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Radio frequency identification of animals — Code structure

Identification des animaux par radiofréquence — Structure du code

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Foreword

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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 document 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).

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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.

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

This third edition cancels and replaces the second edition (ISO 11784:1996), which have been technically revised. It also incorporates the Amendments ISO 11784:1996/Amd. 1:2004 and ISO 11784:1996/Amd. 2:2010.

The main changes are as follows:

— references to ISO 24631-1 has been included to specify the granting and the use of the manufacturer's numbers;

— the following new annexes have been added:

  — Conditions for using ISO 11784 coding (Annex A);

  — Conditions of use of transponder registration (Annex B);

  — Conditions of use of manufacturer codes (Annex C);

  — Steps RA shall take if rules as defined in this document are disrespected (Annex D);

— information related to the Registration Authority for (shared) manufacturer codes has been added.

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.

Introduction

This document specifies the structure of the radio-frequency (RF) identification code for animals. RF identification of animals requires that the bits transmitted by a transponder are interpretable by a transceiver.

Usually, the bit stream contains data bits, defining the identification code and a number of bits to ensure correct reception of the data bits. This document specifies the structure of the identification code.

The transmission protocols between transponder and transceiver are the subject of ISO 11785[1].

This document does not specify the characteristics for advanced transponders. These characteristics are the subject of the ISO 14223 series[2],[3],[4].

This document does not specify the characteristics of the injection sites for injectable transponders. These characteristics are the subject of ISO 15639[5],[6].

This document does not specify the characteristics of the evaluation protocols (including granting and use of a manufacturer code). These characteristics are the subject of the ISO 24631 series[7],[8].

Radio frequency identification of animals — Code structure

1 Scope

This document specifies the structure of the radio-frequency (RF) identification code for 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 3166 (all parts), *Codes for the representation of names of countries and their subdivisions*

ISO 24631-1, *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)*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

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

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

3.1
animal code
bit pattern to identify an animal

3.2
bit pattern
sequence of binary digits or bits (0, 1)

3.3
code field
group of bits in the identification code with a specific meaning

3.4
country code
CC
bit pattern to identify the country where the transponder code was issued

3.5
data block
additional group of bits with a specific meaning

3.6
flag
single bit with a specific meaning

3.7
identification code
part of the code that is used for identification (control codes such as header, trailer and checksum are excluded)

3.8
manufacturer's code
MFC
bit pattern identifying the manufacturer of the transponder

3.9
national identification code
code field with a unique number within a country

3.10
transceiver
device used to communicate with a transponder

3.11
transponder
device (such as tag in the form of an ear tag, leg band, tag attachment, injectable or bolus) which transmits its stored information when activated by a transceiver and may be able to store new information

3.12
retagging
process which assigns a new transponder having the same identification number where the transponder was lost or is no longer readable

3.13
retagging counter
three-bit counter for counting the number of retagging

3.14
user information field
five-bit field for additional user information, used only in conjunction with the country code

3.15
advanced transponder
transponder conforming to ISO 14223, downward compatible according to ISO 11784 and ISO 11785 with facilities for the storage and retrieving of additional data, integrated sensors, etc.

3.16
RUDI-bit
bit that is a Reference to User Data Inside the transponder memory, indicating that the transponder is of the ISO 14223 advanced transponder type

3.17
Registration Authority
RA
entity that has been assigned the responsibility to approve test laboratories to carry out evaluations of conformance of RFID transponders with ISO 11784 and ISO 11785 (including the granting and use of a manufacturer code) based on ISO 24631-1 and issues and registers manufacturer and product codes

4 Description of code structure

The code in the transponder is split up into several code fields, each with its own meaning. Each field is coded in natural binary with the high-order bit being leftmost. The structure of the code shall be as specified in Table 1. Bit number 1 in the code is the most significant bit (MSB); bit number 64 is the least significant bit (LSB).

The combination of CC and national identification code provides a unique worldwide identification number.

Code fields are available in the transponder memory for applications which require:

— the retagging of animals with the same identification number;

— the storage of user-defined information in the transponder;

— indicating the starting digit of the visual number;

— a reference to user data inside the transponder memory.

See Table 1 for the definition of the code structure and an explanation of the code fields.

The code structure shall include a country code or a manufacturer's code; the granting and use of a manufacturer's code are the subject of ISO 24631-1.

Conditions for using the ISO 11784 coding that shall be respected are listed in Annex A.

Table 1 — Code structure

Bit No	Information	Combinations	Description
1	Flag for animal (1) or non-animal (0)[a]	2	This bit signals whether the transponder is used for animal identification or not. In all animal applications this bit shall be 1.
2-4	Retagging counter[e]	8	This counter shall be used only if a retagging with the same identification number is decided by the specific country (bits 17-26). This counter shall be set to zero for the first assign of a transponder to an animal. If further assigns of new transponders because of loss or malfunction to the same animal are necessary, then the identification number shall be the same, but the counter shall be incremented by one.
5-9	User information field[b, e]	32	The content of this field is informative. It is defined by the country, as coded in the CC field.
10-11	Reserved field[e]	4	The value of these bits shall be set to "0".
12-14	Starting digit of the visual number[e]	8	Animals might have a tag for visual recognition with the ISO 11784 number. This might be a number with less than 12 digits (as the electronic number). The electronic number has in this case one or more meaningless zeros in front of the national ID code. The starting digit of the visual number can in those cases be indicated in this field.
15	RUDI-bit[e]	2	This bit should be set to "1" if the transponder is of the advanced transponder types conform to ISO 14223. This bit is a Reference to User Data Inside the transponder memory.
16	Flag indicating the existence of a data block (1) or no data block (0)	2	This bit signals that additional data is to be received (e.g. physiological data, measured by a device which combines identification and monitoring). This bit shall be 1 if additional information is appended to the identification code, otherwise it shall be 0.

