

INTERNATIONAL COMMITTEE FOR ANIMAL RECORDING
(ICAR)

COMITÉ INTERNATIONAL POUR LE CONTRÔLE
DES PERFORMANCES EN ÉLEVAGE



INTERNATIONALES KOMITEE FÜR
LEISTUNGSPRÜFUNGEN IN DER TIERPRODUKTION

Manufacturers of eartags

Sub-Committee on Animal Identification

Dr. Reinhard Pauw
Endenicher Allee 64
D-53115 Bonn
Tel: +49-228-72632-15
Fax: +49-228-72632-23
E-Mail: pauw@lkv-nrw.de

Cc:

- **Members of the ICAR Sub-Committee on Animal Identification**
- **ICAR secretary general, Mr. Andrea Rosati**

Bonn, May 08, 2006

ICAR performance evaluation and approval procedure for official permanent identification devices (conventional permanent plastic eartags)

Dear Madam, dear Sir,

since more than ten years ICAR has gained experience in testing and approval of identification devices to be used in RFID schemes. I am writing to you as a manufacturer of conventional plastic eartags used in official identification schemes for farm animals. ICAR would like to provide you with a final copy of the document that describes the procedures to be followed for obtaining official ICAR approval for conventional permanent plastic eartags. In addition you are invited to participate in the initial test. Attached please find the final version of the procedure.

The test procedure that has been developed, comprises the following parts:

- Preliminary assessment
- Laboratory test
- Preliminary field test
- Extended field test

An eartag will need to pass each assessment/test before it moves to the next level of testing.

The testing procedure incorporates the use of a reference eartag in the field tests. The use of a reference eartag is to indicate if a particular farm has abnormal tag performance, in which case the data will be excluded from the analysis.

A procedure for selecting the reference eartag for first test run has been developed:

1. Manufacturers who apply for the initial test, have successfully participated in the French test and are prepared to supply their eartag as the reference tag, will be listed.
2. One manufacturer from the list will be selected at random by an independent person, to provide the reference eartag.

The procedure description has been developed after careful consideration by ICAR's Sub-Committee on Animal Identification. The development of the document has included a number of discussions with industry representatives. The document provides a practical and economic means for eartag manufacturers

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to gain official recognition for the quality of their products. The following cost is involved with the procedure:

Full ICAR approval procedure	Cost per eartag tested (in Euro)
• One eartag tested in a single test run	44 000
• Two eartags tested in a single test run	40 000
• Three or more eartags tested in a single test run	32 000
If eartag has passed french laboratory test (without machine readability) the following discount will apply	7 500

A deposit of Euro 12 000 has to be paid to Service-ICAR srl. within 14 days of receiving an invoice, to secure a position in the next test run. The balance of the fees will be payable before commencement of the field test.

If you intend to participate in the initial test, please fill in and sign the application form (Annex 1 of the attached document) and send, email or fax it to the address given in the header section of this letter. The completed application form should reach ICAR no later than June 04, 2006.

As the number of participants in the first test will be limited, you are encouraged to submit your application as soon as possible as places in the first test will be allocated in order of receipt of complete and properly filled in applications. Following receipt of applications the number of eartags to be included for testing in the first run will be determined and the appropriate test fees will be calculated. If you are successful in obtaining a place in the first test run, you will be sent an invoice by Service-ICAR srl. which must be paid within 14 days to secure your place.

In addition to your application to participate to the test, please indicate in a separate letter your willingness to submit your eartag as the reference eartag for the first test run. In that case please include a copy of the french certificate with the letter. Please note that the eartag selected as the reference eartag will receive an approval after successful completion of the test. The fee for the reference eartag in the first test run will be the fee applying for an eartag which has passed the french laboratory test (see table above).

For the first test run we expect to have a result on the laboratory test by November 2006. Provisional approvals should be available following the preliminary field test, in about winter 2007.

Kind regards

A handwritten signature in black ink, appearing to read 'Pauw'.

Dr. Reinhard Pauw, Chairman of ICAR Sub-Committee on Animal Identification

Attachment: Performance evaluation and approval of official permanent identification devices, Part 1



International Agreement on Recording Practices, Section 10

Performance evaluation and approval of official permanent identification devices

Part 1: Conventional permanent plastic eartags with or without machine readable printing

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Foreword

The International Committee for Animal Recording (ICAR) is an organisation with more than 50 members, worldwide. Its main interest is standardisation of procedures and methods used in recording of livestock and to establish test procedures for the approval of equipment and methods of recording. For many years, ICAR has had the responsibility for registration systems used in animal recording, which includes individual animal recognition through reliable permanent identification devices.

As the demand for identification strongly increases, more and more emphasis is placed on the need for permanent identification devices. As a result, there is a need to develop standardisation at the international level and to implement quality control of permanent identification devices used for official identification purposes.

Introduction

Permanent identification devices can be divided into two categories: simple identification devices such as conventional plastic or metallic eartags, which may have both visual and machine readable symbology (e.g numerals and barcodes), and electronic identification devices like RFID transponders and the corresponding transceivers.

The ICAR Subcommittee on Animal Identification proposes a procedure for testing the performance and reliability of identification devices, which considers the following issues:

- ease of application and use,
- efficiency of animal recognition,
- durability and tamperproof quality,
- animal welfare.

The following procedures focus on testing the eartag design, printing method and machine readability (if relevant). Specific colours in which the eartag may be available are not assessed and their suitability for a particular task needs to be considered by the purchaser. The procedures do not deal with issues such as recycling and compliance with relevant environmental legislation. It is the responsibility of the manufacturer to comply with the environmental requirements of a particular jurisdiction.

Where eartags are intended for use in official identification schemes, it is the responsibility of the manufacturer to comply with the requirements of a particular jurisdiction, which relate to non-reusability and tamperproof nature of the device.

The different steps that can lead a manufacturer to initially obtain and then retain an approval for a product are described in this document.

The approval procedure is composed of different parts:

- a phase of formal application by the manufacturer where he undertakes to fulfil different requirements and provides technical information concerning the test product. This phase includes preliminary basic tests,
- a phase of laboratory tests, which constitutes the first step of technical evaluation,
- a phase of preliminary field tests, which can lead to a provisional approval,
- a continuation of the field tests, which can lead to a full approval.

