DECLARATION OF CONFORMITY

according to

the EMC Directive 89/336/EEC and the (other directives) including amendments by the CE-marking Directive 93/68/EEC

Type of equipment: Marker Beacon

Type designation: NM7050A/B/C and D

Manufactured by: Normarc Garex AS
PO Box 50 Manglerud
0612 Oslo, Norway
Phone: +47 23 18 02 00 / Fax: +47 23 18 02 10

The following standards and/or technical specifications, which comply with good engineering practice in safety matters in force within the EEA, have been applied:

Standard	*Test report*	
EN 50081-1	Ref.no: 97-1130	Issued by: Det Norske Veritas
EN 50082-2	Ref.no: 97-1130	Issued by: Det Norske Veritas
EN 61000-3-2	Ref.no: 97-1130	Issued by: Det Norske Veritas
EN 61000-3-3	Ref.no: 97-1130	Issued by: Det Norske Veritas
prETS 300 339	Ref.no: 97-1130	Issued by: Det Norske Veritas

Additional information

The product is CE-marked in 1997

Type examination certificate: 510-97-1053
Issued by: Det Norske Veritas, Notified Body no. 575

As manufacturer we declare under our sole responsibility that the equipment follows the provisions of the Directive(s) stated above

Date and place of issue
23.05.97 Oslo

Signature
Thor Breien

Name and position
Thor Breien, Director R&D

DET NORSKE VERITAS

EC TYPE-EXAMINATION CERTIFICATE

CERTIFICATE NO. 510 - 97 - 1053
The certificate consists of 2 pages

This is to certify that the

MARKER BEACON

with type designation(s)

NM 7050 A, -B, -C, -D

Manufactured by

Normarc Garex AS
PO Box 50 Manglerud, 0612 Oslo, Norway

is found to comply with

THE ESSENTIAL HEALTH AND SAFETY REQUIREMENTS APPLICABLE IN COUNCIL DIRECTIVE 89/336/EEC OF 23 MAY 1989 AMENDED BY 92/31/EEC AND 93/68/EEC

The technical documentation file of the product has been assessed with respect to the essential protection requirements of the EMC Directive in accordance with article 10.5.

Place and date
Høvik, 20 May, 1997
for Det Norske Veritas AS
(Notified Body No. 0575)

Odd H. Solumsmoen
Head of Section

This certificate is valid until
20 May, 2001

Per Helstrup
Project Engineer

Notice: This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.

Certificate No.: 510 - 97 - 1053

Product description

The *Marker Beacon* system is intended for use at or near runway of airports. Its purpose is to provide radiofixes to an approaching aircraft. The main function of the marker beacon is to transmit radio signals at 75MHz (AM). The system can be configured as *Outer Marker, Middle Marker* or *Inner Marker* by strap settings on the transmitter card.

System *NM7050* comes in four variants with different numbers of monitors and power supplies:

Variant	Monitor	Power supply
NM7050 A	1	1
NM7050 B	1	2
NM7050 C	2	1
NM7050 D	2	2

Referenced standards

EN 50081-1 (1992)
EN 50082-2 (1995)
EN 61000-3-2 (1995)
EN 61000-3-3 (1995)
prETS 300 339 (Draft 1993)

Application/Limitation

Residential, commercial and light & heavy industry.

Documentation

Technical Documentation File No. MB040P. Rev. 3, dated 12 March, 1997

END OF CERTIFICATE

DNV

TECHNICAL REPORT

Client	:	Normarc AS
Title of Report	:	EMC testing of Normarc Marker Beacon
Report No.	:	97-1130

DET NORSKE VERITAS AS

DNV

PROPRIETARY/CONFIDENTIAL

DET NORSKE VERITAS

REPORT

Date	Dept.	Project No	Type of Report
97-03-04	DN500	510 7172	Technical

Approved by
for Det Norske Veritas AS

Odd H. Solumsmoen
Head of Section

DET NORSKE VERITAS * 1864 *

Client, Sponsor	Client's ref.
Normarc AS Postboks 50 Manglerud N-0612 OSLO	Terje Madsen

