TEST REPORT CONCERNING THE COMPLIANCE OF A 134 KHZ INDUCTIVE PROXIMITY TAG READER, BRAND NEDAP, MODEL VELOS, VP1001 WITH VP6001 ANTENNA, WITH 47 CFR PART 15 (2006-08-14).

FCC listed : **90828**
Industry Canada : IC3501
VCCI registered : R-1518, C-1598

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MEASUREMENT/TECHNICAL REPORT

Nedap N.V.

Model : VELOS VP1001

FCC ID: CGDVELOS1

March 21, 2007
(replaces version **06121202.fcc01** of February 21, 2007)

This report concerns:	Original grant/certification ~~Class 2 change~~ ~~Verification~~		
Equipment type:	134 kHz inductive proximity tag reader		
Deferred grant requested per 47 CFR 0.457(d)(1)(ii) ?	~~Yes~~	~~No~~	n.a.

Report prepared by:		
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The data taken for this test and report herein was done in accordance with 47 CFR Part 15 and the measurement procedures of ANSI C63.4-2003. TNO Electronic Products & Services (EPS) B.V. at Niekerk, The Netherlands, certifies that the data is accurate and contains a true representation of the emission profile of the Equipment Under Test (EUT) on the date of the test as noted in the test report. I have reviewed the test report and find it to be an accurate description of the test(s) performed and the EUT so tested.

Date: March 21, 2007

Signature:

H.J. Pieters
Project Manager TNO Electronic Products & Services (EPS) B.V.

Description of test item

Test item	:	134 kHz Inductive proximity tag reader
Manufacturer	:	N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand	:	Nedap
Model	:	Velos VP1001
Serial number(s)	:	Not available
Revision	:	Not available
Receipt date	:	Not available

Applicant information

Applicant's representative	:	Mr. D. Roosenboom
Company	:	N.V. Nederlandsche Apparatenfabriek "NEDAP"
Address	:	Parallelweg 2
Postal code	:	7141 DC
City	:	Groenlo
PO-box	:	6
Postal code	:	7140 AA
City	:	Groenlo
Country	:	The Netherlands
Telephone number	:	+31 (0) 544 471111
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Test(s) performed

Location	:	Niekerk
Test(s) started	:	December 6, 2006
Test(s) completed	:	January 30, 2007
Purpose of test(s)	:	Equipment Authorisation (Certification).
Test specification(s)	:	47 CFR Part 15 (2006-08-14)
Test engineers	:	A. van der Valk O.H. Hoekstra
Report written by	:	A. van der Valk
Report date	:	March 21, 2007 (replaces version **06121202.fcc01** of February 21, 2007)

Table of contents

1 General information.

1.1 Product description.

1.1.1 Introduction.

The EUT is a 134 kHz inductive proximity tag reader intended to be used as cattle identification and motor control for feeding purposes.
This report is an amended report in which the FCC ID has been modified. The content of this report and measurement results have not been changed other than a clarification related to the data depicted in the table 2.

1.2 Related submittal(s) and/or Grant(s).

Not applicable.

1.3 Tested system details.

Details and an overview of the system in and all of its components, as it has been tested, may be found below.

EUT (item 1)	:	Feedmodule (134 kHz Inductive Tag Reader ISO-Reader motor control)
Manufacturer	:	N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand	:	NEDAP
Model	:	VP1001
Serial number	:	-
Voltage input rating	:	24 VDC, +/- 20%
Current input rating	:	-
Voltage output rating	:	-
Current output rating	:	-
Remarks	:	The VP1001 is a local unit in the VELOS system and usually installed for identification of animals for feeding, weighing, milking, heat detection etc The VP1001 has the following main tasks : - Identification of tags (134 kHz FDX/HDX) - Controlling outputs, 6 outputs available to activate e.g. lights, motors, valves, relays - Reading inputs, 6 inputs available for e.g. sensors, switches Output/input 1 till 4 (I/O 1 till I/O 4) can be used to control feed motors or as normal output/input Output/input 5 and 6 (I/O 5 till I/O 6) can only be used as output/input. The use of feed motors or output/input must be configured in the software (see manual of the V-pu) Following antenna types can be used: - V-sense antennas - EWA transformer with stainless steel antenna strip - HDPE antenna with HDPE antenna tuner