A provisional approval may be granted after a rather short observation period (preliminary field tests) and, in the case of durable favourable results in practical tests, later transformed to a full approval. The full approval provided by ICAR, will indicate the conditions under which the



field tests were conducted and comment on the level of performance of any machine-readable code if it is present on the tag.

Test procedures as laid down in this document, have to be carried out by test institutes approved by ICAR. The fee for the test will be borne by the manufacturer of the device to be tested.

All the approvals are for a specified time period: an approved product can have its approval withdrawn in the event of unexpected poor results over a long term period or if the manufacturer doesn't comply with the requirements to which he/she has subscribed. ICAR will randomly take samples of approved tags from the market place and subject them to appropriate testing to ensure that approved eartags continue to meet ICAR standards. The manufacturer will be required to meet the costs of these assessments.

Also, the manufacturer is responsible for advising of any field performance of products which is not in accordance with previous test results. It is also his/her responsibility to inform ICAR of any change related to the composition or the print quality of an approved tag.

When an eartag is approved by ICAR, the manufacturer will be able to indicate that tags of that particular design (where the front and/or rear plate is not larger than the tested eartag viz. same "family") and printing method have been approved by ICAR. However, the manufacturer should not imply that specific colours of that tag meet the ICAR specifications. Likewise full approval does not imply that the tag is suitable for all environments or that its machine-readable characteristics are satisfactory. Users of eartags will be encouraged to access appropriate ICAR publications to obtain a list of provisionally approved and fully approved tags.

A procedure for subsequently obtaining approval for eartags of a particular design (i.e. same "family") that has already been approved (listing procedure) is outlined in Section 4 of this document. The fee for listing an eartag will be that fee applying for preliminary testing of an eartag.

Scope

This document specifies the requirements that conventional permanent plastic eartags, which may include machine readable printing, must fulfil to be approved by ICAR as permanent official identification devices. Procedures to evaluate the performance of the eartags against the requirements, are described.

Conventional eartags with machine readable printing, include eartags with the following machine readable technologies:

- bar code,
- multi-dimension code,
- automatic recognition of characters.

A separate protocol is proposed for plastic eartags with RFID transponders.

Conventional eartags with machine readable printing submitted to ICAR for approval, may have their visual and machine readable printing evaluated according to this protocol. It is the responsibility of the manufacturer to indicate if the machine readable printing is to be evaluated.

Successful completion of the procedures described in this document results in the registration of the approved eartag (including eartags of the same chemical composition, locking mechanism and design but with neither the front and/or rear plate (male element) no larger than the tested eartag) as a device that is recommended for official identification purposes.



References

The titles of standards referred to in this document are as follows:

- ISO standard 175 : Resistance of thermoplastics to liquids
- ISO standard 1822: Resistance of vulcanized elastomers to liquids
- ISO standard 6427 : Plastics - Determination of matter extractable by organic solvents (conventional methods)
- ISO standard 4650 : Rubber - Identification - Infrared spectrometric method
- ISO standard 9924: Determination of composition of vulcanized elastomers
- ISO standard 11358: Determination of composition of thermoplastics
- ISO standard 9352 : Plastic- Determination of resistance to wear by abrasive wheels
- ISO standard 527-1 : Plastics- Determination of tensile properties part 1: General principles
- ISO standard 37 : Rubber, vulcanised or thermoplastic - Determination of tensile stress-strain properties

The latest version applies.

Definitions

Approval code

An alphanumeric code consisting of “A” (for approved), followed by 3 numeric digits. The approval code is used to identify and register an eartag model that has successfully passed the approval procedure. This code has to be embossed on all ICAR approved eartags for official identification. The placement of the approval code on the eartag should conform with the requirements of any applicable national legislation.

Eartag or tested eartag

The eartag model that is submitted for testing under the approval procedure and described in the application form. However, approvals will also apply to tags of the same “family” i.e.: same chemical composition; same locking mechanism, and same shape, except where front and/or rear plate is larger than the tested eartag. An eartag is composed of 2 or 3 principal elements:

- the front plate which constitutes the so called “female” part,
- the rear plate, which, when it includes the pin in the case of an eartag composed of 2 elements, constitutes the “male part”,
- the pin which constitutes the “male” part in the case of an eartag composed of 3 elements.

Listing

Approval of an eartag from a “family” of eartags that has already received approval.

Manufacturer

The company or person that submitted the application for the approval of an eartag and accepted the conditions of ICAR for the control of production as set out in Section 3 of this document.



Reference colour

The colour of the eartags that are used in the laboratory tests is yellow with black printing (i.e. black except for laser print). For field tests, the colours of the eartags and printing are the official colour used in the country in which the test takes place.

Reference eartag

The eartag model that is used to ensure that test conditions on each farm are acceptable. Reference eartags are chosen by ICAR from among the models that have already been approved.

Reference number

Printing composed of 4 different and predefined figures (from 0 to 9) in bold Arial style, each figure separated by a blank space of 2 mm, to enable the assessment of the eartag for readability. The size of the figures is the maximum that will allow 4 numbers to be printed according to these specifications on the same line on the eartag.

Test code

An alphanumeric code consisting of “T” (for tested), followed by 3 numeric digits. The test code is used to identify and register an eartag model that is tested in the field under the approval procedure. This code has to be printed or engraved on all tested eartags used during the approval procedure.



1. Participation in test procedure to gain ICAR approval

1.1 Application from manufacturers

When a manufacturer wishes to submit an eartag for ICAR approval, he/she has to complete an application and forward it to the Chairman of ICAR's Subcommittee on Animal Identification and also send a copy to the Secretary General of ICAR.

The application comprises a letter of application and application form (Annex 1), which can be obtained from the Chairman of the Subcommittee on Animal Identification or from the ICAR secretariat.

By signing the application form, the manufacturer agrees to fulfil the conditions of ICAR with respect to the test procedure, including the payment of the applicable charges and the monitoring and assessments that are applicable for approved eartags.