Summary

A Normarc Marker Beacon with Remote Control, has been EMC tested according to the worst case combination of the following specifications:

- EN 50081-1, January 1992: Generic emission standard, Part 1: Residential, commercial and light industry
- EN 50082-2, March 1995: Generic immunity standard, Part 2: Industrial environments
- EN 61000-3-2, April 1995: Harmonic emission
- EN 61000-3-3, January 1995: Voltage fluctuations and flicker
- Draft ETS 300339, 97-02-14: Radio Equipment and Systems (RES); General Electro-Magnetic Compatibility (EMC) Standard for Radio Communications Equipment

The main purpose of the tests was to document compliance with the EMC Directive.

The tests were carried out in the Environmental Laboratory at Det Norske Veritas, Høvik, Norway, between 15 January 1997 and 3 March 1997.

A summary of the results is given in Chapter 7 of the report.

DNV Report No.	Subject Group	4 Indexing terms
97-1130	R1	Electromagnetic Compatibility Emission Immunity NA

Title of Report

EMC testing of Normarc Marker Beacon

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Date of last revision	Rev. No.	Number of pages
NA	NA	28

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TABLE OF CONTENT

1. Scope of work

A Normarc Marker Beacon with Remote Control, has been EMC tested according to the worst case combination of the following specifications:

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The main purpose of the tests was to document compliance with the EMC Directive.

2. Test laboratory

The tests were carried out in the Environmental Laboratory at Det Norske Veritas, Høvik, Norway.

Ambient conditions in the laboratory:

	Required (IEC 68-1)	Actual
Temperature [°C]	15 - 35	21 -23.5
Humidity [% RH]	25 - 75 (30-60 for ESD, 2nd. ed.)	31 - 40
Barometric pressure [mbar]	860 - 1060	1000 - 1027

The AC mains supply in the Semi-Anechoic Chamber (used for radiated and conducted emission tests and for radiated immunity tests) and from the Harmonics and Flicker Analyser is configured as a TN network. The AC mains power supply at all other parts of the laboratory is configured as an IT network.

For details about the test facilities and instruments used, see Chapter 8.

3. Test period

The Marker Beacon with Remote Control was received for test 15 January 1997. The tests were carried out between 15 January 1997 and 3 March 1997.

4. Equipment Under Test

4.1 Equipment submitted for tests

Overall designation of system/product:

Description	Make	Type	Ser. no.	SW ver. / Other info
Marker Beacon	Normarc	NM7050D	101	Prototype SW, ID: MBTST F1.4

The above will from now on be referred to as **EUT** (Equipment Under Test).

The following input/output power and signal ports were tested:

Port no.	Description	Type (AC/DC/Sign.)	Minimum cable requirements	Minimum cable termination requirements	Other info
1	AC supply	AC	None	Terminal block	
2	Remote Control communications	Sign.	Twisted pair	Weider-Müller plug	
3	RF in	Sign.	Coax	N-plug	
4	RF out	Sign.	Coax	N-plug	

The EUT was also fitted with a RS232 port, used for service purposes only. This port was therefore not subjected to the tests.

The chassis of the EUT was earthed with a separate earth cable.

4.2 Test configuration

The EUT was configured as follows during the testing.