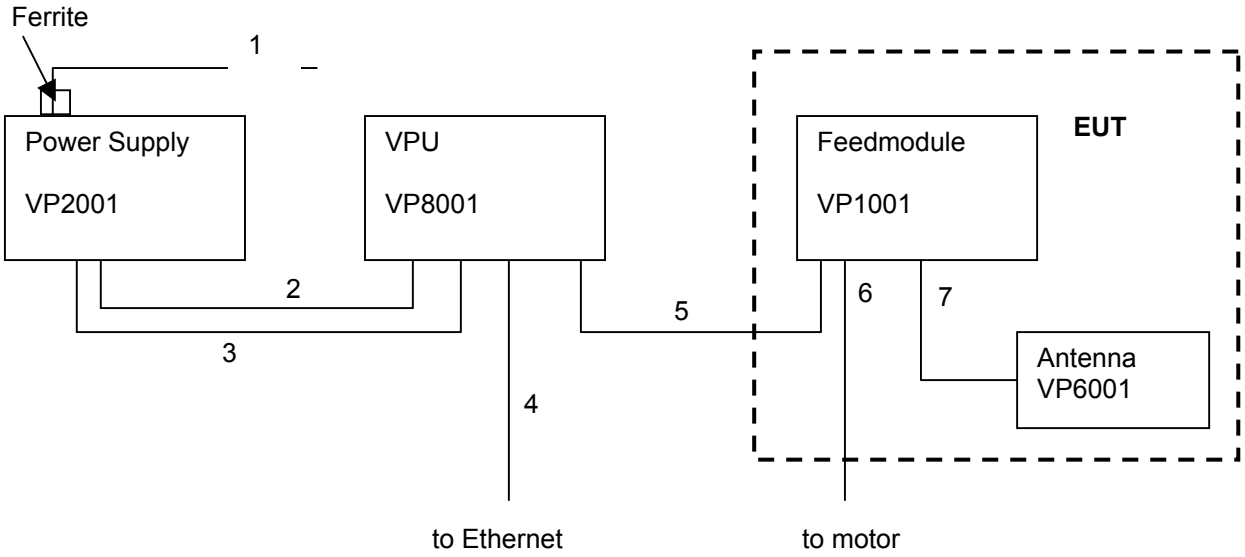
EUT Item 2	:	V-sense Antenna (height 120 cm wide 50 cm)
Manufacturer	:	N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand	:	NEDAP
Model	:	VP6001
Serial number	:	-
Voltage input rating	:	-
Current input rating	:	-
Voltage output rating	:	-
Current output rating	:	-
Remarks	:	The VP6001 is used as antenna in Velos system and connected to a V-pack. The VP6001 is connected to a V-pack by a coax cable, see manual of the concerning V-pack.

Ancillary equipment:

Ancillary item 1	:	Velos Processing Unit (V-pu)
Manufacturer	:	N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand	:	NEDAP
Model	:	VP8001
Serial number	:	-
Voltage input rating	:	24 VDC, +/-20%
Current input rating	:	-
Voltage output rating	:	-
Current output rating	:	-
Remarks	:	V-pu : Velos Processing Unit. Embedded PC used for running applications like identification or feeding, CAN communication, embedded database and web server.

Ancillary item 2	:	Power supply
Manufacturer	:	N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand	:	NEDAP
Model	:	VP2001
Serial number	:	
Voltage input rating	:	87 -265 VAC 47 – 63 Hz
Current input rating	:	-
Voltage output rating	:	Output 1, 2 and 3: 25.0 +/- 0.5 VDC
Current output rating	:	Output 1 and 2: 4A max. Output 3: 1 A max
Remarks	:	Output 1 used for the tests in this report The VP2001 is used as power supply in the VELOS system and is connected to the V-pu.

1.3.1 Description of input and output ports.



Number	Ports	From	To	Shielding	Remarks
1	AC mains	AC mains	VP2001	~~yes~~ / no	**None**
2	DC power input port	VP2001	VP8001	yes / ~~no~~	**None**
3	Secondary DC power	VP2001	VP8001	yes / ~~no~~	**None**
4	Ethernet	VP8001	Ethernet device	~~yes~~ / no	**> 3 m Ethernet cable UTP**
5	Controller/DC power	VP8001	VP1001	yes / ~~no~~	**None**
6	Motor drive	VP1001	Feed motor	~~yes~~ / no	**None**
7	Antenna port	VP1001	VP6001	yes /~~no~~	**None**

1.4 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 15 (2006-08-14), sections 15.207 and 15.209.

The test methods, which have been used, are based on ANSI C63.4: 2003.

Radiated emission tests above 30 MHz were performed at a measurement distance of 3 meters.
Radiated emission tests below 30 MHz were performed at a measurement distance of 3 meters and if necessary at 10 and 30 meters. To calculate the field strength level from these results to the appropriate distance at which the limit is specified, the computation method in appendix 1 has been applied.

1.5 Test facility.

The Federal Communications Commission has reviewed the technical characteristics of the test facilities at TNO Electronic Products & Services (EPS) B.V., located in Niekerk, 9822 TL Smidshornerweg 18, The Netherlands, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 2, section 2.948.

