

HDX Tag Test Procedure

Summary: This document describes a procedure to test ISO11784/5 compliant livestock RFID tags to ensure their form and function is appropriate for commercial animal identification use.

Revision History			
Version	Date	Initials	Description
1.0	19 Mar 2010	LB	First issue
2.0	20 Jul 2010	PK	Incorporation of agreed MLA comments as per email 28 Apr 2010.
2.1	24 Mar 2014	PK	Update to capture improvements to test protocol, summary of how pass-fail criteria were derived, test results reported using a Template Spreadsheet instead of hand-written, inclusion of new Reference Tags, addition of range testing with Datamars wand reader, clarification that Field Testing is only done upon special request, clearer distinction between Range Testing and Field Testing.
2.2	4 Nov 2015	MP / PK	Update to capture outcomes of meeting between NLIS and Elexon 26 November 2014. Also, range testing Annex overhauled to reflect use of new apparatus, and to show the procedure with pictures.
3.0	4 March 2016	PK	Final review before release, with minor changes. Co-branding of document by NLIS and Elexon.

Updated by: P. Kuiper / M. Brough

Reviewed by: L. Bateman / M. Prendergast

1. Introduction

The commercial livestock industry requires electronic identification transponders to have sufficient performance such they are reliably read by existing hand held, race and high flow reader systems. This document focuses on tags for use in Australia for tracking cattle, sheep, and goats (tests for sheep tags are assumed to apply to goats).

This document specifies the following testing to determine whether a tag is acceptable:

- Technical test to a subset of ISO 24631-3:2009. Where this standard does not provide pass-fail criteria, pass-fail criteria are determined by the performance of tags that are known to perform well in the Australian beef and sheep industry. These are called “Reference Transponders” in this document.
- A range test, both “on-axis” and “off-axis”. Again, the pass-fail criteria are determined by the performance of the Reference Transponders.

2. Basis for Testing

2.1. Laboratory Testing

International Standard Organisation (ISO) and International Committee for Animal Recording (ICAR) have worked together to develop technical standard ISO 24631-3:2009 ‘Evaluation of the performance of ISO 11784 and ISO 11785 RFID transponders’. This standard is used as the basis for testing, but is tailored as follows:

- Pass-fail criteria have been added, based on the performance of Reference Transponders;
- Only HDX tags will be tested;
- No specific organization is acting as “Responsible Authority” (RA); and
- Elexon is not formally certified as an ISO 24631-3 testing facility.

2.2. Range Testing

The range testing records the range that each tag can be read with a selection of race readers commonly used in industry, and one wand reader. The test is repeated “on-axis” (best case orientation) and “off-axis” (“second-worst case” orientation). The results are compared against the Reference Transponders, to determine pass-fail criteria.

3. Determination of Pass-Fail Criteria

Pass-Fail criteria must be defined in order to determine whether a tested tag is acceptable for use in Australia. For some tests, pass-fail criteria are defined in standards (for example the pass-fail criteria of frequency stability are specified in ISO 11784). However, for most of the performance characteristics specified in this document, the pass-fail criteria must be determined by comparing to transponders that are known to give acceptable performance in the field.

4. Reference Transponders

In December 2013, NLIS supplied sets of reference transponders for Cattle and Sheep:

- Reference Cattle Tag: RI-INL-0243-40-P
- Reference Sheep Tag: TIRIS TRPGP40ATGA.

These tags are to be retested for each session of tag testing. The results are stored in the Excel template, together with the tags under test, for comparison.

5. Test Conduct






The test is conducted as follows:


1. If the organisation requesting the testing has provided the male pins and the tool to insert them, and has requested that testing be conducted with the pins inserted, then fit the pins;
2. For laboratory testing, follow the procedure at Annex A.
3. For range testing: Conduct the range testing of both the Tag Under Test and the applicable Reference Tags, in accordance with the instructions at Annex B, and enter results in the spreadsheet.
4. Have the data reviewed by an engineer experienced in tag testing.

Annex A: Laboratory Test Procedure


Refer to Template Excel spreadsheet.

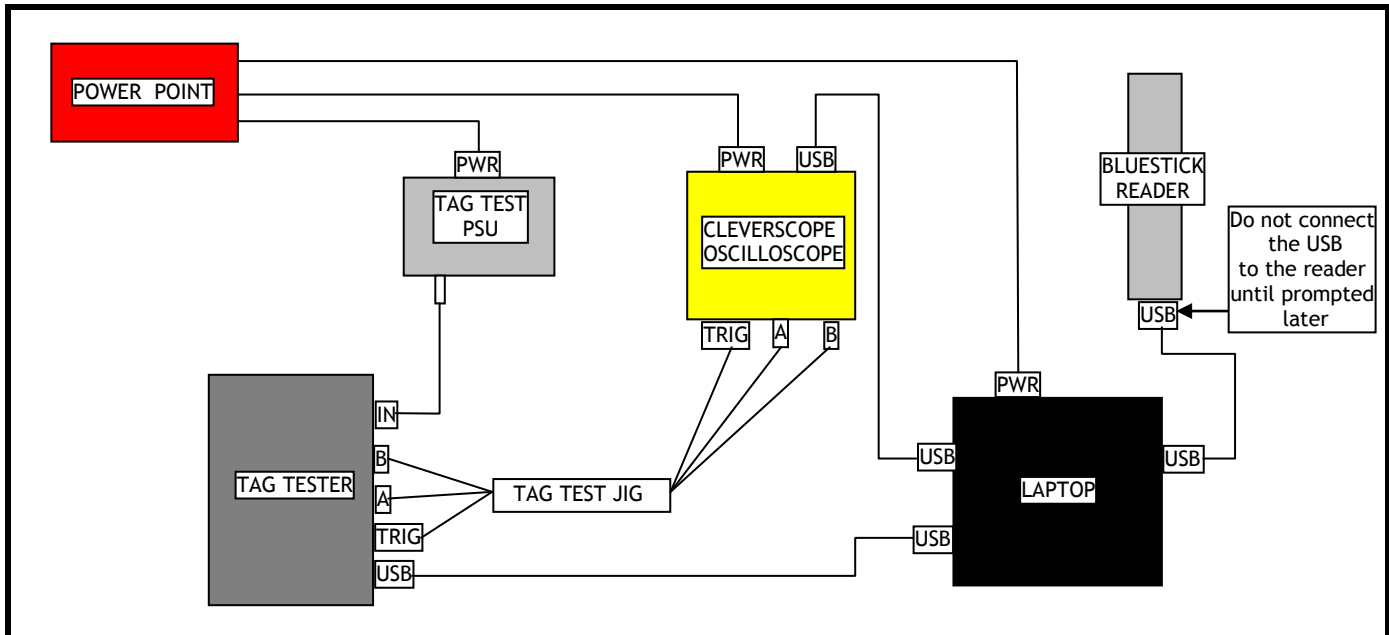
6. Equipment

Equipment needed	Example
Laptop (Elexon 84).	
Tag Tester (jig) and tag holder.	
Cleverscope oscilloscope and power adapter.	
Tag Test PSU (Power cable already attached).	
Tag Test Jig (cable) - Connects test jig to Cleverscope.	
USB cable	From PC to test jig
USB cable	From PC to Cleverscope
Thermometer	Must show temperature and humidity