1.2 Preliminary assessment of the eartags

The manufacturer will deliver a sample of 100 eartags marked with the reference printing and 2 pliers. In situations where the eartags have machine readable printing, the manufacturer should indicate whether this printing is to be evaluated. If so, a reader must be supplied. The reader does not have to be commercially available from the eartag manufacturer but it does have to be commercially available for use in farm and allied situations. Readers should be able to read tags with non-ISO standard printing, but the printing must meet the standards for print quality in this protocol.

Where machine readability is to be assessed, the application should specify the type of symbology (language) on the tag, e.g. Quick Response (QR) Model 2, Data Matrix (DM) ECC 200, Aztec, Code 128, Code 39 or Interleaved 2 of 5. The applicant should indicate if AIM (Automatic Identification Manufacturers International Inc) quality standards (code dimensions) have been met.

In order to assess conformance of the eartags with the information given in the application form and to detect any major failure (damage of the tag at application, possible unlocking without deformation, inappropriate design considering welfare requirements), the eartags will be submitted to some preliminary assessments, conducted by an ICAR approved technician.

Based on visual assessment, the technician will determine if the requirements and recommendations concerning the following tamperproof aspects are met.

Step 1: preliminary assessment of locking followed by attempted unlocking will be undertaken on 60 eartags of which 30 will be heated to 80°C ±5°C (after locking and before the attempted unlocking).

Step 2: a second set of assessments including application to animals' ears in a slaughter house to simulate field conditions. Forty eartags will be applied.

To be sure that the application of the eartag suits all categories of animals, young and adults, the technician will use ears from animals which are more than 18 months of age.

The required standards to be achieved by the submitted eartags, to enable further consideration of the application are:



STANDARD TO BE ACHIEVED AT STEP 1 TEST	STANDARD TO BE ACHIEVED AT STEP 2 TEST
none of the 60 eartags: <ul style="list-style-type: none"> - has been broken at locking, or - presents any deformation after locking or - has been unlocked without breaking or damaging 	none of the 40 eartags: <ul style="list-style-type: none"> - has been broken at locking, or - presents any deformation after locking, or - has been unlocked without breaking or damaging

The following preliminary assessment of machine readability (Step 3 Test) will be undertaken only where eartags are supplied with machine readable printing and the manufacturer has requested those printing be evaluated. Where this test is to be performed, it should occur before tags are subjected to heating in the Step 1 Test and application to animal's ears in the Step 2 Test.

Step 3 (Optional – Manufacturer to advise if test is required):

For eartags with linear barcodes, the “Quiet Zone” or margin at each end of the barcode should be at least 5mm. The height of the barcode should be at least 8 mm. For both linear and 2D type barcodes, preliminary assessment of machine readability and print quality will be undertaken on 100 tags and 20 tags respectively in a laboratory situation. In the machine readability component of the test, the tags will be each read with the reader supplied and the number of attempts required for successful reading (up to maximum of four attempts for each tag) will be recorded. The standard of performance to be reached is set out in the next table:

STANDARD TO BE ACHIEVED AT STEP 3 TEST MACHINE READABILITY	
SCAN	NO. OF TAGS SUCCESSFULLY READ
First	95
First and Second	98
First, Second and Third	99

The linear barcodes are assessed for print quality using QUICK CHECK software. The standards to be met are:

CHARACTERISTIC	STANDARD
Dimension of Data	P
Print contrast signal	75 or above
Message format	P

The print contrast signal (PCS) for linear barcodes, is a traditional comparison of bar and space reflectance. It is measured as the ratio of the difference of space and bar reflectance to space reflectance, or $PCS = (R(L) - R(D)) / R(L)$. The PCS grade is **Pass** when PCS is at or above 75% ; or else the grade is **Fail**.

In the print contrast component of the test for 2D barcodes, the QR code and DM tags are assessed for print quality using QR checker software that complies with the AIM International standards. The QR and DM code tags are scanned by a flat bed scanner and the images that have been scanned are checked by the QR code checker software. Each image scanned has a report



for the following parameters, which are referenced in the AIM International standards, section “M” under “Matrix Code Print Quality Guideline:

1. Decode Quality
2. Symbol Contrast
3. Print Growth X-axis
4. Print Growth Y-axis
5. Axial Non-uniformity”

A scale of A (highly satisfactory) to F (unsatisfactory) is used to record the print quality for each characteristic.

When determining overall print quality, the final score for the code on a tag is the worst grade recorded for any of the assessed parameters.

In relation to QR and DM symbologies, the following print quality specification, as outlined in the next table should be met:

CHARACTERISTIC	PRINT GRADE
Decode (the only grades used are A and F)	A
Symbol contrast (white tags)	A
Symbol contrast (tags other than white)	no worse than D
Print growth X axis and Y axis	A/A, A/B or B/A
Axial non-uniformity	A

Where an eartag fails the Step 3 Test, its machine readable characteristics will not be subjected to the subsequent laboratory testing. However, the manufacturer will be advised in the report from ICAR of the standards achieved by the machine readable printing.

The Chairman of the Subcommittee on Animal Identification will inform the manufacturer of the results of the Preliminary Assessment.

1.3 Completion of the preliminary basic test phase

Assuming that the application form has been satisfactorily completed, the preliminary assessment is satisfactory and the eartags and pliers don't present any obvious major failure, the manufacturer can submit the eartags for tests and assessments as described in the following pages.

1.4 Assigning a test centre

Following successful completion of the preliminary assessment, the Chairman of the Subcommittee on Animal Identification will assign an ICAR-approved test centre to undertake laboratory assessments and measurements on the eartags.

The Chairman will transmit a copy of the application form to the test centre so that the technical information provided by the manufacturer can be verified.

1.5 Granting of a test code

A specific test code will be allocated to the eartag under test, by the Chairman of the Subcommittee on Animal Identification. The manufacturer will be advised of the test code so that it is printed or engraved on each eartag produced for subsequent tests.



2. Description of laboratory and field tests and assessment procedures

2.1 Laboratory tests

After satisfactory completion of the preliminary basic test phase, the laboratory tests can commence in the test centre assigned by ICAR's Chairman of the Subcommittee on Animal Identification.

Prior to this testing, the manufacturer has to deliver to the assigned test centre, **100** yellow eartags marked with the test code and reference printing and 2 pliers. The manufacturer has to specify the nature of the polymer used for the eartag, i.e. thermoplastic elastomer (subsequently referred to as thermoplastic) or vulcanized elastomer. The manufacturer will be allocated 25 reference numbers (Annex 2) to print on the 100 eartags (i.e. 4 tags with each reference printing).