The description of the test facilities has been filed at the Office of the Federal Communications Commission under registration number 90828. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

The list of all public test facilities is available on the Internet at http://www.fcc.gov.

1.6 Test conditions.

Normal test conditions.

Temperature (*)	: +15°C to +35°C
Relative humidity(*)	: 20 % to 75 %
Supply voltage	: 115 VAC
Air pressure	: 950 – 1050 hPa

* When it was impracticable to carry out the tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests are stated separately.

2 System test configuration.

2.1 Justification.

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.4: 2003.

2.2 EUT mode of operation.

The EUT has been tested in active mode, i.e. the EUT is ready to detect a tag. The EUT was set to maximum power output, and the antenna tuning was executed as described in the manual.

All test set ups have been documented in pictures in the documentation package which will be submitted to the Commission

2.3 Special accessories.

No special accessories are used and/or needed to achieve compliance with the applicable sections of 47 CFR Part 15.

2.4 Equipment modifications.

No modifications have been made to the equipment in order to achieve compliance with the appropriate sections of 47 CFR Part 15.

2.5 Block diagram of the EUT.

The block diagram is available in the technical documentation package which will be submitted to the Commission.

2.6 Schematics of the EUT.

The schematics are available in the technical documentation package which will be submitted to the Commission.

2.7 Part list of the EUT.

The part list is available in the technical documentation package which will be submitted to the Commission.

3 Radiated emission data.

3.1 Radiated field strength measurements (30 MHz – 1 GHz, E-field).

Frequency (MHz)	Measurement results dB(µV)/m @ 3 metres Quasi-peak		Limits dB(µV)/m @ 3 metres Quasi-peak	Margin (dB) Quasi-peak		Result
	Vertical	Horizontal		Vertical	Horizontal	
30 - 300	n.i.	n.i.	40.0 – 46.0	-	-	PASS
300 - 1000	n.i.	n.i.	46.0 – 54.0	-	-	PASS
1000 - 2000	n.i.	n.i.	54.0	-	-	PASS

Table 1: Radiated emissions of the EUT.

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15, section 15.209, are depicted in table 1.

Notes:

1. (AV) average detector
2. (QP) quasi peak detector
3. n.i. indicates that no field strength values related to the EUT could be measured for the listed frequency or for the listed frequency range.
4. << indicates that field strength values of radiated emissions are more than 20 dB below the applicable limit.
5. The reported field strength values are the worst case values at the indicated frequency, obtained by rotation of the EUT and orientation of the antenna.
6. Up to the 10 th harmonic of the transmit frequency or beyond because of the incorporation of a digital device was investigated, as per 47 CFR Part 15 section 15.33

Test engineer

signature : 

Name : A. van der Valk

Date : January 31, 2007

3.2 Radiated field strength measurements (frequency range of 0.009-30 MHz, H-field).

Frequency (kHz)	Measurement results dBµV		Antenna factor dB	Cable loss dB	Calculated results dB(µV)/m	Limits Part 15.209 dB(µV)/m
	3 meters	30 meters				
9.00 – 134.00	n.i.	-	-	-	-	-
134.21	108.7 (AV)	54.0 (AV)	20.1	1	19.2	25.1 (300 m)
268.42	47.9 (AV)	n.i.	20.0	1	<<	19.0 (300 m)
536.84	41.5 (QP)	n.i.	20.0	1	<<	33.0 (30 m)
536.84- 1705	n.i.	-	-	-	-	-
1.705 – 30.0 MHz	n.i.	-	-	-	-	-

Table 2: Radiated emissions of the EUT.

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15, sections 15.205 and 15.209, are depicted in table 2. Measurement results are readings from the measuring device in dBµV. Using the appropriate antenna factor and cable losses, these readings are expressed directly into dB (µV)/m and are recalculated at distances as appropriate.

Notes:

1. (AV) average detector
2. (QP) quasi peak detector
3. The computation method for calculation of the field strength at different distances can be found in Appendix 1.
4. Frequency range: 9-90 kHz and 110-490 kHz: Average detector (AV) used during measurements.
5. n.i. indicates that no field strength values related to the EUT could be measured for the listed frequency or for the listed frequency range.
6. << indicates that field strength values of radiated emissions are more than 20 dB below the applicable limit.
7. The reported field strength values are the worst case values at the indicated frequency, obtained by rotation of the EUT and orientation of the antenna.