Bluestick reader - With battery power charger.	
USB cable	From Bluestick reader to PC.
Program:	VS Express (Microsoft Visual Studio Express 2013)(Tag test ISO24631) - For testing tags.
Program:	Datamars (Rumisoft) - For use when transferring files from Bluestick reader (Opens automatically when reader connected via USB cable).
File:	Elexon(Z)\Customers\NLIS\Tag Testing\Test Results\Working Copies
Test jig	For field testing

7. Set Up

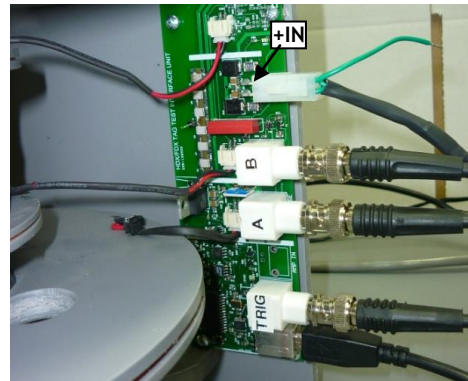
Instruction	Example
<p>Set up the Tag Test Jig as shown following the diagram and instructions below.</p> <p>Important: This test must be conducted on a non-metallic bench. The nearest solid metallic structure, such as a metal beam or metal paneling, must be greater than 600mm from the test coils in any direction.</p> <p>NOTE: You do not need to connect the Bluestick reader at this point. Just have it ready for later in the test.</p>	



Connecting the cables to the PCB on the Tag Tester.

Connector lead from the Tag Test PSU to the connector at +IN.

3 leads from the Tag Test Jig to A, B and TRIG.
USB from Laptop to USB slot.



Connect the other 3 leads of the Tag Test Jig to the Cleverscope oscilloscope.

WARNING: ENSURE THE SAME LEAD CONNECTED TO 'A' ON THE TAG TESTER IS ALSO CONNECTED TO 'A' ON THE CLEVERSCOPE OSCILLOSCOPE, 'B' TO 'B' AND 'TRIG' TO 'TRIG'.

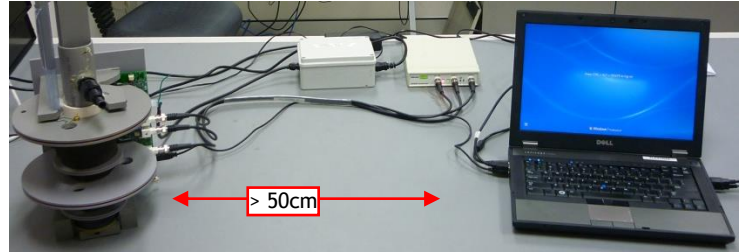


Connect a USB lead from the laptop to the Tag Test PSU.

NOTE: Ensure there is a distance of at least 50 cm between the Tag Test and the other equipment (Cleverscope, PSU and laptop).

Push all cables to the back so as not to cause interference during the testing.

Plug the power leads from the laptop, Cleverscope and PSU into a power point.

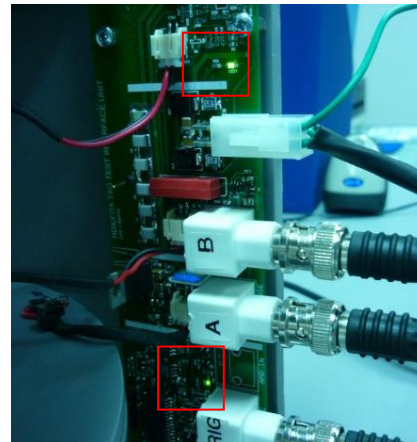


When you switch on the power you will notice:-

The **TRG** LED and **POWER** LED on the Cleverscope will light.

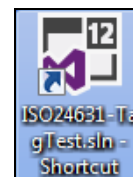
The 2 LED's on the Tag Tester PCB will do the following:

- Top LED will stay on solid, and
- Bottom LED will flicker.



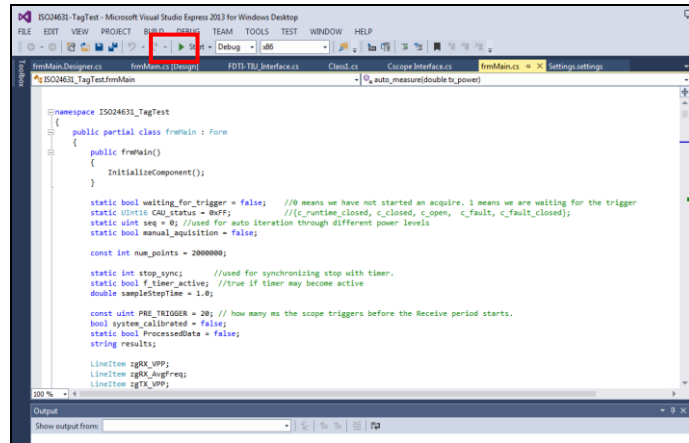
The tag test is carried out through VS Express (Microsoft Visual Studio Express 2013). This program needs to be signed into with a username and password.

Open the ISO24631-Tag Test program by clicking on the shortcut on the desk top.



The following screen will open.

Click Start.



On the next screen under Settings, check the values match below.

Cadence = 50/20

Cattle = 0.5

Cycles = 2

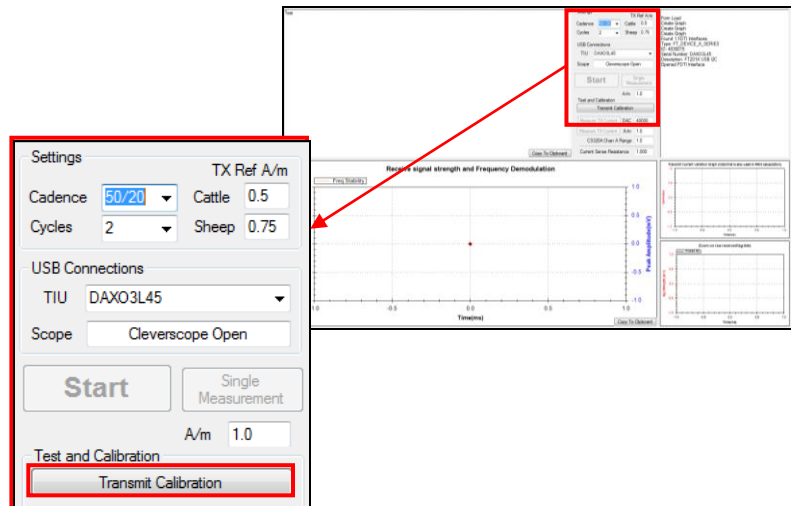
Sheep = 0.75

Under USB Connections:-

TIU = DAXO3L45

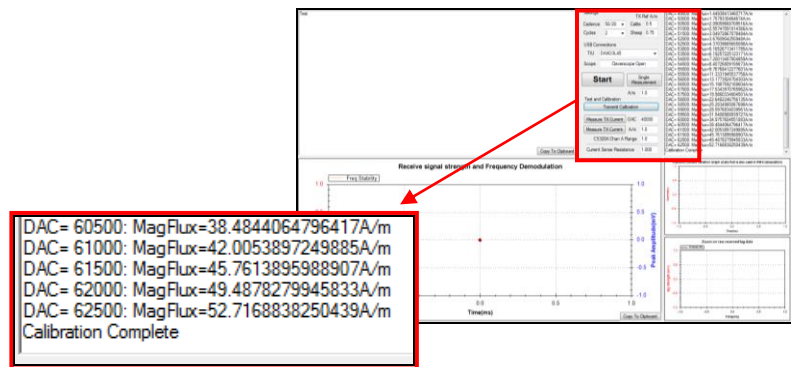
Scope = Cleverscope Open

Click Transmit Calibration.