In situations where the eartags have machine readable printing, and the manufacturer requests that this printing be evaluated, the machine readable printing on the eartags will include the 4 digits of the reference number, preceded in the barcode by 10 digits. In addition, a reader must be supplied. The reader does not have to be commercially available from the eartag manufacturer but it does have to be commercially available for use in farm and allied situations. Readers should be able to read tags with non-ISO standard printing but printing must meet the standards for print quality in this protocol.

2.1.1 Assessment of descriptive parameters

The different parameters that describe the eartag will be assessed and when possible, compared to the information provided in the application form to ensure accuracy of description.

2.1.1.1 Weight and dimensions

Weight of the complete locked eartag and the dimensions (height, width and thickness) of the front plate, rear plate and pin will be measured.

2.1.1.2 Composition of the device

Several criteria which define the composition will be evaluated.

2.1.1.2.1 Characteristics of the plastic of the eartag plate

A sample is placed in a solvent solution which is then submitted to centrifugation. The resulting liquid is placed and dried on a slide of glass.

The film of residue on the glass slide is submitted for IR analysis, which will characterise the plastic raw material (ISO standard 4650).

2.1.1.2.2 Plastifying agent of the eartag plate

The plastifying agent will be extracted from a sample placed in a soxhlet full of ether (ISO standard 6427: Plastics - Determination of matter extractable by organic solvents [conventional methods]). After evaporation of ether, the characteristics of the extracted material will be determined by IR analysis (ISO standard 4650: Rubber - Identification - Infrared spectrometric method).

2.1.1.2.3 Proportions of organic, carbon and mineral content (of the front plate, excluding the locking mechanism)

These criteria will be determined by subjecting a sample to increasing temperatures and measuring the decreasing weight at different critical points (ISO 9924 for composition of vulcanized elastomers and ISO 11358 for composition of thermoplastics).

	TEMPERATURES	GRADIENT OF TEMPERATURES	ATMOSPHERE
Phase 1	from 30°C to 60°C	20 °C / min	N ₂
Phase 2	from 60°C to 600°C	20 °C / min	N ₂
Phase 3	from 600°C to 850 °C	20 °C / min	O ₂

2.1.1.2.4 Mineral measurements after burning (detection of toxic atomic elements)

The (above) residue of incineration will be analysed by means of a X spectrometer.

The presence of elements known for their allergic, toxic or severely polluting effect will be recorded.

2.1.2 Performance assessment

The following table summarises the various treatments to be conducted before particular characteristics are assessed:

Tested characteristic	Unused Tag							Aged Tag		
	Un-treated	Heat & Humidity 23°C	acid bath	alkaline bath	abrasive treatment	micro-organisms	ear wax	Un-treated	Heat & Humidity 23° C	abrasive treatment
Resistance of the locking system		✓							✓	
Visual readability	✓				✓			✓		✓
Machine readability	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

* An aged tag is a tag that has been subjected to the accelerated ageing process.

2.1.2.1 Protocols for the different treatments

These treatments are to prepare tags for subsequent testing, as outlined in the following sections.

2.1.2.1.1 Heat and humidity treatments

The tag is placed for 3 hours in a box at 23°C and with a relative humidity of 50 %.

2.1.2.1.2 Protocol for the acid bath treatment

Immersion for 3 weeks in a 50°C acid liquid (pH = 3) - ISO standard 175 for thermoplastics; ISO standard 1822 for vulcanized elastomers.

2.1.2.1.3 Protocol for the alkaline bath treatment

Immersion for 3 weeks in a 50°C alkaline liquid (pH = 12) - ISO standard 175 for thermoplastics; ISO standard 1822 for vulcanized elastomers.

2.1.2.1.4 Protocol for the abrasive treatment

The ISO 9352 standard (Plastic- Determination of resistance to wear by abrasive wheels) is used to create a level of abrasion based on 900 cycles of abrasion in a 23 °C atmosphere.

2.1.2.1.5 Protocol for the accelerated ageing process

The accelerated ageing process consists of 180 simulated climatic cycles (about 1000 hours) each being comprised as follows:

CLIMATIC CYCLE *	TEMPERATURE	HUMIDITY AND LIGHT	DURATION OF THE PHASE
<i>Phase 1</i> – rain effects	20°C	simulated rain - no light	30 min
<i>Phase 2</i> – cold effects	-20°C	cold - no light	60 min
<i>Phase 3</i> – heat and humidity of air effects	55 °C	humidity of air = 95 %	60 min
<i>Phase 4</i> – dry heat and light effects	55 °C	Irradiance : 0.55 W/m ² at wavelength 340nm Total light power emitted P = 623 W/m ² Spectrum : 300 – 800 nm Arc xenon UV light Inner and outer filters in borosilicate the radiant heat is produced by a black board of anodised aluminium with temperate of 55°C	80 min

* The rate of temperature change between each phase is 2° C/min.

2.1.2.2 Readability assessment

This assessment consists in a readability comparison of numbers printed on eartags (treated and untreated) with numbers printed on paper.

2.1.2.2.1 Protocol for the evaluation of visual readability

Five untreated tags and five tags from each of the following treatment groups will be selected for assessment:

- Unused tag without treatment
- Unused tag with abrasive treatment
- Aged tag without treatment
- Aged tag with abrasive treatment

The colour of the 5 test tags from each treatment group will be yellow with black printing.

For each of the 5*4 (number of test tags*number of treatment groups) single tags in the assessment procedure a page of paper carrying a number given in Annex 2 will be prepared. The paper to be used will be white with black printing.

The font size, print style and space between the digits will be the same for the printed numbers on both the eartag and the page.



To commence the assessment, the 4 eartags for testing and 4 pages with randomly chosen numbers are successively placed on a vertical surface at head height (viewing surface) in a random order.

The testing laboratory is to ensure appropriate lighting and that assessors have appropriate eyesight to undertake this aspect of the testing protocol. Five assessors initially standing at a distance of 15 meters from the viewing surface, commence walking towards it, successively trying to read the numbers on different eartags and pages. For each assessor, the distance at which each device (tag or page) initially can be read without mistake, will be registered in an evaluation sheet as given in Annex 3. The mean reading distances for the pages and for the eartags will be separately calculated for each assessor and for the average of the assessors.