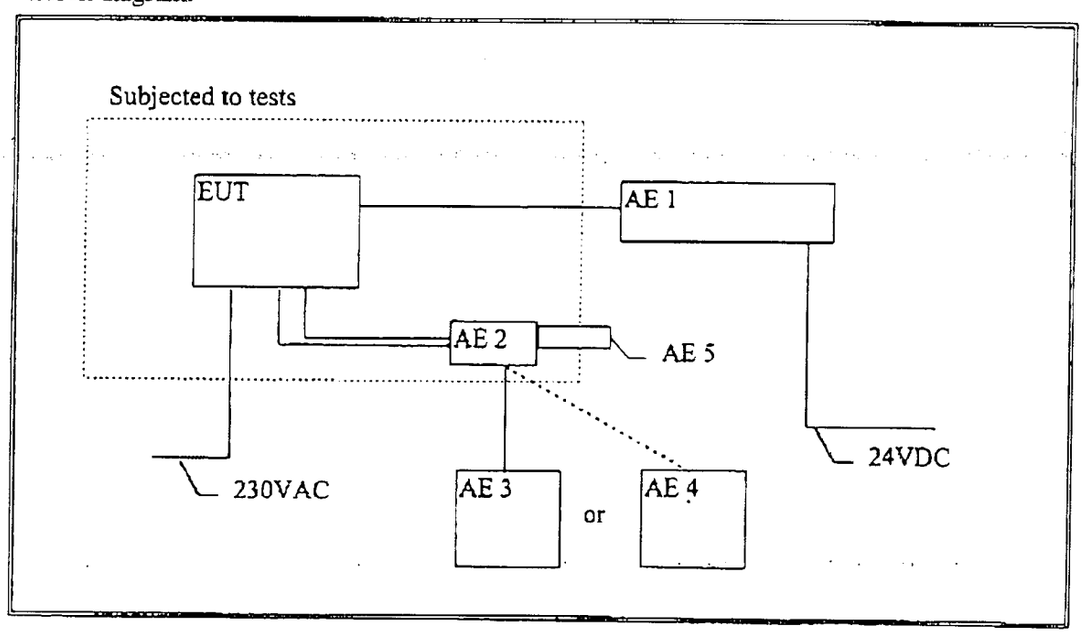
Auxiliary equipment (AE):

AE no.	Description	Make	Type	Ser. no.	SW ver. / Other info
1	Remote Control	Normarc	RFA1353	Prototype	
2	Splitter	Normarc	DC420	NA	
3	Modulation Analyzer	R&S	FAM	344.2015.54	
4	Oscilloscope	Tektronix	485	NA	
5	Dummy load	Bird	8080	NA	

Cables:

Cable no.	From - To	Type	No. of leads	Shielded	Length (m)
1	EUT - AC	Normal 0.75ϕ	3	No	1.5 [1]
2	EUT - AE 1	Twisted pair	2	No	>7
3	EUT - AE 2 (x2)	Coax	NA	Yes	2-3
4	AE 2 - AE 3/4	Coax	NA	Yes	2-3

Block diagram:



[1] The cable length was reduced to 0.2m for the Conducted disturbances, induced by radio-frequency fields test and to 0.7m for the Electrical fast transient/burst test

4.3 Modes of operation

The EUT was powered by 230VAC during the testing.

As the final SW for the units were not available, the units were run in "test mode", using the above mentioned prototype SW. The prototype SW allowed all the main functions of the unit to be exercised. Alarm, communication and other status information was displayed on the LCD when in "Test mode", and was hence used for monitoring the EUT during the immunity tests.

The system is intended for transmitting the 75MHz signal constantly during the whole life cycle. The EUT was therefore not tested in standby modus, as this was not a valid state for the EUT.

4.4 Modifications

The EUT was modified as follows during the test period in order to pass all the tests:

- The ventilation rails on top of the unit were covered by a metal mesh
- The front lid of the unit was fitted with extra brackets in order to improve the shielding of the vertical slots of the lid
- The grounding of the feedback hybrid on the transmission card was improved by means of a Cu tape strap.
- A new PCB, with ID 16839A4, was inserted on the transmission card of the unit

All the above modifications were carried out in order to improve Radiated emission performance.

The significance of the modifications on other tests, previously carried out, was evaluated, and these tests were not found necessary to be repeated.