Text will appear in the box to the right ending with Calibration Complete.

The program is now ready to start testing.



8. Reference Transponders

Instruction

Before you begin to test the tags you will first need to test the reference tags and enter the results into the Test Results spreadsheet as below.

There are two different kinds of tags, Cattle and Sheep. Determine what kind of tags you will be testing and use the correct reference tags for those tags. There will be 15 tags in each set.



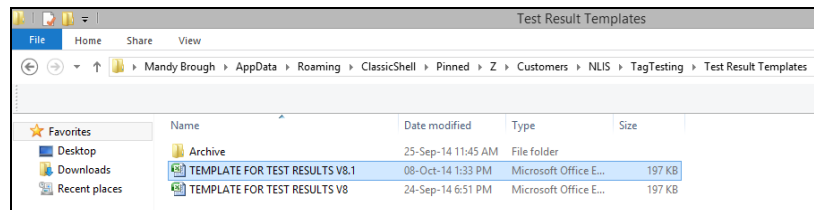
The tags will be marked with two letters followed by two numbers i.e. AU01, AU02, AU03 - AU15. Always test in numerical order.

Open the latest revision Tag Test spreadsheet template located at:

Elexon(Z)\Customers\NLIS\Tag Testing\Test Results Templates

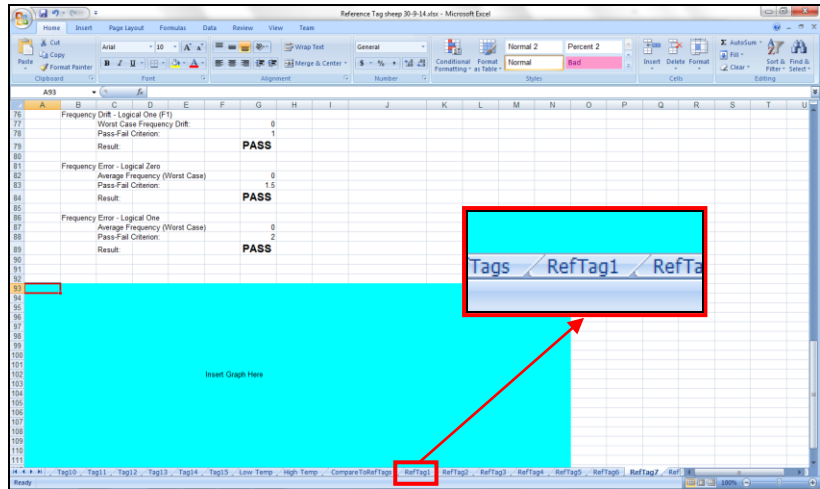
Select 'Save As' and rename the file 'REF TAGS' and the days date.

i.e. REF TAGS 10-8-14.

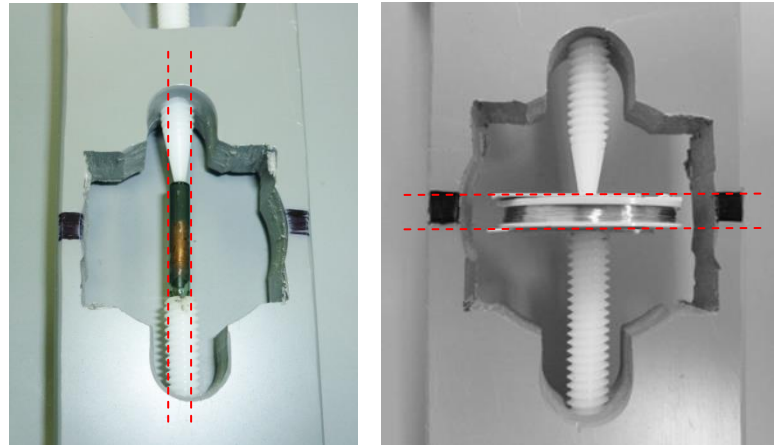


Example

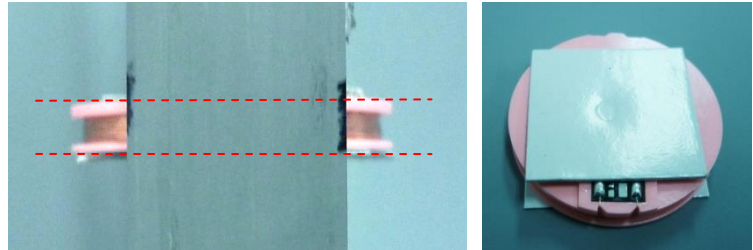
Scroll along the spreadsheet tabs at the bottom of the page and click on RefTag1



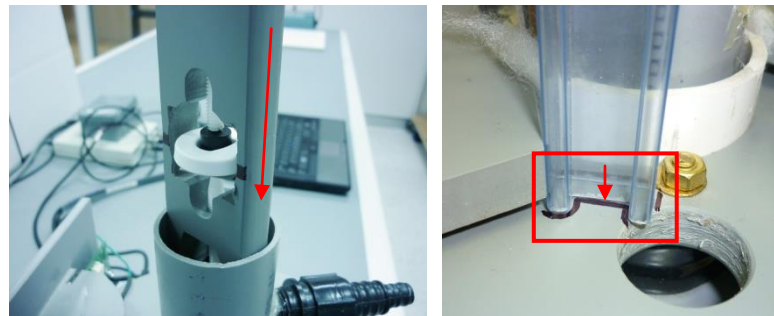
Place your first reference tag in the tag holder as shown.
 Adjust the screw sections to ensure the tag is perfectly central both horizontally and vertically and is central to the black markings on the tag holder.



For round tags that have a hole through the center you may use some card to support the tag in the jig.



Place the tag holder into the tube on the top of the tag tester taking care not to dislodge the tag.
 Push the holder down until the stopper aligns up with the markings on the tester.



Click Start on the test screen.
 You will notice activity in the graph and text will appear in the upper section.

When the test is complete, click Copy To Clipboard in the bottom right of the graph.

In the spreadsheet, in tab RefTag1, Click in the top left corner of the blue section (A93).

Press Ctrl + V or right click and paste to insert the bar graph into the spreadsheet.

Back in the test program, click on Copy To Clipboard underneath the lines of text.

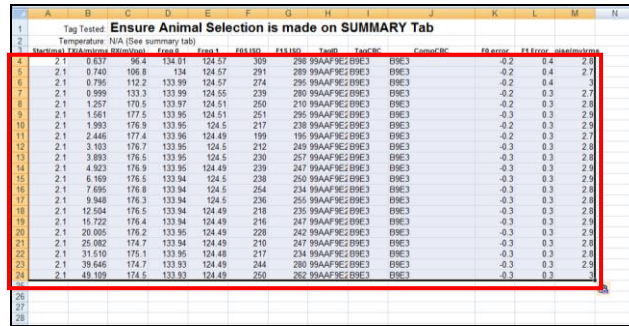
Paste this into the spreadsheet at the top of the page at A4.

Continue this testing for the next 14 reference tags, recording their results into the spreadsheet in the corresponding tabs. i.e. ref tag AU02 results copied into RefTag2.