2.1.2.2.2 Minimum requirements for visual readability

Unused tag without treatment

The mean distance at which the reference printing is read on the eartags must be at least 80 % of the mean distance at which the pages are read.

Unused Tag with abrasive treatment and aged tag with and without abrasive treatment

The mean distance at which the reference printing is read for the eartags should not be less than 65 % of the mean distance at which the pages are read.

2.1.2.2.3 Protocols for the evaluation of machine readability (This section only applies when a manufacturer has requested that machine readability is evaluated).

Protocol for the evaluation of print quality of symbology

The linear barcode eartags subjected to various treatments are assessed for print quality using QUICK CHECK software. The standards to be met for these eartags after various treatments are:

CHARACTERISTIC	STANDARD
Dimension of Data	P
Print contrast signal	75 or above
Message format	P

The print contrast signal (PCS) for linear bar codes, is a traditional comparison of bar and space reflectance. It is measured as the ratio of the difference of space and bar reflectance to space reflectance, or $PCS = (R(L) - R(D)) / R(L)$. The PCS grade is **Pass** when PCS is at or above 75% ; or else the grade is **Fail**.

The 2D code tags subjected to various treatments, are assessed for print quality using checker software which complies with the AIM International standards. Testing will be performed in a laboratory that complies with ISO standard requirement.

The 2D code tags are scanned by a flat bed scanner and the scanned images are checked by the code checker software. Each image scanned has a report for the following parameters, which are referenced in the AIM International standards, section “M” under “Matrix Code Print Quality Guideline”:

1. Decode Quality
2. Symbol Contrast
3. Print Growth X-axis
4. Print Growth Y-axis
5. Axial Non-uniformity”



A scale of A (highly satisfactory) to F (unsatisfactory) is used to record the print quality for each characteristic.

When determining overall print quality, the final score for the code on a tag is the worst grade recorded for any of the assessed parameters.

The standard of symbology should be no more than one print quality grade below that for each parameter on an unused tag without treatment (see Step 3 Test above).

Protocol for the Evaluation of scanning performance

The tags subjected to various treatments are scanned with the reader supplied by the tag manufacturer.

Each tag from each treatment is scanned a minimum of 100 times to give a minimum number of readings of 1000 readings per treatment. The tags from a treatment are scanned in sequence and after the initial tag is successfully read or scanned a maximum of four times, the second tag is scanned until successfully read or scanned a maximum of four times. This procedure is repeated for each tag in the treatment group and after the last tag is scanned, the scanning recommenced (Run 2) with the first tag. A total of 100 Runs are needed to obtain sufficient data to assess performance.

The number of scans required to successfully read each tag (e.g. one, two, three or four) in each Run is recorded.

Data is tabulated so that the percentage of tags, from each treatment group, successfully read after the first scan, the first and second scan combined, a total of the first three scans, is shown. The performance of the tag is assessed against the minimum performance standards shown below:

PREFERRED PERFORMANCE TO BE ACHIEVED AT SCANNING	
SCAN	TAGS SUCCESSFULLY READ (%)
First	95
First and Second	98
First, Second and Third	99.7

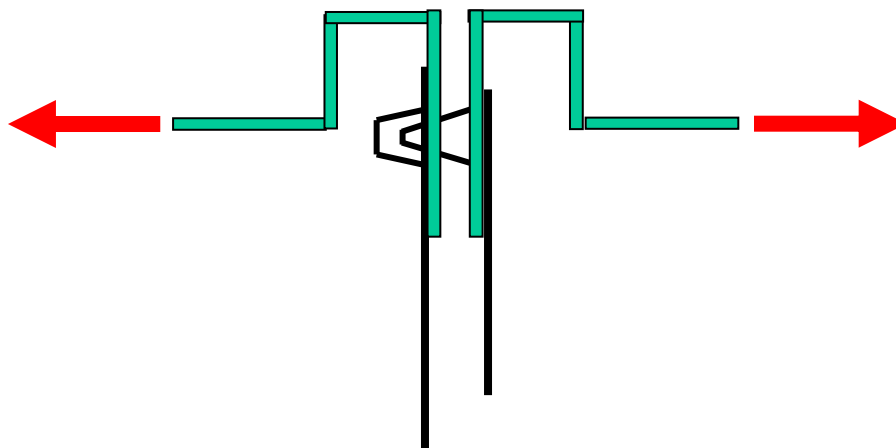
The scanning performance achieved for each treatment, would be described in the Report on the performance of a tag under laboratory conditions.

2.1.2.3 Protocol for the evaluation of the resistance of the locking system

Five untreated (unused tag without treatment) eartags and five aged eartags each having been subjected to the heat and humidity treatment, will be subjected to increasing forces to determine the force required to cause breakage or unfastening of the eartag (Note: an additional untreated eartag will be required to enable the mechanical testing machine to be calibrated).

The forces will be applied at a rate of 500 mm/min. For the aged eartags, they will be applied immediately after the tags are removed from the heat box. The force applied to cause breakage or unfastening of each eartag will be recorded. The mean force applied to the untreated eartags should not cause breakage or unfastening at 280 Newton or less with a standard deviation of 20 Newton. For aged eartags the equivalent value should be 250 Newton or less with a standard deviation of 20 Newton.

The following diagram illustrates how the forces should be applied:



2.1.3 Conclusion of the laboratory tests

The test centre will prepare a report of the tests and will send 2 copies to ICAR's Chairman of the Subcommittee on Animal Identification. It should be noted that all information collected during the laboratory tests will be treated as confidential and only disclosed to the manufacturer of that eartag.

If the results are satisfactory, the Chairman will advise the manufacturer that preliminary field tests can commence.

However, if the results are unsatisfactory, the manufacturer will be advised that the procedure will cease and a copy of the report will be provided.

It should be noted that the report will only comment on machine readability if evaluation has been requested by the manufacturer. Machine readable printing will **not** be classified as, satisfactory/unsatisfactory, but the Report will describe the standards achieved.