5. Evaluation of performance during the tests

5.1 Function testing

A thorough verification of performance was carried out (before) and after each test, by the following function test:

- The RF out from the EUT was analysed by means of a Modulation Analyser (frequency and modulation) and the shape was controlled by means of an Oscilloscope
- The keypad on the front of the unit was operated to see that the unit responded correctly

5.2 Performance monitoring

In order to verify correct performance of the EUT during the tests, the following functions were monitored:

- The RF out from the EUT was analysed by means of a Modulation Analyser (frequency and modulation)
- The communications between the EUT and AE1 was monitored for errors
- The LCD display on the front of the unit was monitored for status change and alarms

5.3 Criteria of acceptance

In order to pass each test, the EUT shall meet the following criteria:

- The RF out from the EUT shall not deviate beyond the tolerances specified below:
  - ⇒ Frequency: 75MHz ± 3.75kHz
  - ⇒ Modulation: 95% ± 2%
- The communications between the EUT and AE1 shall be maintained at all times
- Not show any other signs of malfunction

For the tests which have other or additional criteria of acceptance, this is described in the relevant Chapters.

The following representatives from the client were present during the testing, and took part in the performance testing and in the evaluation of same.

- Terje Madsen
- Morten Bremsrud

6. Tests

6.1 Emission

6.1.1 Conducted emission

Referenced standard:

- EN 55022, August 1994, inclusive EN 55022/A1, May 1995: Limits and methods of measurement of radio disturbance characteristics of information technology equipment

DNV Laboratory Procedure:

- 17.3.4: EMC testing according to Emission standard EN 55022, August 1994, including A1, May 1995

Emission limits, Class B:

Frequency range	Limits (quasi-peak)	Limits (average)
150 - 500 kHz	66 - 56 dBμV	56 - 46 dBμV
500 kHz -5 MHz	56 dBμV	46 dBμV
5 - 30 MHz	60 dBμV	50 dBμV

The emission was measured by means of an Artificial Mains Network (AMN), inserted between the EUT and the mains supply.

Result: The emission from the EUT was below the specified limits. The acceptance criterion was met, and the EUT passed the test.

The worst case emissions are shown in Appendix II.

6.1.2 Radiated emission

Referenced standard:

- EN 55022, August 1994, inclusive EN 55022/A1, May 1995: Limits and methods of measurement of radio disturbance characteristics of information technology equipment

DNV Laboratory Procedure:

- 17.3.4: EMC testing according to Emission standard EN 55022, August 1994, including A1, May 1995

Emission limits, Class B:

Frequency range	Limits (quasi-peak)
30 - 230 MHz	30 dBμV/m at 10 m
230 - 1000 MHz	37 dBμV/m at 10 m

The emission was measured with the antenna in horizontal and in vertical polarization, at a distance of 3 meters. The limits were adjusted by adding 10 dB.

The emission tests were carried out with the EUT in varying positions relative to the antenna and with antenna heights adjusted between 1 and 4 m, to find the highest levels. The position of cables was also varied to find the maximum emissions.

Result: The emission from the EUT was initially above the specified limits. Modifications as specified in Ch. 4.4 were therefore implemented.

The emission from the EUT was below the specified limits after the modifications. The acceptance criterion was met, and the EUT passed the test.

The worst case emissions are shown in Appendix II.

6.1.3 Harmonic current emission

Test Specification:

- EN 61000-3-2, April 1995: Electromagnetic compatibility (EMC) - Part 3: Limits - Section 2: Limits for harmonic current emissions (Equipment input current ≤ 16 A per phase)

DNV Laboratory Procedure

- 17.3.6: EMC testing according to emission standard EN 61000-3-2, April 1995

Emission limits and results, Class A:

Harmonic order (n)	Maximum permissible harmonic current (A)	Results
Odd harmonics		
1	NA	0.319
3	2.30	0.279
5	1.14	0.257
7	0.77	0.225
9	0.40	0.187
11	0.33	0.145
13	0.21	0.104
$15 \le n \le 39$	$0.15 \times 15/n$	< 0.066
Even harmonics		
2	1.08	0.0000
4	0.43	0.0003
6	0.30	0.0004
$8 \le n \le 40$	$0.23 \times 8/n$	< 0.0001

The harmonic current emission test was carried out by providing the AC power to the EUT independent of the mains supply, and analysing the harmonic current emission from the EUT by means of an Harmonic Current Analyser.

