11785 of RFID (radiofrequency identification) transponders used in the individual identification of animals. It sets forth the conditions for the granting and use of the manufacturer code related to a transponder and the associated rights and obligations of the parties involved in the issuance of the code.

The test procedures specified in this part of ISO 24631 are recognized by the FECAVA (Federation of European Companion Animals Veterinary Association) and WSAVA (World Small Animal Veterinarian Association) and, as such, can be applied also to companion animals.

2 Conformance

Test centres approved by the registration authority (RA) shall perform transponder 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 transponder testing by completing and submitting to the RA the application form provided in Annex A, while agreeing to abide by the code of conduct set forth in Annex B. Approval depends on the transponder product passing the tests of Clause 7. A product code consisting of a manufacturer code and serial number is issued to a transponder that is approved by the RA. The conditions attached to use of this approval by the manufacturer are laid down in Annex C.

Transponders for which conformance with ISO 11784 is claimed shall carry a numeric-3 code in accordance with ISO 3166-1, where numbers up to 900 refer to countries and numbers from 900 to 998 indicate individual manufacturers.

Use of a manufacturer code is only permitted the manufacturer who has been issued that code by the RA. The application form for obtaining the manufacturer code is presented in Annex D, while the rules for its granting and use are set forth in Annex E.

3 Normative references

The following referenced documents are indispensable for the application 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 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes*

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

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

ERC recommendation 70-03, *Relating to the Use of Short Range Devices* (SRD)[1)]

4 Terms and definitions

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

4.1
country code
three-digit numeric code representing a country in accordance with ISO 3166-1

4.2
identification code
code used to identify the animal individually, at the national and, in combination with a country code, international levels

NOTE It is a national responsibility to ensure the uniqueness of national ID codes.

4.3
laboratory activation field
electromagnetic field with a frequency of 134,2 kHz and a magnetic field strength according to ERC Recommendation 70-03

4.4
laboratory reference transceiver
transceiver used to test the transponders generating the laboratory activation field, able to read FDX-B and HDX transponders

4.5
manufacturer
company that submits an application for conformance testing or for the granting and use of a manufacturer code for transponders in conformance with ISO 11784 and ISO 11785 while accepting the conditions set forth in Annexes B, C and E

4.6
manufacturer code
MFC
three-digit number granted by the RA to a manufacturer under the conditions set forth in Annex E, whose range and placement within the code structure are in accordance with ISO 11784

NOTE Only one manufacturer code is granted to the same manufacturer.

4.7
primary transponder packaging
primary protective layer of transponder components

4.8
product code
six-digit number granted by the registration authority to a manufacturer for a certain type of transponder, formatted such that its first part is the manufacturer code and second part a three-digit serial number

1) CEPT (Conférence Européenne des Administrations des Postes et des Télécommunications) publication.

4.9
purchaser
person, organization or company that receives legal ownership of equipment by a transaction involving that equipment

4.10
RA-approved test centre
accredited test centre meeting the criteria of the registration authority

NOTE 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]).

4.11
RA-approved transponder
transponder approved by the registration authority

4.12
RA-registered manufacturer
manufacturer with one or more RA-approved transponders

4.13
registration authority
RA
entity that approves test laboratories and issues and registers manufacturer and product codes

4.14
retagging
process that assigns to a new transponder the same identification number as a transponder that has been lost or that is no longer readable

4.15
retagging counter
three-bit field for counting the number of retagging

4.16
shared manufacturer code
three-digit number granted by the registration authority to a manufacturer according to Annex E

NOTE A shared manufacturer code can be granted to more than one manufacturer.

4.17
secondary transponder packaging
additional layers to primary transponder packaging

4.18
transceiver
device used to communicate with the transponder

4.19
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 A transponder can be characterized according to its components (chip, coil, capacitor, etc.), communication protocol, size, shape and packaging, or any additional characteristics that could change its properties. The main types are defined in 4.19.1 to 4.19.4 below.