2.2 Preliminary field tests

A short-term period of field tests, called preliminary field tests, is required to check the performance of the eartags when applied to livestock, prior to a decision to grant or refuse a provisional approval being taken. The preliminary field tests will be for a period of 3 months but eartags will remain in the cattle for a further 9 months (extended field test).

The Chairman of the Subcommittee on Animal Identification will select the country in which the preliminary field tests should be located (at least 2 countries will be selected) and assign the ICAR approved test organisation to co-ordinate these tests.

The use of reference eartags in this test is to indicate if a particular farm has abnormal tag performance, in which case the data will be excluded from the analysis.

After excluding abnormal data, assessment of test tags will be based on their actual performance, not their performance relative to the reference eartags.



2.2.1 Experimental plan and general organisation

2.2.1.1 Experimental plan

A set of farms will be established so that 400 young animals can be tagged within a 3 months period within each country. Two hundred animals will receive test eartags, the other 200 will receive reference eartags.

Each animal will receive 2 identical eartags, that will be applied within 15 days of birth. The approved agent in charge of each test in each country will select a set of farms in that country knowing that :

- each selected farm should have at least 30 births per year,
- the animals participating in the test will remain for at least 3 months (but preferably 12 months) after tagging on the farm where they are born,
- the total number of farms in the set has to be at least 8,
- on each test farm, the number of animals tagged with 2 tested eartags should approximately be equal to the number of animals tagged with 2 reference eartags.

The manufacturer whose eartags are tested, will provide a pair of pliers and a set of reserve pins to each farmer.

2.2.1.2 General organisation

The application of the eartags and the collection of observations will be by the farmers themselves.

At the beginning of the test

The farmers will be invited to a presentation at which:

- application of the test eartags will be demonstrated and advice on the correct use of the materials may be provided by the manufacturer,
- an agent of the test organisation will present details about the specific pre-registered forms (see Annex 4) that farmers will use to collect the experimental observations and the farmer's personal comments.
- copies of the form will be distributed
- the farmers will be informed of the name of the agent of the test organisation to whom they will have to refer.

During the test period

At application, the farmers will, as much as possible, select alternate animals for the test eartags and reference eartags so that the environmental conditions at the time the application of tags occurs, are equivalent for test and reference eartags.

The farmers will collect the data on a daily basis if possible, and retain all lost or broken tags that they find.

In situations of major problems related to the eartags, the farmers will contact their agent. The agent will inform the manufacturer so that a visit to the farm, in the company of a manufacturer's representative, may be organised.

At the end of the test period

Three months after the application of the last eartags, the farmers will return completed forms and defective eartags to their agent.



2.2.2 Recording (see Annex 4)

The information that will be collected when both test and reference eartags are applied is as follow:

- general information: see page 1 and 2 of Annex 4,
- results of application of the tags: see page 3 of Annex 4,
- suitability of the pliers.

Additional comments may also be collected (e.g. opinion on the packaging of the eartags).

In the 3 months following the application of the eartags, the farmers will register on the recording form: animals with healing problems (such as infection or necrosis), losses of tags, broken tags, unreadable tags, tags with changes of colour or deformation (see page 4 of Annex 4).

When it occurs, the date when an animal belonging to the test leaves the farm, will also be recorded (Annex 4, page 4).

2.2.3 Data analysis

In situations where a farm records poor results (i.e. greater than 5 percent loss; greater than 5 percent necrosis) for each of the 2 models of eartags (i.e. reference and test eartags), it will be excluded from the data analysis.

Considering the farms that remain in the data analysis, the total percentage of each event (broken tag at application, deformed tag at application, healing problems, losses) will be calculated for the test eartag.

Also the farmers' evaluation of the pliers, percentage of broken tags and deformed tags at application, will be compiled for information purposes.

2.2.4 Conclusion

If, at the conclusion of the preliminary field test, the test eartag shows a retention rate (i.e. based on number of successfully applied eartags) greater than or equal to 99 % and if there is a necrosis rate equal to or less than 3%, provisional approval may be granted.

The test organisation will prepare a report of the preliminary field tests and will send 2 copies of it to ICAR's Chairman of the Subcommittee on Animal Identification. The Chairman will inform the manufacturer of the results of the laboratory tests and the preliminary field tests.

Considering both laboratory and preliminary field tests results, the Board of ICAR will advise the manufacturer whether a provisional approval has been granted and the enlarged field tests can be performed or further evaluations cease because of unsatisfactory performance of the eartag.



2.3 Extended field tests

Following the preliminary field tests, extended field tests are required to check the medium term performance of the eartags when applied to livestock, prior to a decision to grant or refuse a full approval being taken. The extended field tests will be for a period of 9 months, which follow immediately after the 3 month preliminary field tests.

The use of reference eartags in this test is to indicate if a particular farm has abnormal tag performance, in which case the data will be excluded from the analysis.

After excluding abnormal data, assessment of test tags will be based on their actual performance, not their performance relative to the reference eartags.

2.3.1 Experimental plan and general organisation

2.3.1.1 Experimental plan

- The set of farms and animals that were used for the preliminary field tests will be used for the extended field tests.
- The aim should be to have a minimum of 100 animals with test eartags and 100 animals with reference eartags at the conclusion of the extended field test. If this is not probable with the farms involved in the preliminary test, additional farms/animals will need to be recruited.

2.3.1.2 General organisation

The application of the eartags and the collection of observations will be by the farmers themselves.

During the extended test period

The farmers will collect the data on a weekly basis if possible, and retain all lost or broken tags that they find.

In the case of major problems related to the eartags, the farmers will contact their agent. The agent will inform the manufacturer so that a visit to the farm, in the company of a manufacturer's representative, may be organised.

At the end of the extended test period

Twelve months after the application of the last eartags, the farmers will return completed forms and defective eartags to their agent.

2.3.2 Recording (see Annex 5)

The information that will be collected during the extended field test is as follows:

- general information: see page 1 of Annex 5,

In the 9 months following the preliminary field test, the farmers will register on the recording form: animals with healing problems (such as infection or necrosis), losses of tags, broken tags, unreadable tags, tags with changes of colour or deformation (see page 2 of Annex 5).

When it occurs, the date when an animal belonging to the test leaves the farm, will also be recorded. (Annex 5, page 2).