Save the spreadsheet when you have finished testing all reference tags.



A	B	C	D	E	F	G	H	I	J	K	L	M
Tag Tested: Ensure Animal Selection is made on SUMMARY Tab												
Temperature: N/A (See summary tab)												
1	Temp(m)	RM(mVpp)	Freq 9	Freq 1	F85 ISO	F15 ISO	TagID	TagCRC	CompCRC	F0 error	F1 Error	oise(mjms)
2												
3												
4												



A	B	C	D	E	F	G	H	I	J	K	L	M	N
Tag Tested: Ensure Animal Selection is made on SUMMARY Tab													
Temperature: N/A (See summary tab)													
1	Temp(m)	RM(mVpp)	Freq 9	Freq 1	F85 ISO	F15 ISO	TagID	TagCRC	CompCRC	F0 error	F1 Error	oise(mjms)	
2	2.1	0.637	96.4	134.01	124.57	309	296	9AAAF9E3	E9E3	-0.2	0.4	2.9	
3	2.1	0.740	106.8	134	124.57	291	289	9AAAF9E3	E9E3	-0.2	0.4	2.7	
4	2.1	0.795	112.2	133.99	124.57	274	295	9AAAF9E3	E9E3	-0.2	0.4	3	
5	2.1	0.899	133.3	133.99	124.55	239	280	9AAAF9E3	E9E3	-0.2	0.3	2.7	
6	2.1	1.257	170.5	133.97	124.51	250	210	9AAAF9E3	E9E3	-0.2	0.3	2.8	
7	2.1	1.561	177.5	133.95	124.51	251	295	9AAAF9E3	E9E3	-0.3	0.3	2.9	
8	2.1	1.993	176.9	133.95	124.5	217	238	9AAAF9E3	E9E3	-0.2	0.3	2.9	
9	2.1	2.446	177.4	133.96	124.49	199	195	9AAAF9E3	E9E3	-0.2	0.3	2.7	
10	2.1	3.103	176.7	133.95	124.5	212	249	9AAAF9E3	E9E3	-0.3	0.3	2.8	
11	2.1	3.893	176.5	133.95	124.5	230	257	9AAAF9E3	E9E3	-0.3	0.3	2.8	
12	2.1	4.923	176.9	133.95	124.49	239	247	9AAAF9E3	E9E3	-0.3	0.3	2.8	
13	2.1	6.189	176.5	133.94	124.5	238	250	9AAAF9E3	E9E3	-0.3	0.3	2.9	
14	2.1	7.095	176.8	133.94	124.5	254	234	9AAAF9E3	E9E3	-0.3	0.3	2.8	
15	2.1	9.948	176.3	133.94	124.5	236	255	9AAAF9E3	E9E3	-0.3	0.3	2.8	
16	2.1	12.584	176.5	133.94	124.49	218	235	9AAAF9E3	E9E3	-0.3	0.3	2.8	
17	2.1	16.722	176.4	133.94	124.49	216	247	9AAAF9E3	E9E3	-0.3	0.3	2.9	
18	2.1	20.005	179.2	133.95	124.49	229	242	9AAAF9E3	E9E3	-0.3	0.3	2.9	
19	2.1	25.082	174.7	133.94	124.49	210	247	9AAAF9E3	E9E3	-0.3	0.3	2.8	
20	2.1	31.010	175.1	133.95	124.48	217	234	9AAAF9E3	E9E3	-0.3	0.3	2.8	
21	2.1	39.646	174.7	133.93	124.48	244	280	9AAAF9E3	E9E3	-0.3	0.3	2.8	
22	2.1	48.189	174.5	133.93	124.49	250	262	9AAAF9E3	E9E3	-0.3	0.3	3	

NOTE: You will probably be testing more than one set of tags. Determine how many sets of tags you will be testing then make a copy of the spreadsheet for every set.

If you are going to be testing both CATTLE and SHEEP tags, finish one type **BEFORE** moving on to the other.

9. Tag Test

Instruction

Randomly remove 15 tags from the bag of tags under test. If the tags of one type have different colours, there should be some direction from the organization requesting the testing as to what to do. For example, either randomly select from the entire batch, or treat as two different tag types. If the organisation requesting the testing has not specified how to deal with the different colours, seek clarification from them before testing.

Example

NOTE: The customer should have supplied at least 50 tags for each set. We only need to test 15. If less than 50 tags have been supplied, put the quantity received in the Summary Tab of the spreadsheet.






Using a fine point sharpie, give each tag a code consisting of 2 letters followed by 2 numbers (always 01-15). i.e. BP01, BP02, BP03 up to BP15. The last code used will have a report under Z:\Customers\NLIS\TagTesting\Test Results\As sent, however also check Z:\Customers\NLIS\TagTesting\Test Results\Working Copies, in case someone forgot to transfer the last results to the "as sent" folder.

The letters used will always follow the last set of tags tested and will go in the order of AA, AB, AC, AD, AE, etc up to AZ then onto BA, BB, BC etc (when the 2nd letter reaches Z, the 1st letter will change to the next letter in the alphabet).

Before testing each tag in the Tag Tester, take a reading of each tag using the Bluestick reader and transfer the data into the spreadsheet.



Lay the tags out in numerical order approximately 12 inches apart. Make sure all other tags are out of range so they are not read by mistake.

Press  to turn on the reader
Press  to go to **Main Menu**.
Press  to go to **Data Files**.
Press  to select **New File**.
Press  repeatedly (approx 3 times) until display reads **Reading**. The red and green LED's next to **OK** will flash.
The reader is now ready to read the tags.



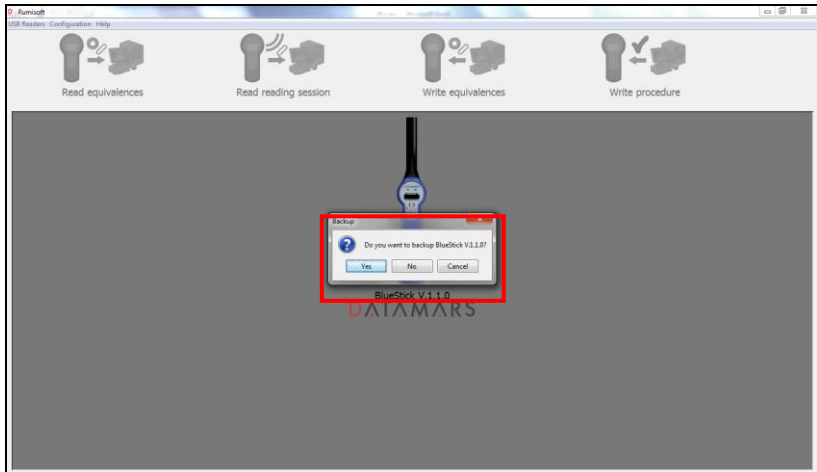
Hover the reader over each tag in numerical order until it beeps.

Remove the end cap from the Bluestick reader and connect it to the laptop via the USB lead.