4.19.1
injectable transponder
small transponder able to be injected into an animal's body and encapsulated in a biocompatible and non-porous material such as glass

4.19.2
electronic ear tag transponder
plastic-covered transponder able to be fixed to the ear of the animal using a locking mechanism or to be attached to an ear tag such that it cannot be removed from the tag without damaging it

4.19.3
electronic ruminal bolus transponder
transponder placed into a high specific gravity container able to be orally administered to a ruminant, which remains permanently in its fore stomach

4.19.4
tag attachment
transponder components covered by a primary protection layer and meant for producing one or more of the three other main transponder types or other types of animal transponder

4.20
user information field
five-bit field for additional user information, used only in conjunction with the country code

5 Abbreviated terms

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

RFID radiofrequency identification

6 Application

6.1 The manufacturer may apply for either a full or limited test or for a listing update.

a) Full test — Category A

Applicable when:

1) a manufacturer is not yet registered by the RA (no tested product and no MFC);

2) an RA-registered manufacturer uses new silicon (integrated circuit) or new technology (HDX or FDX-B) in the transponder;

3) an RA-registered manufacturer changes his coil technology (ferrite vs. air coils).

b) Limited test — Category B

Applicable when:

1) an RA-registered manufacturer inserts previously RA-approved transponder hardware (silicon plus coil) into a different primary transponder packaging material;

2) an RA-registered manufacturer uses the silicon of an RA-approved transponder with different coil dimensions;

3) an RA-registered manufacturer inserts an RA-approved transponder with its original primary packaging in a different secondary packaging (e.g. glass transponder in a bolus or in an ear tag).

c) Listing update — Category C

Applicable when an RA-registered manufacturer intends to use an RA-approved transponder without modification.

The applicant shall deliver a copy of the original test report and a written confirmation from the RA-registered manufacturer who originally submitted the transponder in question for approval.

6.2 The application submitted to the RA shall consist of a covering letter, the application form presented in Annex A and the signed code of conduct set forth in Annex B. The RA shall confirm receipt of the application to the manufacturer within two weeks. By signing the application form and the code of conduct, the manufacturer agrees to fulfil the provisions of this part of ISO 24631.

6.3 The test centre 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 transponder product.

6.5 The manufacturer shall provide the RA-approved test centre with 50 transponders of the same type and model for a full test, or 10 transponders of the same type and model for a limited test or listing update. The transponders shall carry the country code “999” (indicating a test transponder) or the manufacturer’s code if existent. The manufacturer may freely choose the identification codes, but duplicated numbers are not allowed. The manufacturer shall provide a list of the transponder codes in decimal representation.

6.6 The RA-approved test centre shall verify the transponders using the test procedures specified in Clause 7. All tested transponders shall be readable by the laboratory reference transceiver. The codes read shall match the codes provided by the manufacturer.

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.

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 product code for each conformant transponder type and model.

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

6.11 The RA shall make publicly available a list of conformant transponder models in any of the three application categories [6.1, a), b) and c)]. A photograph of the approved transponder 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 applicability of a particular test procedure depends on whether a full (category A) or limited (category B) test or listing update (category C) is required (see 6.1).

7.2 Full test (category A)

The shape and dimensions of the transponders under test shall be checked against the information provided in the application form.

The resonance frequency of the 50 test transponders shall be $(134{,}2 \pm 3)$ kHz, measured before a transponder is activated. The transponders shall be positioned at the centre of the test coil. The returned signal frequencies of the 50 transponders under test shall be checked to ensure that they are within the frequency bands specified in ISO 11785.

The test procedures for FDX-B and HDX transponders are identical. The transponders shall be read using a reference transceiver. This transceiver produces an interrogation signal that activates the transponder. The return signal of the transponder shall be demodulated. The test program shall include a check of the incoming bit stream to verify that the header is present. For FDX-B transponders, it is verified that every ninth bit after the header is a logical “1”. The received pattern shall be displayed in 13 data fields, each of eight bits, and stored in a log file. For FDX-B transponders, the control bits between the blocks shall be displayed between square brackets at the end of each block. In particular, the following test results shall be displayed.

