STANDARD OPERATING PROCEDURE

Sample test device distribution for ring tests of RFID devices

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PURPOSE

All ICAR approved laboratories must participate in annual ring test measurements to review uniformity of test results between test laboratories. This Standard Operating Procedure (SOP) outlines the procedures by which ICAR approved laboratories choose the sample device type and then conduct the necessary quantity of test measurements to provide an accurate summary of their individual lab results. ICAR can then review these results to measure overall uniformity between ICAR approved laboratories.

Note: It is automatically assumed within this SOP that the current versions of ISO 24631-1 and ISO 24631-3 are the ISO standards used for conducting the tests pertinent for the Ring Test measurements.

SCOPE

This SOP concerns the ICAR-accredited Test Centres that carry out tests on RFID devices, the Animal Identification Sub-Committee, and the ICAR Secretariat.

TERMS & DEFINITIONS

- Ring test: Part of an external quality assurance programme for a measuring method. A reference institute sends identical samples which must be analysed for special parameters to different laboratories.
- HDX: Half duplex - the tag must store sufficient energy when the receiver's activating field is turned on to allow it to transmit when the activating field is switched off. The HDX tag cannot transmit when the activating field is turned on.
- FDX-B: Full duplex - the tag can transmit immediately when in the presence of the receiver's activating field.

RESPONSIBILITIES

Laboratories: Carry out the ring test and send the results to the Chair of the ID Sub-Committee

Chair of ID Sub-Committee:

ICAR Secretariat: Provide support as requested

PROCEDURE

1. Four RFID device types are chosen of which
   a) two types are HDX and two are FDX-B
   b) every one of the two HDX and FDX-B types have a ferrite coil and an air coil.

Thus, a total of 20 samples will be chosen consisting of:

   a) 5 – FDX ferrite coil
   b) 5 – HDX ferrite coil
   c) 5 – FDX air coil
   d) 5 – HDX air coil

2. All samples will be circulated to the ICAR approved laboratories for the Ring Test measurements in the following order: IMA - DLG - SAIT - IMA. Test duration shall not exceed a four-week period.
3. The measurements are obtained and recorded in one trial for each sample device. Between the trials the samples are completely removed from the Helmholtz coils and test fixtures.
4. The measured parameters will consist of:
   a) Ambient temperature [°C] and relative humidity [%]
   b) Code structure details:

ID code (D), Country code (D), Data block flag (B) 1, Retagging counter (D), User information field (B), Reserved field (B), RUDI bit (B), Animal bit (B), CRC (H) 1

   c) Resonance frequency [kHz], sidebands high/low [kHz]
   d) Minimal activating magnetic field strength [A/m]
   e) Modulation parameters:

FDX-B mode: Modulation amplitude UMA [mV] at 0.6, 1.2, 5 and 10 A/m,

HDX mode: Modulation amplitude UMA [mV] at 0.6, 1.2, 5 and 10 A/m

5. On completion of measurements, each laboratory will send a summary of results to the chair of ICAR SC utilising the ICAR Ring Test Sample Device Measurement Template as outlined in Annex 1.
6. The ICAR SC chair will keep the Ring Test results confidential until each laboratory has submitted the report and any irregularities, mistakes or concerns are communicated and cleared with the respective lab responsible. The reports representing the labs´ best effort will be released to all labs by the ICAR SC chair.
7. At the invitation of the ICAR SC chair a teleconference will be organized to discuss the Ring Test results.

REFERENCE DOCUMENTS

- ISO standard 24631-1: Radio frequency identification of animals - Part 1: Evaluation of conformance of RFID transponders with ISO 11784 and ISO 11785
- ISO standard 24631-3: Radio frequency identification of animals - Part 3: Evaluation of performance of RFID transponders conforming with ISO 11784 and ISO 11785

Annex 1. Sample Device Measurement Template

HDX mode:

Type	ID code	Country code	Data block flag	Retag counter	User info	Reserved field	RUDI bit	Animal bit	CRC	Resonance frequency	Sideband high	Sideband low	Min. activ. field strength
	D	D	B	D	B	B	B	B	H	[kHz]	[kHz]	[kHz]	[A/m]
air coil													
ferrite coil													

Type	Field strength	Modulation amplitude U_{MA}
	[A/m]	[mV]
air coil	0.6	
	1.2	
	5.0	
	10.0	
ferrite coil	0.6	
	1.2	
	5.0	
	10.0	

FDX-B mode:

Type	ID code	Country code	Data block flag	Retag counter	User info	Reserved field	RUDI bit	Animal bit	CRC	Resonance frequency	Sideband high	Sideband low	Min. activ. field strength
	D	D	B	D	B	B	B	B	H	[kHz]	[kHz]	[kHz]	[A/m]
air coil													
ferrite coil													

Type	Field strength	Modulation amplitude U_{MA}
	[A/m]	[mV]
air coil	0.6	
	1.2	
	5.0	
	10.0	
ferrite coil	0.6	
	1.2	
	5.0	
	10.0	

mean value (5) and standard deviation