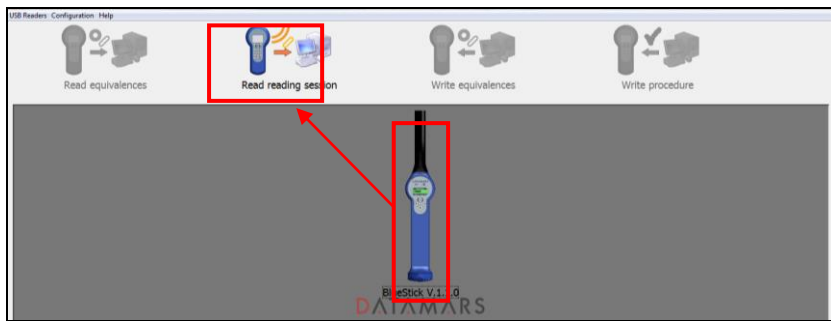


The DATAMARS program will open automatically when you plug in the USB.

Click **NO** on the pop up box asking if you want to back up Bluestick.

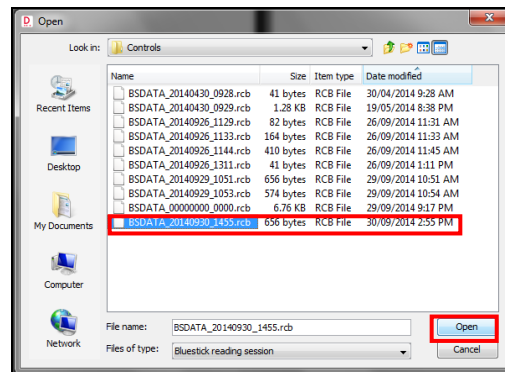


Click on the picture of the reader in the center which will highlight **Read reading session**.

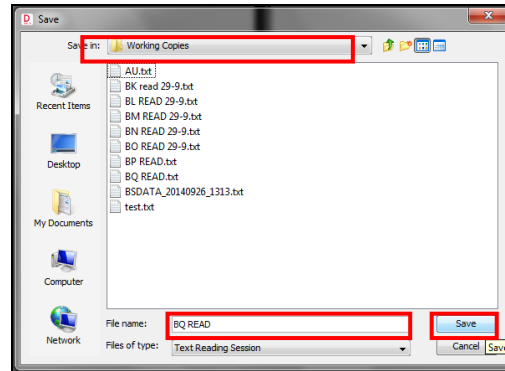


A screen will open showing all the files on the reader. Double click on the latest file to open it.

You may need to expand the selection so you can view the date and time.



Rename the file with the relevant code used on the tags followed by READ i.e. **BQ READ**
SAVE in Z\Customers\NLIS\Tag Testing\Test Results\Working Copies



Click **YES** on the next pop up box that asks if you want to erase the data on the Bluestick.

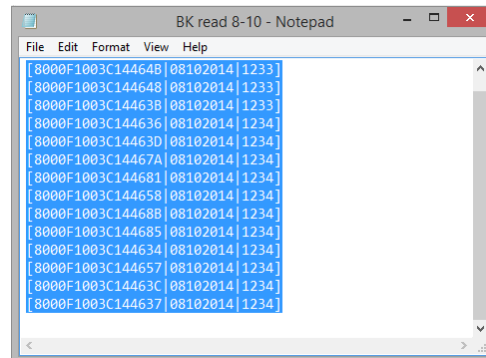
Click **OK** on next pop up box to finish.

Click **CANCEL** on the next pop up box.

The saved files will open.
Check there are 15 readings in total.

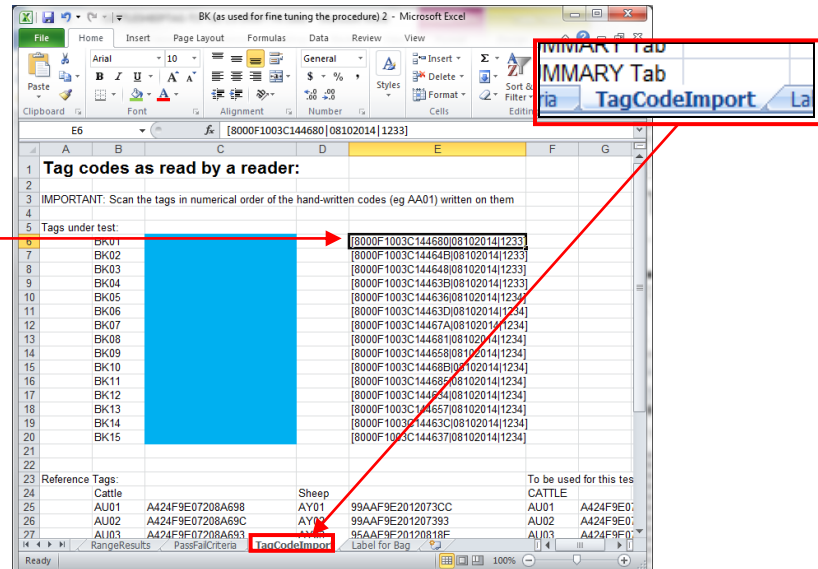
NOTE: The lines of text should begin with numbers and not a letter i.e. [8000....etc] not [A000...etc]. If this begins with a letter check the settings in DATAMARS.

Highlight the files and copy.



In the spreadsheet, click on the **TagCodeImport** tab at the bottom.

Click in this cell (to the right of the blue shaded cells), and press **Ctrl** and **V** to paste the data into the spreadsheet.

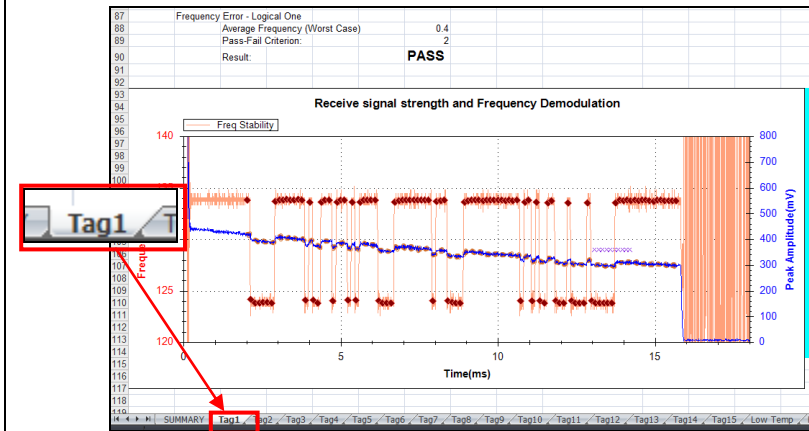


The data just pasted has too much information. A subset needs to be copy-pasted as follows: For each tag ID, copy and paste the first set of numbers to the adjacent blue cell, like with this example.