2.3.3 Data analysis

In situations where a farm records poor results (i.e. greater than 5 percent loss; greater than 5 percent necrosis) for each of the 2 models of eartags (i.e. reference and test eartags), it will be excluded from the data analysis.

Considering the farms that remain in the data analysis, the total percentage of each event (broken tag at application, deformed tag at application, healing problems, losses) will be calculated for the test eartag.

Also the farmers' evaluation of the pliers, percentage of broken tags and deformed tags at application, will be compiled for information purposes.

2.3.4 Conclusion

If, at the conclusion of the extended field test, the test eartag shows a retention rate (i.e. based on number of successfully applied eartags) greater than or equal to 98 % and if there is a necrosis rate equal to or less than 3%, full approval may be granted. The calculation of the retention rate and the necrosis rate is based on the full period of preliminary field test and extended field test. The data must include a minimum of 100 reference and 100 test eartags.

The test organisation will prepare a report of the extended field tests and will send 2 copies of it to ICAR's Chairman of the Subcommittee on Animal Identification. The Chairman will inform the manufacturer of the results of the laboratory tests, the preliminary field tests and the extended field tests.

Considering both laboratory, preliminary field test and extended field test results, the Board of ICAR will advise the manufacturer whether a full approval has been granted.



3. Conditions for granting, maintenance and use of ICAR approvals

3.1 Conditions for the granting of a provisional approval

Based on laboratory test results and preliminary field test results, ICAR's Subcommittee on Animal Identification will recommend whether a provisional approval should be given or not.

In cases where a provisional approval is granted, the phase of extended field tests, will proceed which must be successfully completed to obtain a full approval.

The Board of ICAR will inform the manufacturer of the decision that has been taken regarding provisional approval. This advice will also include a description of the conditions (e.g. locations, enterprises, types of housing) for the preliminary field test, as well as performance of machine readable printing, if requested.

The details of eartags (including tags of the same "family" of eartags) receiving provisional approval will be made publicly available by ICAR.

3.2 Conditions for the maintenance/withdrawal of a provisional approval

If an eartag fails an extended field test, its provisional approval will be withdrawn by ICAR.

3.3 Conditions for the granting of a full approval

Full approval will be granted by ICAR if the eartag has met the standards established for laboratory testing and the extended field test, and the manufacturer has signed an appropriate undertaking regarding production of future eartags to the standard of the test eartags.

The Board of ICAR will inform the manufacturer of the decision that has been taken regarding full approval. This advice will also include a description of the conditions (e.g. locations, enterprises, types of housing) for the extended field test, as well as performance of machine readable printing, if requested.

The details of eartags (including tags of the same "family" of eartags) receiving full approval will be made publicly available by ICAR.

3.4 Conditions for the maintenance/withdrawal of a full approval

ICAR reserves the right to withdraw its approval of an eartag if its long-term field performance is unsatisfactory or the manufacturer significantly alters the design, composition or printing of the eartag. In addition, ICAR has the right to periodically conduct an unannounced test regardless of whether an approved eartag fulfils the conditions set out in this document.



4. Listing procedure to gain ICAR approval

4.1 Application from manufacturers

When a manufacturer wishes to submit an eartag for ICAR approval via the listing procedure, he/she has to complete an application and forward it to the Chairman of ICAR's Subcommittee on Animal Identification and also send a copy to the Secretary General of ICAR.

The application comprises a letter of application and application form (Annex 6), which can be obtained from the Chairman of the Subcommittee on Animal Identification or from the ICAR secretariat.

By signing the application form, the manufacturer agrees to fulfil the conditions of ICAR with respect to the test procedure, including the payment of the applicable charges and the monitoring and assessments that are applicable for approved eartags.

A manufacturer may only apply for approval via the listing procedure if the manufacturer has an eartag previously approved by ICAR, which is in the same "family" as the eartag submitted for approval by listing. The same "family" means the same chemical composition, locking mechanism and design but with neither the front and/or rear plate no larger than the previously approved eartag.

4.2 Assessment of the eartags submitted for listing

The manufacturer will deliver a sample of 100 eartags, comprising 50 approved eartags and 50 eartags of the model to be approved by listing. The eartags to be assessed should be marked with the reference printing. Two pliers suitable for each model of eartag should be included.

Conformance of the eartags to be listed with the information given in the application form and the previously approved eartags will be assessed by an ICAR approved technician.

4.3 Conclusion

If the technician determines that the eartags submitted for listing should be considered to be members of a previously approved "family" of eartags, the Chairman of the Subcommittee on Animal Identification will be advised with a written report.

The Chairman will inform the manufacturer of the results of the assessment.

Considering the assessment, the Board of ICAR will advise the manufacturer whether an approval to list the eartag model within a "family" of approved eartags, has been granted.

Conditions for maintenance/withdrawal of a full approval (Section 3.4), apply to eartags that have gained approval via the listing procedure.



Annex 1: Application form

Application form for ICAR approval of Official Permanent Identification Devices: Conventional Permanent Plastic Eartags with or without machine readable printing		
Applicant's Name	Applicant's Address	
<i>Owner of eartag design:</i>	<i>Address of owner:</i>	
Device Name and Model Number:		
<i>Device Type:</i>		
<i>Machine readable printing:</i>	YES <input type="checkbox"/>	NO <input type="checkbox"/>
<i>Printing to be assessed:</i>	YES <input type="checkbox"/>	NO <input type="checkbox"/>
<i>Description of machine readable printing:</i>		
<i>Description of pliers that must be used to apply tag:</i>		
Physical Characteristics:		
<i>Shape:</i>		
<i>Weight:</i>	<i>Locking system:</i>	
<i>Colour:</i>		
<i>Material:</i>	<i>Type of Plastic:</i>	
<i>Specification of raw material:</i>		
<i>Metallic Parts: NO <input type="checkbox"/> YES <input type="checkbox"/> , if yes, description of the parts and type of metal:</i>		
Device is useable for:		
<i>cattle Y/N</i>	<i>horses Y/N</i>	<i>laboratory animals Y/N</i>
<i>sheep Y/N</i>	<i>pigs Y/N</i>	<i>other:</i>
<i>goats Y/N</i>	<i>companion animals Y/N</i>	
Photograph of the Device (attach):		
OTHER MODEL NUMBERS TO BE INCLUDED UNDER THIS APPLICATION (attach descriptions and photographs: 50 eartags of each model that is to be considered for inclusion within this "family" of eartag.		
The undersigned agrees to abide by all conditions set forth within ICAR's document "Performance Evaluation and Approval of Official Permanent Identification Devices" and specifically agrees to the following:		
Only using the raw material specified in this application, to manufacture tags;		
Submitting the eartags to all tests and paying the fees determined by ICAR;		
Complying with any additional ICAR conditions regarding production and sale, including payment of any fees to maintain approved status; and		
Complying with official rules of each Country where tags are sold.		
Date:	Name:	Position:
Signature:		