The harmonic currents generated by the EUT was first analyzed in continuous mode in order to reveal possible fluctuating harmonics. Steady state harmonics was then measured at the worst case mode of the EUT.

Result: The emission from the EUT was below the specified limits (see above). The acceptance criterion was met, and the EUT passed the test.

6.1.4 Voltage fluctuations and flicker

Test Specification:

- EN 61000-3-3, January 1995: Electromagnetic compatibility (EMC) - Part 3: Limits - Section 3: Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current ≤ 16A

DNV Laboratory Procedure

- 17.3.7: EMC testing according to emission standard EN 61000-3-3, January 1995

Emission limits and results:

Parameter	Limit	Results
Pst	≤ 1.0	0.0020
PIt	≤ 0.65	Negligible
Relative steady state voltage change, dc	≤ 3 %	Negligible
Maximum relative voltage change, dmax	≤ 4 %	0.049
Value of d(t) during av voltage change	Not to exceed 3 % for more than 200 ms	0.000

The voltage fluctuations and flicker test was carried out by providing the AC power to the EUT independent of the mains supply, and analysing the voltage changes which is produced by the EUT by means of an Flickermeter.

Result: The emission from the EUT was below the specified limits (see above). The acceptance criterion was met, and the EUT passed the test.

6.2 Immunity

6.2.1 Radiated, radio-frequency electromagnetic fields

Test specification:

- EN 61000-4-3, September 1996: Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 3: Radiated, radio-freqency electromagnetic field immunity test

DNV Laboratory Procedure:

- 17.3.11: EMC testing according to basic immunity standard EN 61000-4-3, September 1996

Severity levels:

Test parameters	Units	Severity levels
Frequency	MHz	80-1000
Amplitude	V/m	10
Modulation		
Type		AM
Frequency	kHz	1
Depth	%	80
Antenna polarisations		Horizontal and Vertical

The EUT was placed on a wooden table, 0.8m above the ground plane. The cables were carefully configured in order to create a worst case situation with respect to susceptibility of the EUT.

The EUT to antenna distance was 3m. The EUT was tested with the front facing the antenna.

Result: No deviation in frequency or modulation of the RF out signal beyond the tolerances specified in Chapter 5.3 or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

6.2.2 Radiated electromagnetic field from digital radio telephones

Test specification:

- ENV 50204, March 1995: Radiated electromagnetic field from digital radio telephones immunity test

DNV Laboratory Procedure:

- 17.3.20: EMC testing according to immunity standard ENV 50204, March 1995

Severity levels:

Test parameters	Units	Severity levels
Frequency	MHz	900 ± 5 and 1890 ± 10
Amplitude	V/m	10
Modulation		
Type		Pulse
Frequency	Hz	200
Duty Cycle	%	50
Antenna polarisations		Horizontal and Vertical

The EUT was placed on a wooden table, 0.8m above the ground plane. The cables were carefully configured in order to create a worst case situation with respect to susceptibility of the EUT.

The EUT to antenna distance was 3m. The EUT was tested with the front facing the antenna.

Result: No deviation in frequency or modulation of the RF out signal beyond the tolerances specified in Chapter 5.3 or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

6.2.3 Power frequency magnetic fields

Test specification:

- EN 61000-4-8: "Electromagnetic compatibility (EMC); Part 4: Testing and measurement techniques, Section 8: Power frequency magnetic field immunity test", 1993.

DNV Laboratory Procedure:

- 17.3.19: EMC testing according to basic immunity standard EN 61000-4-8, September 1993

Test levels:

Test parameters	Units	Severity levels
Frequency	Hz	50
Field strength	A/m	30

The test was performed using Helmholtz-coils. The EUT was rotated with respect to the coils in order to expose the EUT to the field in all three perpendicular orientations.