Tag codes as read by a reader:								
IMPORTANT: Scan the tags in numerical order of the hand-written codes (eg A4B1) written on them								
Tags under test								
BK01	8000F1903C144638		[8000F1003C144608081020141233]					
BK02	8000F1903C144649		[8000F1003C144649081020141233]					
BK03	8000F1903C144639		[8000F1003C144639081020141233]					
BK04	8000F1903C144636		[8000F1003C144636081020141234]					
BK05	8000F1903C144630		[8000F1003C144630081020141234]					
BK06	8000F1903C144637A		[8000F1003C144637081020141234]					
BK07	8000F1903C144637A		[8000F1003C144637081020141234]					
BK08	8000F1903C144637		[8000F1003C144637081020141234]					
BK09	8000F1903C144638		[8000F1003C144638081020141234]					
BK10	8000F1903C144639		[8000F1003C144639081020141234]					
BK11	8000F1903C144635		[8000F1003C144635081020141234]					
BK12	8000F1903C144634		[8000F1003C144634081020141234]					
BK13	8000F1903C144637		[8000F1003C144637081020141234]					
BK14	8000F1903C144637		[8000F1003C144637081020141234]					
BK15	8000F1903C144637		[8000F1003C144637081020141234]					
Reference Tags:								
23	AUI1	AA2AF9E07208A98	AV01	9AAAF9E2012073CC	AUI1	AA2AF9E07208A98	CATTLE	To be used for this testing
24	AUI2	AA2AF9E07208A9C	AV02	9AAAF9E201207393	AUI2	AA2AF9E07208A9C	CATTLE	
25	AUI3	AA2AF9E07208A97	AV03	9AAAF9E20120819E	AUI3	AA2AF9E07208A97	CATTLE	
26	AUI4	AA2AF9E07208A9A	AV04	9AAAF9E201208195	AUI4	AA2AF9E07208A9A	CATTLE	
27	AUI5	AA2AF9E07208A97	AV05	9AAAF9E201208195	AUI5	AA2AF9E07208A97	CATTLE	
28	AUI6	AA2AF9E07208A9A	AV06	9AAAF9E201207395	AUI6	AA2AF9E07208A9A	CATTLE	
29	AUI7	AA2AF9E07208A99	AV07	9AAAF9E2012073F2	AUI7	AA2AF9E07208A99	CATTLE	
30	AUI8	AA2AF9E07208A72	AV08	9AAAF9E2012073F9	AUI8	AA2AF9E07208A72	CATTLE	
31	AUI9	AA2AF9E07208A9C	AV09	9AAAF9E201208161	AUI9	AA2AF9E07208A9C	CATTLE	
32	AUI10	AA2AF9E07208A7B	AV10	9AAAF9E201208194	AUI10	AA2AF9E07208A7B	CATTLE	
33	AUI11	AA2AF9E07208A96	AV11	9AAAF9E20120817D	AUI11	AA2AF9E07208A96	CATTLE	
34	AUI12	AA2AF9E07208A9B	AV12	9AAAF9E201207794	AUI12	AA2AF9E07208A9B	CATTLE	
35	AUI13	AA2AF9E07208A71	AV13	9AAAF9E201208195	AUI13	AA2AF9E07208A71	CATTLE	

The set of 15 tags can now be tested in the Tag Tester in the same way that you tested the reference tags.

Copy the graph and data results from each tag into the spreadsheet in the corresponding tab starting at Tag1 tab.



When you have completed the testing for all 15 tags and entered the results into the spreadsheet, click on the SUMMARY tab.

All of the blue highlighted areas need to be completed.

In Product Under Test, enter the identification information for the tags, as per what is on the bag they were supplied in.

If anything out of the ordinary was noticed, enter a comment under "Tester's Comments (if Applicable)".

Annex A: Laboratory and Field Test Procedure			
Record the following information:			
Product Under Test	MULA TITRONIC		
Type of animal (CATTLE or SHEEP)	SHEEP		
Type of tag (HDX or FDX)	FDX		
Code used to identify all tags tested in accordance with this procedure. Format: two Capital Letters (eg AA)	BC		
Date of testing	30 Sep 15		
Person conducting test	MANDY BROUGH	Pass-Fail	
Humidity during test (%RH)	30%	TESTING INVALID	
Temperature during test (°C)	22	OK	
4.1. Notes			
1. Throughout this document, ISO means ISO 24631-3:2009			
4.2. Equipment			
Prepare the test apparatus according to ISO sections 7.1 to 7.4			
Calibrate the test apparatus to ISO Sections 6.1 and 7.2			
4.3. Inspect and Select Tags			
Number of tags received	50	OK	
Are all tags of similar appearance? (Y/N)	Y	OK	
Select 15 random sample tags from the 50 provided, and record their codes.			
Tags Under Test			
Tags selected for Laboratory Testing:			
Tag Data Exported From Reader:			
BQ01	BQ02	BQ03	BQ04
[A000000095100030]	[A000000095100030]	[A000000095100030]	[A000000095100030]
SUMMARY Tag			

Insert a photo of the tags showing both front and back sides.

Save the spreadsheet and rename it with the 2 letters of the code you issued to the tags.

Annex A: Laboratory and Field Test Procedure

Record the following information:

PROJECT Under Test:	AG-1448888
Type of animal (CATTLE or SHEEP):	CATTLE
Type of tag (RFID or UHF):	RFID
Code used to identify all tags tested on:	AG-1448888
Form used to record the procedure:	Form: Not Capital Letters tag AA)
Tag ID:	AG-1448888
Initial condition/issue:	NOV09 PASSED
Initial condition/issue:	NOV09 PASSED
Temperature (Min and Max):	NOV09 PASSED

4.1. Notes
Throughout this document, ISO means ISO 24613:3 2009.

4.2. Equipment
Prepare the test apparatus according to ISO Sections 7.1 to 7.4. Calculate the test apparatus to ISO Sections 7.5.1 and 7.4.2.

4.3. Inspect and Select Tags

Number of tags received:	10
Are all tags of similar appearance? (Y/N):	Y

Select 10 random sample tags from the 10 provided, and record their codes.

Tags Under Test

Tag selected for Laboratory Testing	BN01	BN02	BN03	BN04	BN05	BN06
Tag Data Exported From Reader	0000P 1001C 1448888	0000P 1001C 1448888	0000P 1001C 1448888	0000P 1001C 1448888	0000P 1001C 1448888	0000P 1001C 1448888

References - Tag Details

Tag selected for Laboratory Testing	AN01	AN02	AN03	AN04	AN05	AN06
Current Tag Code (from Annex A)	AN01P 1001C 1448888	AN02P 1001C 1448888	AN03P 1001C 1448888	AN04P 1001C 1448888	AN05P 1001C 1448888	AN06P 1001C 1448888

4.4.4. Task Summary

Click on the **RefTagRangeResults** tab.
Print a copy of this field test data table.

Microsoft Excel screenshot showing the **RefTagRangeResults** tab. A red box highlights the tab name. A red arrow points from the tab name to the spreadsheet content.

AT03	Not Tested	Not Tested
AT04	Not Tested	Not Tested
AT05	Not Tested	Not Tested
AT06	Not Tested	Not Tested

Click on the **RangeResults** tab.
Print a copy of this field test data table.

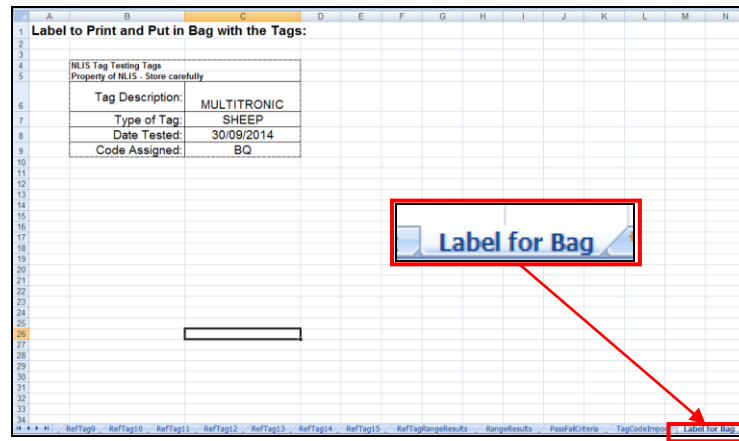
Microsoft Excel screenshot showing the **RangeResults** tab. A red box highlights the tab name. A red arrow points from the tab name to the spreadsheet content.