Test engineer

signature : 

Name : A. van der Valk

Date : January 9, 2007

4 Conducted emission data.

4.1 Conducted emission data of the EUT.

Frequency (MHz)	Measurement results dB(µV) Neutral		Measurement results dB(µV) Line 1		Limits dB(µV)		Margin (dB) Neutral		Margin (dB) Line 1		Result
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV	
0.215	16.4	14.2	34.9	34.6	63.0	55.1	-46.6	-40.9	-28.1	-20.5	PASS
0.388	46.3	35.1	44.8	32.5	58.1	48.7	-11.8	-13.6	-13.3	-16.2	PASS
0.400	42.5	23.5	43.9	27.2	57.9	48.4	-15.4	-24.9	-14.0	-21.2	PASS
0.820	36.5	19.5	36.9	20.7	56.0	46.0	-19.5	-26.5	-19.1	-25.3	PASS
4.250	40.8	39.9	41.2	39.2	56.0	46.0	-15.2	-6.1	-14.8	-6.8	PASS
8.100	47.6	47.3	48.1	47.7	60.0	50.0	-12.4	-2.7	-11.9	-2.3	PASS

Table 3: Conducted emission measurements of the EUT

The results of the conducted emission tests, carried out in accordance with 47 CFR Part 15, section 15.207, are depicted in table 3

Notes:

1. The conducted emissions on frequencies which are not listed in the table above were found to be below 25 dBµV on both neutral and line 1.

Test engineer

signature : 

Name : A. van der Valk

Date : January 19, 2007

5 Carrier stability under special conditions.

5.1 Frequency stability in accordance with 47 CFR Part 15:

From measurements performed as indicated below, the frequency stability will not cause non-compliant situations with respect to exclusion bands or emissions outside permissible bands (band edges)

Stability under special conditions Temperature (°C)	Measured frequency (kHz)	Frequency deviation (%)
20.0	134.200 (reference)	N.A.
-20	134.202	< 0.01
50	134.200	0

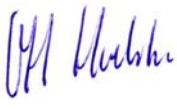
Stability under special conditions % variation U	Measured frequency (kHz)	Frequency deviation (%)
0	134.200 (reference)	N.A.
-15	134.200	0
+15	134.200	0

5.2 Amplitude stability in accordance with 47 CFR Part 15, sections 15.31 (e).

Variation of the supply voltage between 85% and 115% of the nominal rated supply voltage, showed no variation of the radiated signal level of the fundamental frequency component.
EUT amplitude stability measured at 3 different power supply voltages determined at 21 degrees C

Stability under special conditions % U	Measured output (relative)	Amplitude deviation (dBm)
100.0	51.2 *(reference)*	N.A
85.0	51.2	0
115.0	51.2	0

Test engineer

signature : 

Name : O.H. Hoekstra

Date : January 29, 2007

6 List of utilized test equipment.

Inventory number	Description	Brand	Model
12512	LISN FCC	Emco	3725/2
12636	Polyester chamber	Polyforce	--
13313	Pulse limiter	R&S	ESH3-Z2
13886	Open Area testsite	Comtest	--
14051	Anechoic room	Comtest	--
15633	Biconilog Testantenna	Chase	CBL 6111B
15667	Measuring receiver	R&S	ESCS 30
99055	Non-conducting support	NMi	--
99061	Non-conducting support 150cm	NMi	--
99077	Regulating trafo	RFT	LTS006
15453	Loop antenna	Chase	HLA6120
12636	Polyester chamber	Polyforce	--
13886	Open Area testsite	Comtest	--
99069	Cable 5m RG214	NMi	--
99071	Cable 10m RG214	NMi	--
99077	Regulating trafo	RFT	LTS006
99112	Tripod	Chase	--
12476	Antenna mast	EMCO	TR3
12477	Antenna mast 1-4 mtr	Poelstra	--
12640	Temperature chamber	Heraeus	VEM03/500

Appendix 1

Calculated measurements results radiated field strength, H-Field

The rules of Part 15 section 15.31 allow scaling of the measured values or limits when measurements are made at distances other than those specified. The extrapolation factor for frequencies below 30 MHz are 40 dB/decade which means that for a distance change of 10 to 1 (a decade), the limit, or measured value, may be recalculated by adding(moving closer) or subtracting (moving away) 40 dB, respectively.

It is also possible to make radiated-emission measurements at two different distances and extrapolate to a third distance. The calculation method described below, should then be followed.

General Formula:

d_1 = short distance

d_2 = long distance

So:
$(d_1/d_2)^n = H_{d2}/H_{d1}$

$n \log(d_1/d_2) = \log(H_{d2}/H_{d1})$

Calculation of n:

$n = \log(H_{d2}/H_{d1}) / \log(d_1/d_2)$

Calculation of field strength at other distance (10m --> 300m):

$H_{d2} = H_{d1} (d_1/d_2)^n$