— Identification code: displayed in binary, hexadecimal and decimal formats. It shall be compared with the list of codes supplied by the manufacturer.

— Country code: displayed in binary, hexadecimal and decimal formats. It shall be the manufacturer or test code.

— Data block flag: bit indicating that additional data is to be received. In this test, it shall be checked to ensure it is a logical “0”.

— Retagging counter: three-bit retagging counter displayed in binary, hexadecimal and decimal formats. These bits shall be checked to ensure they are logical zeroes.

— User information field: five-bit additional user information field displayed in binary, hexadecimal and decimal formats. These bits shall be checked to ensure they are logical zeroes.

— Reserved field: displayed in binary, hexadecimal and decimal formats. These bits shall be checked to ensure they are logical zeroes.

— Animal bit: it shall be checked to ensure it is a logical “1” (animal application).

— CRC: displayed in binary, hexadecimal and decimal formats. The CRC code received shall match the value calculated according to ISO 11785:1996, Annex B.

7.3 Limited test (category B)

The test procedure shall be as specified 7.2, except that 10, instead of 50, transponders shall be tested.

7.4 Listing update procedure (category C)

The manufacturer codes and the identification codes of 10 transponders shall be checked against the reference transceiver to ascertain whether they are in conformance with the codes submitted by the manufacturer.

7.5 Test apparatus

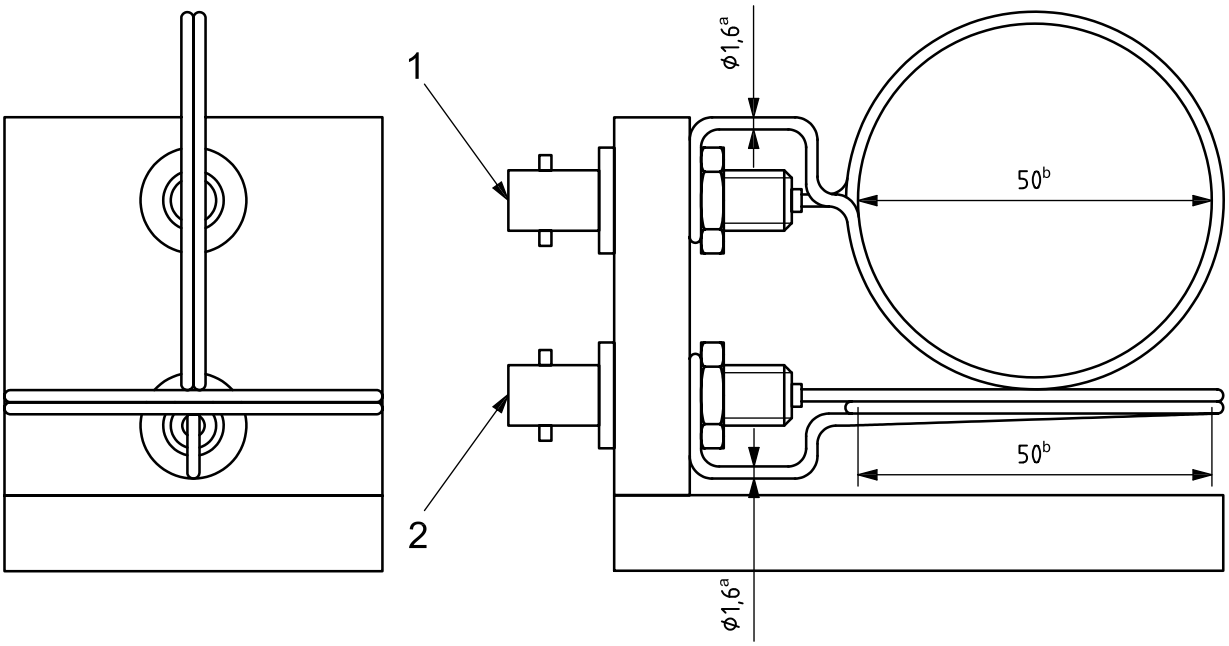
7.5.1 Reference transceiver, capable of activating FDX-B and HDX transponders, recovering the return signal, and validating and communicating the data.