BQ05	Not Tested	Not Tested
BQ06	Not Tested	Not Tested
BQ07	Not Tested	Not Tested
BQ08	Not Tested	Not Tested
BQ09	Not Tested	Not Tested
BQ10	Not Tested	Not Tested
BQ11	Not Tested	Not Tested
BQ12	Not Tested	Not Tested
BQ13	Not Tested	Not Tested
BQ14	Not Tested	Not Tested
BQ15	Not Tested	Not Tested
Average	Not Tested	Not Tested
Pass/Fail Criterion	Not Tested	Not Tested
Overall Pass/Fail	Not Tested	Not Tested

Click on the **Label for Bag** tab.

Print a copy of the label.

Place the label inside the bag of tags
along with the data tables you printed
previously.



Label to Print and Put in Bag with the Tags:

NLS Tag Testing Tags	
Property of NLS - Store carefully	
Tag Description:	MULTITRONIC
Type of Tag:	SHEEP
Date Tested:	30/09/2014
Code Assigned:	BQ

The screenshot shows an Excel spreadsheet with a table of tag data. A red box highlights the 'Label for Bag' tab in the bottom right corner of the spreadsheet. A red arrow points from the 'Label for Bag' tab to the 'Label for Bag' text in the main content area of the page.

The tags are now ready to be range tested.

Annex B – Range Testing

9.1. Panel Antennas

9.1.1. Set up at an Appropriate Location

The range testing must be conducted in an area with minimal RF noise. The noise reading on the Aleis 9162 reader must be below 25, ideally 20 (see below for more detail). This is generally not feasible in industrial or built-up areas.

The readers must be in free air, with no metal (eg cattle railings) nearby. Only one reader must operate at a time.

9.1.2. Equipment

Set up the test apparatus as follows:

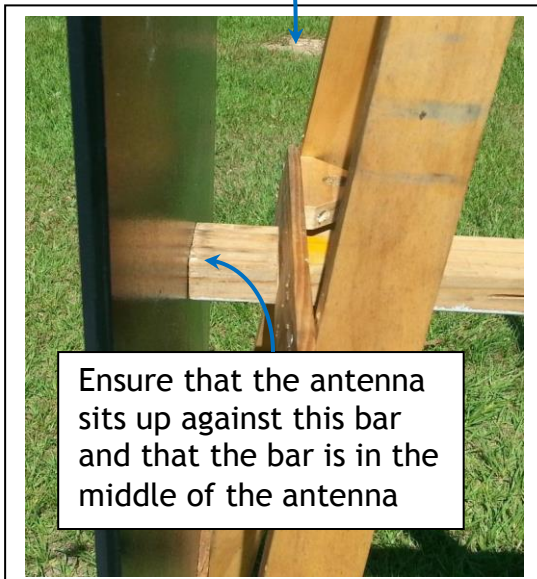
Before setup:



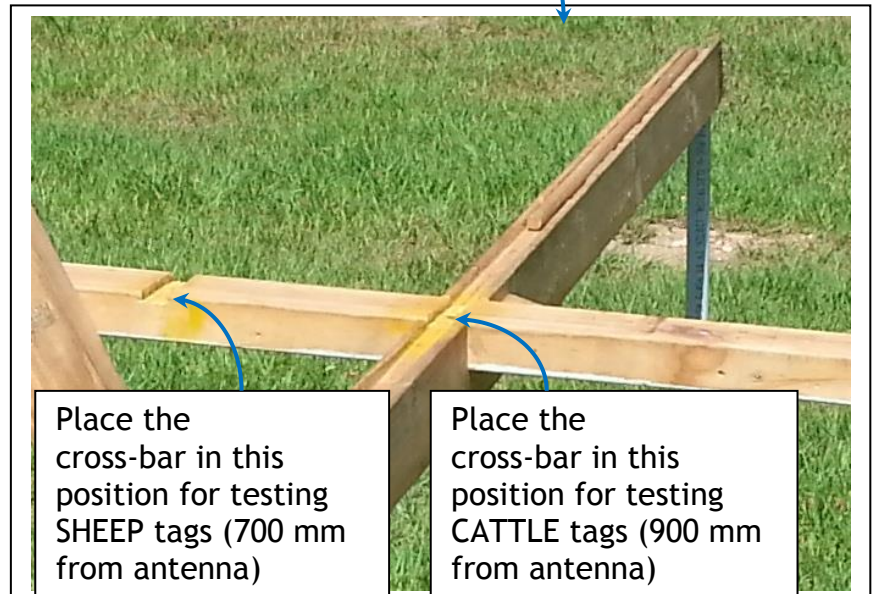
Set up the apparatus as follows:



The Allflex antenna is shown here. The Aleis reader fits in the same spot.



Ensure that the antenna sits up against this bar and that the bar is in the middle of the antenna



Place the cross-bar in this position for testing SHEEP tags (700 mm from antenna)

Place the cross-bar in this position for testing CATTLE tags (900 mm from antenna)

First set up the apparatus with a 9162 Aleis reader (so the ambient noise level can be checked).

9.1.3. Check Ambient Noise Level

Before starting any testing, check the ambient noise level on the Aleis reader, as follows:

Power up the reader by connecting the power leads to a 12 Volt battery. If this battery is in a car, ensure that it is parked at least 3 metres from the reader.

Press the Left Cursor arrow and then the OK button.



This puts the reader in a mode that shows the ambient noise level (see below). The noise level should be below 25, ideally at 20 or better. Record this noise level in the appropriate box in the results.



If the noise level is too high (as per the picture above), move to a quieter spot. Note that the noise level often drops after sunset (probably due to industry activity shutting down).

9.1.4. Select Tags

Use the same fifteen tags that were used for Laboratory Testing, and the applicable (CATTLE or SHEEP) reference tags. The reference tags only need to be tested once per test session.

9.1.5. Test Conduct

Record the read range of each tag (normally 15 of each type) and the applicable Reference Transponders (also 15 of each type), with each type of reader, in the Test Results Spreadsheet:

- Results for Tag Under Test in the tab RangeResults, and
- Results for Reference Tags in the tab RefTagRangeResults.

It is acceptable to print the appropriate tabs from the spreadsheet, record the results on the printed page, and then transcribe the results in the spreadsheet. If the results are typed directly into the spreadsheet, then the laptop computer must be far enough away from the antenna to ensure that it does not add noise. Verify this using the Aleis reader's noise monitoring function described above.

Conduct On-axis testing as follows:

Measure along the main bar that protrudes from the middle of the antenna, as follows:



On-Axis measurement: Air Coil Type Transponder



On-Axis measurement: Ferrite Type Transponder

Ensure that the tag is orientated correctly, as per the pictures above.

Record the range of each tag as follows:

- The reader should read about once per second,
- Record to a resolution of 1 cm (the timber bar has range markings drawn on it), and
- Record the range to the middle of the tag (as opposed to its end).

Conduct Off-axis testing as follows:

Measure along the crossbar that runs parallel to the antenna. As mentioned above, note that the crossbar can be fitted to either of two positions:

- For Sheep tags: 700 mm from the antenna, and
- For Cattle tags: 900 m from the antenna.