Annex 2 – Sets of figures that are to be used as reference printing

Set-No.	Digits
1	8080
2	7117
3	3883
4	5656
5	8808
6	3383
7	1717
8	3038
9	9989
10	4949
11	9444
12	2727
13	2772
14	7222
15	1441
16	1114
17	1414
18	5665
19	6555
20	1234
21	5678
22	9012
23	0888
24	8998
25	8999



Annex 3 – Evaluation sheet for visual readability assessment

		Distance (recorded in meters at a precision of 1 decimal digit: “mm,m”)							
Assessor	No.	Untreated		Abrased		Aged, untreated		Aged, abraded	
		Tag	Paper	Tag	Paper	Tag	Paper	Tag	Paper
1	1								
1	2								
1	3								
1	4								
1	5								
Ass.-aver.	1								
2	1								
2	2								
2	3								
2	4								
2	5								
Ass.-aver.	2								
3	1								
3	2								
3	3								
3	4								
3	5								
Ass.-aver.	3								
4	1								
4	2								
4	3								
4	4								
4	5								
Ass.-aver.	4								
5	1								
5	2								
5	3								
5	4								
5	5								
Ass.-aver.	5								
Average									



**Annex 4 - Page 1 Recording sheet for ICAR preliminary field tests for eartag approval
General information**

Identification of the supervising agent and organisation

Name of the organisation :
Name of the agent :
phone N° :
fax N°:

Identification of the farm

Farm Identification N° :
Name of the owner :
Address:
phone N°:
fax N° :

Characteristics of the farm where the test animals are reared

Animal breed:
Number of adult animals:

	Birth to Weaning	Weaning to 18 Months	Young Adults (21/2 years old)	Breeders
A. Housing: Individual Group				
B. Type of Fencing: Plain wire Plain and barbed wire ringlock electric netting timber iron other: describe: _____				
C. Type of Country: no trees few trees heavy scrub forested feedlot other: describe: _____				

Place tick in appropriate places on matrix.



**Annex 4- Page 2 Recording sheet for ICAR preliminary field tests for eartag approval
Observations concerning the application**

Description of the application conditions

Who applied the eartags : _____

Did you apply any disinfectant or healing substance at the eartag application? Yes No

Comments concerning the application of the eartags

	easy	difficult
Placing the tag in the pliers		
Positioning the pliers with the eartag, in the ear		
Penetration of the pin through the ear		
Achievement of locking		
Removing of the pliers		

Personal evaluation on the eartags (packaging, readability...) or the pliers

**Annex 5 - Page 1 Recording sheet for ICAR extended field tests for eartag approval
General information**

Identification of the supervising agent and organisation

Name of the organisation :
Name of the agent :
phone N° :
fax N° :

Identification of the farm

Farm Identification N° :
Name of the owner :
Address:
phone N°:
fax N° :

Characteristics of the farm where the test animals are reared

Animal breed:
Number of adult animals:

	Birth to Weaning	Weaning to 18 Months	Young Adults (21/2 years old)	Breeders
A. Housing: Individual Group				
B. Type of Fencing: Plain wire Plain and barbed wire ringlock electric netting timber iron other: describe: _____				
C. Type of Country: no trees few trees heavy scrub forested feedlot other: describe: _____				

Place tick in appropriate places on matrix.

Annex 6: Application form for listing of an eartag

Application form for ICAR approval by listing, of Official Permanent Identification Devices: Conventional Permanent Plastic Eartags with or without machine readable printing		
Applicant's Name	Applicant's Address	
<i>Owner of eartag design:</i>	<i>Address of owner:</i>	
Device Name and Model Number:		
<i>Device Type:</i>		
<i>Machine readable printing:</i>	YES Ω	NO Ω
<i>Description of machine readable printing:</i>		
<i>Description of pliers that must be used to apply tag:</i>		
Physical Characteristics:		
<i>Shape:</i>		
<i>Weight:</i>	<i>Locking system:</i>	
<i>Colour:</i>		
<i>Material:</i>	<i>Type of Plastic:</i>	
<i>Specification of raw material:</i>		
<i>Metallic Parts: NO Ω YES Ω , if yes, description of the parts and type of metal:</i>		
Device is useable for:	<i>cattle Y/N</i>	<i>horses Y/N</i>
	<i>sheep Y/N</i>	<i>pigs Y/N</i>
	<i>goats Y/N</i>	<i>laboratory animals Y/N</i>
	<i>companion animals Y/N</i>	<i>other:</i>
Photograph of the Device(attach):		
<hr/> <p><i>MODEL NUMBERS OF EARTAGS PREVIOUSLY APPROVED AND COMPRISING SAME "FAMILY" AS EARTAG SUBMITTED FOR LISTING UNDER THIS APPLICATION (attach descriptions and photographs; provide 50 eartags of each model that has previously been approved and is a member of this "family" of eartags):</i></p>		
<p><i>The undersigned agrees to abide by all conditions set forth within ICAR's document "Performance Evaluation and Approval of Official Permanent Identification Devices" and specifically agrees to the following:</i></p> <p><i>Only using the raw material specified in this application, to manufacture tags;</i></p> <p><i>Submitting the eartags to all assessments and paying the fees determined by ICAR;</i></p> <p><i>Complying with any additional ICAR conditions regarding production and sale, including payment of any fees to maintain approved status; and</i></p> <p><i>Complying with official rules of each Country where tags are sold.</i></p>		
Date:	Name:	Position:
Signature:		