Result: No deviation in frequency or modulation of the RF out signal beyond the tolerances specified in Chapter 5.3 or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

6.2.4 Electrostatic discharge

Test specification:

- EN 61000-4-2, March 1995: Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 2: Electrostatic discharge immunity test

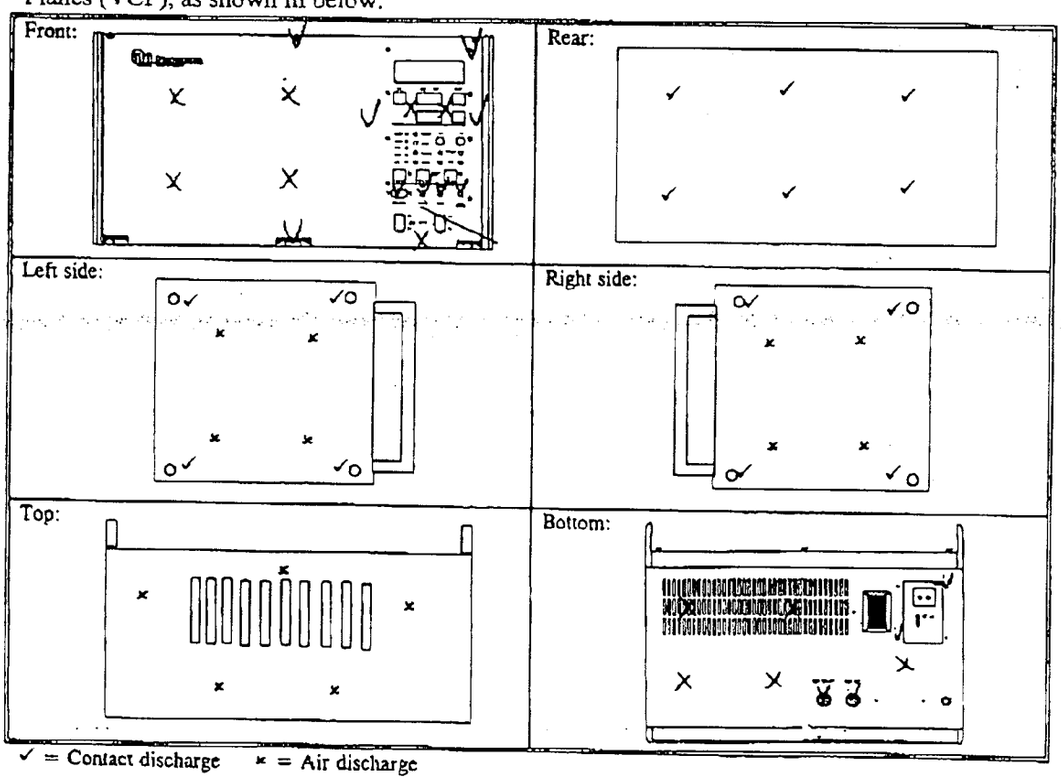
DNV Laboratory Procedure:

- 17.3.10: EMC testing according to basic immunity standard EN 61000-4-2, March 1995

Severity levels:

Test parameters	Units	Severity level
Amplitude	$kV_{contact}/kV_{air}$	4/8
Polarities		±
Number of discharges	/preselected point/polarity	10
Repetition rate	Hz	< 1

The discharges were applied to all accessible parts of the EUT, and to the Vertica Coupling Planes (VCP), as shown in below:



✓ = Contact discharge × = Air discharge

Result: No deviation in frequency or modulation of the RF out signal beyond the tolerances specified in Chapter 5.3 or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

6.2.5 Conducted disturbances, induced by radio-frequency fields

Test specification:

- EN 61000-4-6, July 1996: Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 6: Immunity to conducted disturbances, induced by radio-frequency fields

DNV Laboratory Procedure:

- 17.3.14: EMC testing according to basic immunity standard EN 61000-4-6, July 1996

Severity levels:

Test parameters	Units	Severity levels
Frequency	MHz	0.15-80
Amplitude	V	10
Modulation		
Type		AM
Frequency	kHz	1
Depth	%	80

The ports of the EUT were configured as follows during the test:

Port no.	Coupling method	Decoupling method
1	CDN-M3	CDN-M3 with RF injection input terminated in 50 Ω
2	CDN-AF8	CDN-AF8 with RF injection input terminated in 50 Ω
3	Clamp injection	150Ω from screen to ground and ferrite tube.
4	Clamp injection	150Ω from screen to ground and ferrite tube.