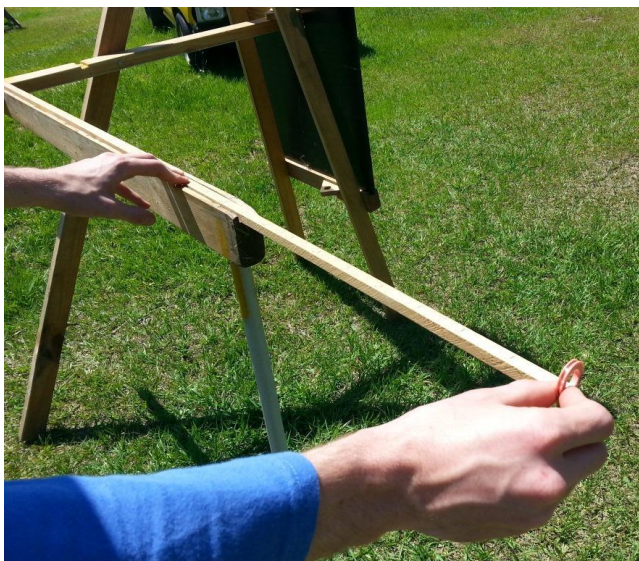
Ensure the correct position is being used.

The apparatus has a timber measuring stick that slides in a groove in the crossbar.

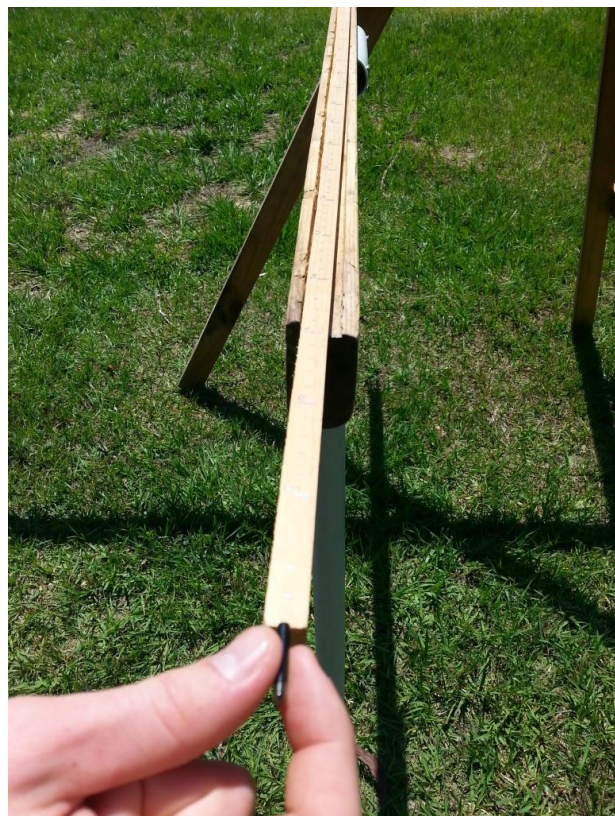
Record the off-axis measurement for each tag, as follows:

- With the tag against the “zero” end of the stick and oriented as shown below, slide the measuring stick out, and find the point at which the reader reads about once per second.

Air Coil Type Transponder:



Ferrite Type Transponder:



- Leave the stick in place, and now move just the tag along the stick until it again only reads once per second.

Air Coil Type Transponder:



Ferrite Type Transponder:



- Record the measurement on the stick. Again, record to a resolution of 1 cm.

NOTE: With the off-axis measurement, the point at which to measure is somewhat “fuzzy”. Sometimes the reader may not read at all for a while and then it may read continuously for a while. This is normal. The errors in each reading average out when the data is processed in the spreadsheet. For the averaging process to work properly, it is important that the same person tests the Tags Under Test and the Reference Tags, in the same session, using the same technique.

Repeat the above with a Large Allflex panel reader.

9.2. *Datamars wand reader*

Set up the Datamars wand reader, such that:

1. The range is measured protruding straight from the tip of the wand,
2. The reader is off the ground, and
3. There is no metal (other than screws in timber apparatus) nearby.

For example, set up as shown below using timber sawhorses. The timber measuring stick used for off-axis measurement is a suitable measuring stick for this test.



Take the measurements as shown below:

Air Coil Type Transponder:



Ferrite Type Transponder:



Notes:

- Orientate the tags as shown above,
- Again, record to a resolution of 1 cm,
- Take each measurement at the middle of the tag,
- Take readings for each Tag Under Test and the 15 Reference Tags of appropriate type (CATTLE or SHEEP), and
- Record all readings in the Spreadsheet or a printout thereof.

Annex C – Logic behind testing

This Annex provides the logic behind some of the key testing parameters. The results of this logic are incorporated in the test apparatus and the spreadsheet template. Therefore, this Annex can be ignored when conducting testing in accordance with this document.

Minimum Activation Strength Test

The benchmark activation strength signal was calculated when the reference tags were tested on 22 September 2014 for the purposes of a minimum activation test. It is assumed that the benchmark signal will not change markedly between test batches.

The benchmark for the activation field strength at which to test the strength of the response of the test tags is set at the mean minimum activation strength of the benchmark transponders PLUS three standard deviations. Based on the 22 September 2014 results, the activation strength to be used is 0.5A/m rms for cattle and 0.75 A/m rms for sheep. The raw data for this calculation is recorded below.

CATTLE REFERENCE TRANSPONDER

Tag	Minimum Activation Field Strength	
AU01	0.446	
AU02	0.461	
AU03	0.461	
AU04	0.449	
AU05	0.423	
AU06	0.474	
AU07	0.474	
AU08	0.457	
AU09	0.476	
AU10	0.481	<- Worst Result
AU11	0.446	
AU12	0.454	
AU13	0.434	
AU14	0.447	
AU15	0.452	
Mean:	0.455667	
Standard Deviation:	0.016136	
No. of SDs to use:	3	
To use for minimum response testing:	0.504076	
Percentage margin above worst result:	4.58%	

SHEEP REFERENCE TRANSPONDER

Tag	Minimum Activation Field Strength	
AY01	0.646	
AY02	0.598	
AY03	0.691	
AY04	0.698	
AY05	0.664	
AY06	0.61	
AY07	0.631	
AY08	0.652	
AY09	0.655	
AY10	0.661	
AY11	0.664	
AY12	0.642	
AY13	0.712	<- Worst Result
AY14	0.641	
AY15	0.685	
Mean:	0.656667	
Standard Deviation:	0.031345	
No. of SDs to use:	3	
To use for minimum response testing:	0.750702	
Percentage margin above worst result:	5.16%	

Transmission Pulse

For both cattle and sheep, an interpretation of the ISO activation protocol has been adopted, which requires a 50 ms transmission period (activation) followed by a 20 ms reading period, with two pulses sent. Two pulses simulates a worst case event of an animal moving quickly though the detection field.

The minimum activation strength of 15 reference transponders and 15 test tags will be measured.

The assessment of the 15 test tags against the 15 benchmark transponders will require

- Calculating the mean result of the 15 test tags
- Calculating the mean result of the 15 reference transponders plus three standard deviations

-
- The mean minimum activation strength result of the test tags must be at least as low as the reference tag performance, calculated as the mean of the reference tag plus three standard deviations.
 - In addition to reporting the mean result, also record the results for individual tags/transponders and compare them to the pass/fail criteria.
 - If a tag does not respond at all, the result is to be shown as “N/A”, with a note that no response was recorded.