Table 1 *(continued)*

Bit No	Information	Combinations	Description
17-26	IS0 3166 num 3 country code[c, d, f]	1 024	Country coded transponders shall be coded with the CC (codes from 000 to 899) as defined in ISO 3166, "Country codes" from 900 to 998 shall only be used to refer to manufacturers of transponders as assigned by the Registration Authority under ISO 24631-1.Country codes from 900 to 909 refer to multiple manufacturers having a shared MFC and Country codes from 910 to 998 refer to individual manufacturers with an unshared MFC. Normative conditions of use of transponder registration are listed in Annex B and conditions that shall be respected on the use of manufacturer codes are listed in Annex C. Step the RA shall take if rules, as defined in this document, are disrespected, are listed in Annex D. CC 999 is used to indicate that the transponder is a test transponder and need not contain a unique identification number.
27-64	National identification code[c,f]	274 877 906 944	Animal code, unique number within a country (and in combination with numeric-3 CC unique worldwide)

[a] The method to distinguish between animal and non-animal applications using bit No. 1 allows the code structure to be recognized electronically. However, this requires that future standards on RF identification in other fields will adhere to this convention.

[b] The use of 'retagging counter' and 'user information field' is only applicable where bits 17 to 26 of the transponder contain a valid numeric-3 CC in accordance with the ISO 3166 series.

[c] The length of the national identification code was chosen to have enough combinations available for all animals in a large country. Moreover, the uniqueness of a code is expected to be maintained over thirty years.

[d] It is a national responsibility to ensure the uniqueness of the national identification code. If necessary, number series may be allocated to species and/or manufacturers, but this will not be standardized. Ideally every country should maintain a central database in which all issued codes are stored, together with a reference to the database where the information concerning the associated animal can be retrieved.

[e] In case the retagging counter, the user information field, reserved field, starting digit of the visual number, RUDI-bit are not used, those bits shall be set to zero.

[f] Remarks related to Identification code:

— It is possible to make a subdivision in the National ID Code as long as the combination of the CC and the national identification code is unique, and the chosen structure will leave enough space for numbering the animals with unique numbers for a period of at least thirty years.

— It is advised to take the expected number of animals for the coming thirty years into account if a subdivision is made. This may lead to unequal subdivisions.

— The WYSIWYG (what you see is what you get) solution, where the number of the RFID tag is the same (or can be converted) into the visual number on the tag, can be used if the visual ear tag number can be found in the series 000,000,000,000 - 274,877,906,943 or can be transferred to that series.

— It is free to choose the entrée of a subdivision of the national identification code, but one should be aware that this reduces the number of available codes (the advice is therefore to use a meaningless number without information in the number itself and with a minimum or no subdivision of the number).

— When writing MFC information into the 12-digit ID-code the numbering system must take into account all possible combinations (shared and unshared). It must be considered that the highest possible number is 274,877,906,943. For example, if supplier information must be written in the first 2 digits, the options are limited to numbers 00 to 27, if the first 3 digits are used this is limited to 000 to 274. By mid-2023, more than 60 unshared manufacturer codes have been issued and more than 280 shared manufacturer codes. There is therefore NO calculation rule that can place the (un)shared manufacturer codes (> 340 total) in the first 2 or 3 digits of the ID code!

Annex A
(normative)

Conditions for using ISO 11784 coding

In order to maintain and enhance user confidence in the usability and functioning of RFID technology conformant with this document 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-recognized test centres and the signed letter from the RA for use of the granted MFC;

— that the conditions set forth by the RA for the right to use such granted codes in accordance with this document are respected;

— that the ISO 11784 code of all ISO 11784 and ISO 11785 compliant transponders marketed is locked;

— to hold a database in which the link of the serial number of each silicon chip with the programmed ISO 11784 code is unchangeably stored to guarantee uniqueness;

— that the use of CC "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 ISO 11785, and for supporting and promoting these International Standards in a positive way.

Annex B
(normative)

Conditions of use of transponder registration

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

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

B.1 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.2 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.

B.3 The manufacturer shall use the registration only in relation to the product code given to the transponder that has been registered by the RA.

B.4 The manufacturer shall not utilize the product code granted in a registration on a transponder:

1) not manufactured by them;
2) that does not comply in all respects with the registration and the product code, including but not limited to maintaining
    a) packaging (both primary and secondary) identical to the registered transponder,
    b) technology and manufacture identical to the registered transponder, and
    c) transponder type/model identical to the registered transponder;
3) that utilizes the MFC of another manufacturer;
4) supplied or intended to be supplied to a person ("the receiver") who will market the transponder as if manufactured by themselves, unless
    a) the receiver has obtained registration under this process, and
    b) the transponder bears either the shared MFC or MFC 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 of this annex. The right to use registration may be withdrawn if one or more conditions are not met.

Any disputes regarding these conditions or the use of a registration shall be addressed to the RA.

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 registration.