Each port was tested in turn with the remaining cables terminated/decoupled, as specified above.

Result: No deviation in frequency or modulation of the RF out signal beyond the tolerances specified in Chapter 5.3 or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

6.2.6 Electrical fast transient/burst

Test specification:

- EN 61000-4-4, March 1995: Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 4: Electrical fast transient/burst immunity test

DNV Laboratory Procedure:

- 17.3.12: EMC testing according to basic immunity standard EN 61000-4-4, March 1995

Severity levels:

AC supply terminals, common mode:

Test parameters	Units	Severity levels
Amplitude	kV	2
Repetition frequency	kHz	5
Polarities		+ & -
Duration/polarity	min	>2

The bursts were applied between each line and GND in turn, via a Coupling-/Decoupling network (CDN).

Data, control and communications lines, common mode:

Test parameters	Units	Severity levels
Amplitude	kV	1
Repetition frequency	kHz	5
Polarities		+ & -
Duration/polarity	min	>2

The bursts were applied on each signal line of the EUT in turn, via a Capacitive Coupling Clamp (CCC).

Result: No deviation in frequency or modulation of the RF out signal beyond the tolerances specified in Chapter 5.3 or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

6.2.7 Surge

Test specification:

- EN 61000-4-5, March 1995: "Electromagnetic compatibility (EMC), Part 4: Testing and measurement techniques, Section 5: Surge immunity test",.

DNV Laboratory Procedure:

- 17.3.15: EMC testing according to basic immunity standard EN 61000-4-5, March 1995

Severity levels:

AC supply terminals, common mode (Line-to-ground):

Test parameters	Units	Severity levels
Amplitude	kV	2
Interval between pulses	min	>1
Phases	°	0, 90, 180 and 270
Polarities		+and -
No. of pulses	/phase/polarity	5

AC supply terminals, differential mode (Line-to-line):

Test parameters	Units	Severity levels
Amplitude	kV	1
Interval between pulses	min	>1
Phases	°	0, 90, 180 and 270
Polarities		+and -
No. of pulses	/phase/polarity	5

The surges were applied to the lines, via a Coupling-/Decoupling network (CDN).

Result: No deviation in frequency or modulation of the RF out signal beyond the tolerances specified in Chapter 5.3 or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

6.2.8 Voltage dips, short interruptions and voltage variations

Test specification:

- EN 61000-4-11, June 1996: "Electromagnetic compatibility (EMC), Part 4: Testing and measurement techniques, Section 11: Voltage dips, short interruptions and voltage variations immunity tests", 1994.

DNV Laboratory Procedure:

- 17.3.21: EMC testing according to basic immunity standard EN 61000-4-11, June 1996

Test levels, AC power input ports:

Test parameters	Units	Severity levels
Voltage variations /duration	% / minutes	± 10 / 15
Voltage dips / duration	% reduction / ms	30 / 10 60 / 100
Voltage interruptions / duration	% reduction / s	> 95 / 5

The dips and interrptions were applied using a drop-out generator.

Additional acceptance criterion:

- For the Voltage interruptions test, loss of function is allowed, provided the function can be restored means of any user intervention, f.inst. power on/off.

Result: No deviation in frequency or modulation of the RF out signal beyond the tolerances specified in Chapter 5.3 or other malfunctions were observed during or after the test, except for the Voltage interruptions test, where user intervention was necessary in order to restore its function.. The acceptance criteria were met, and the EUT passed the test.