7.5.2 Two-channel oscilloscope, with a minimum measurement bandwidth of 10 MHz.

7.5.3 Spectrum or network analyzer, capable of measuring the resonance frequency with a maximum tolerable error of ± 30 Hz.

When performing the resonance frequency measurement using a spectrum analyzer, use a test setup with a test coil configuration as shown in Figure 1.

Dimensions in millimetres



Key

1 tracking generator output

2 spectrum analyzer input

a Two turns.

b 20 mm for small transponders.

Figure 1 — Test setup — Resonance frequency measurement

7.6 Test conditions

The test conditions shall be as follows.

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:	< 30 dBµV/m (bandwidth 2,7 kHz) 50 Hz to 1 MHz during measurements

Special attention shall be given to spurious emissions, which can be emitted, for example, by insufficiently shielded computer monitors. The electromagnetic test conditions of the measurements shall be checked by carrying out the measurements both with and without a transponder in the field.

Annex A
(normative)

Test application form

This form is also available on the RA web site: http://www.icar.org/.

RA approval date:					Date:	
Company Name:			**Address:**			
Test:	Full	☐	Limited	☐	Listing update	☐
Device type:			Injectable transponder	☐	Tag attachment	☐
			Electronic ear tag	☐	Bolus	☐
					Other	☐
Device name/model:						
Technology:			HDX	☐	FDX-B	☐
Physical characteristics:						
Length:	Diameter:		Mass:		Colour:	
Packaging material:						
Primary transponder packaging:						
Secondary transponder packaging:						
Photograph of device:						
The undersigned agrees to abide by all provisions and conditions of ISO 24631-1 and to the payment of application fees.						
Date:	**Name:**			**Position:**		

Annex B
(normative)

Code of conduct

This annex is reproduced on the RA web site: http://www.icar.org/.

In order to maintain and enhance user confidence in the usability and functioning of RFID technology conformant with ISO 11784 and ISO 11785, the manufacturer/supplier shall ensure:

— that the products offered to the market for use in animal identification (i.e. animal bit = '1') and claimed to be conformant are in full conformance to both ISO 11784 and ISO 11785, proven by test reports issued by RA-approved test centres and the signed letter from the RA for use of the granted manufacturer code;

— that the conditions set forth by the RA for the right to use such granted codes in accordance with ISO 24631-1 are respected;

— that the use of country code "999" is restricted to test applications only, and that such coded devices shall not be sold commercially;

— that the initial purchaser of the ISO 11784 and ISO 11785 conformant device, including the origin of the silicon chip in the device, can be traced;

— that for transponders applied to animals in countries where there is no national authority which regulates the transponder codes, the manufacturer recommends to his distributor and purchaser network that traceability be maintained up to and including the applier of the transponder;

— that the manufacturer/supplier of the RFID technology assumes responsibility for communicating accurate information concerning RFID technology, products and performance based on ISO 11784 and 11785, and for supporting and promoting these International Standards in a positive way.

Company name:	**Address:**	
The undersigned declares to have taken note of, and agrees to abide by and submit to, all the provisions and conditions of ISO 24631-1, and is aware of the possibility, accepts and acknowledges that the RA may withdraw any product approval or manufacturer code if one or more of those provisions or conditions are not met.		
Date:	**Name:**	**Position:**

Annex C
(normative)

Conditions of use of transponder approval

IMPORTANT — Approval of a transponder confirms conformance with the code structure and technical concepts set out in ISO 11784 and ISO 11785. It does not imply approval of the transponder's product quality and performance.

Following successful participation in a test, the RA shall grant approval together with an approval reference number with the following conditions.

a) The manufacturer shall maintain a database in which the initial purchaser of all transponders conforming to ISO 11784 and ISO 11785 sold (or ownership is transferred) is recorded.

b) The manufacturer shall recommend to his purchasers to maintain the same information and further on for subsequent purchasers until the transponder is applied to an animal.

c) The manufacturer shall use the approval only in relation to the product code given to the transponder that has been approved by the RA.

d) The manufacturer shall not utilize the product code granted in an approval on a transponder:

    1) not manufactured by him;

    2) that does not comply in all respects with the approval and the product code, including but not limited to maintaining

        i) packaging (both primary and secondary) identical to the approved transponder,

        ii) technology and manufacture identical to the approved transponder,

        iii) transponder type/model identical to the approved transponder;

    3) that utilizes the manufacturer code of another manufacturer;

    4) supplied or intended to be supplied to a person ("the receiver") who will market the transponder as if manufactured by himself, unless

        i) the receiver has obtained registration under this process, and

        ii) the transponder bears either the shared manufacturer code or manufacturer code of the receiver.

The RA reserves the right to periodically conduct an unannounced test to ascertain whether a particular manufacturer continues to meet the conditions. Upon request, the manufacturer shall provide the RA with the information necessary for verifying conditions a) to c) of this annex. The right to use approval may be withdrawn if one or more conditions are not met.

Any disputes regarding these conditions or the use of an approval shall be addressed to ISO.

The RA reserves the right to distribute an advice notice regarding any manufacturer who distributes RFID transponders in conflict with the prescribed use described in the approval.

Annex D
(normative)

Manufacturer code application form

This annex is reproduced on the RA web site: http://www.icar.org/.

RA approval date:		Date:
Company Name:	**Address:**	
☐ **Step 1:** **Shared manufacturer code** ☐ First application, primary set of identification codes ☐ Second application, additional set of identification codes		
☐ **Step 2:** **Manufacturer code** (only applicable if step 1 has been passed)		
The undersigned agrees to abide by the provisions and conditions of ISO 24631-1.		
Date:	**Name:**	**Position:**

Annex E
(normative)

Conditions of use of manufacturer codes

E.1 The manufacturer is allowed to use only the manufacturer code (MFC) granted him by the RA.

E.2 The manufacturer shall ensure that there is no duplication of individual identification codes of products he manufactures in combination with his MFC or the shared MFC in combination with the limited identification code series granted to him by the RA. The manufacturer shall implement appropriate record keeping and quality control procedures for that purpose. A manufacturer is not permitted to use a country code unless he is authorized by the specific official competent authority in this country. The manufacturer shall communicate the official authorization to the RA.

E.3 The RA has the right to periodically conduct an unannounced test to ascertain whether a specific manufacturer continues to fulfil these conditions. Upon request, the manufacturer shall provide the RA with the information necessary for verifying the conditions set out in this annex. The right to use an MFC may be withdrawn if the conditions are not met.

E.4 All registered manufacturers with an MFC will be informed whenever a new version of ISO 24631-1 becomes available. The manufacturer shall order the new edition and shall send to the RA, within a year of publication of the latest edition of ISO 24631-1, a signed copy of the code of conduct (see Annex B) from that edition. By signing the code of conduct, the manufacturer declares that he has taken notice of, and agrees to abide by, all the conditions set forth within the latest edition. A product approval or MFC may be withdrawn if the RA does not receive from the manufacturer the signed consolidation form within the given period.

E.5 Any disputes regarding these conditions or the use of the manufacturer code shall be addressed to ISO.

E.6 The RA reserves the right to distribute an advice notice regarding any manufacturer who distributes RFID transponders in conflict with the prescribed use of MFC.

Bibliography

[1] *International agreement of recording practices*. ICAR Guidelines approved by the General Assembly held in Kuopio, Finland on 9 June 2006

[2] ISO/IEC 17000, *Conformity assessment — Vocabulary and general principles*

ICS 65.040.99

Price based on 13 pages