7. Summary of test results

With the modifications described in Chapter 4.4, the EUT passed all the tests.

8. Test facilities and instruments

The following test facilities and instruments were used during the tests:

Description	Make	Model	Serial No.	Calibration Interval
Power Amplifier	AR	100A250	20028	When new
Power Amplifier	AR	200W1000M7	12949	When new
Log-periodic antenna	AR	AT1080	17257	None
Remote control for 200W1000M7	AR	CP3000	18621	None
Dual Directional Coupler	AR	DC6280M1	14768	When new
Receiver Module for Field Probe	AR	FM2000	12784	None
Field Strength Probe	AR	FP2000	12789	None
Field Strength Probe	AR	FP2000	19064	When new
Bilog Antenna	Chase	CBL6121A	1019	3 yesrs
Personal Computer	Compaq	LTE ELITE 4/75CXL	8S06HMM61281	NA
Personal Computer	Compaq	Prolinea 5150	None	NA
SW for Large EMC room	DNV	EMC_ROOM	NA	NA
SW for radiated immunity testing	DNV	EMC_RUN	NA	None
Vertical Coupling Plane	DNV	LABH-95-3	NA	None
Helmholz Coils	DNV	LABH-96-1	NA	None
Electrostatic Discharge Generator	Haefely	PSD 25B	082197-41	1 year
Printer	Hewlett Packard	LaserJet III	3124JD0595	None
Internal N-plug cable, no. I7	NA	NA	NA	
N-plug cable, No. N13	NA	RG214	NA	None
Artificial Mains Network	PMM	L3-25	295	When new
SW for emission testing	Rohde & Schwarz	ES-K1	1026.6790.02	None
EMI Test Receiver	Rohde & Schwarz	ESAI	825316/009	1 year
Signal Generator	Rohde & Schwarz	SMP 02	844039/0017	3 years
Coupling Network	Schaffner	CDN113	109	None
Main Frame (Interference simulator system)	Schaffner	NSG600	211	3 years
AC/DC Line Dropout and Variation Simulator	Schaffner	NSG603	197	3 years
Fast Transients/Burst Generator	Schaffner	NSG625	207	3 years
Combinational Surge Generator	Schaffner	NSG651	160	3 years
Coupling Clamp	Schaffner	SL400-071	NA	None
SW for NSG 600	Schaffner	WIN600	IN5094-068	NA
SW for NSG 651	Schaffner	WIN651	IN5094-069	NA
Internal N-plug cable, No. I01	Siemens	NA	NA	
Internal N-plug cable, No. I02	Siemens	NA	NA	
Internal N-plug cable, No. I05	Siemens	NA	NA	
Semi-anechoic Chamber	Siemens Matsushita Components	NA	NA	None
Harmonics analyser	Spitzenberger + Spies	D5000/PAS	NA	3 years
N-plug cable, No. N04	Suhner	NA.	NA	None
N-plug cable, No. N15	Suhner	Sucoflex 104A	21373/4A	When new
N-plug cable, No. N14	Suhner	Sucoflex 104A	21374/4A	When new
N-plug cable, No. N07	Suhner	Sucoflex 104A	3810/4A	When new
Personal Computer	Tandon	TM 7443	IWJ02A013393	None
Coaxial Cable, No. C01	DNV	RG-58C/U	NA..	None
N-plug cable, No. N16	DNV	RG-58C/U	NA...	None
Coupling/Decoupling Network	Lüthi	CDN801-AF8	9450216	When new
Coupling/Decoupling Network	Lüthi	CDN801-M2/M3	9450196	When new
EM Clamp	Lüthi	EM101	9435108	When new
Decoupling Clamp	Lüthi	FTC101	4147	When new
Signal Generator	Marconi	2030	119486-091	1 year
Personal Computer	Tandon	T30000	ENQ24A033275	
N-plug cable, No. N12	Tektronix	012-0114-00	NA	None

APPENDIX I

Photos

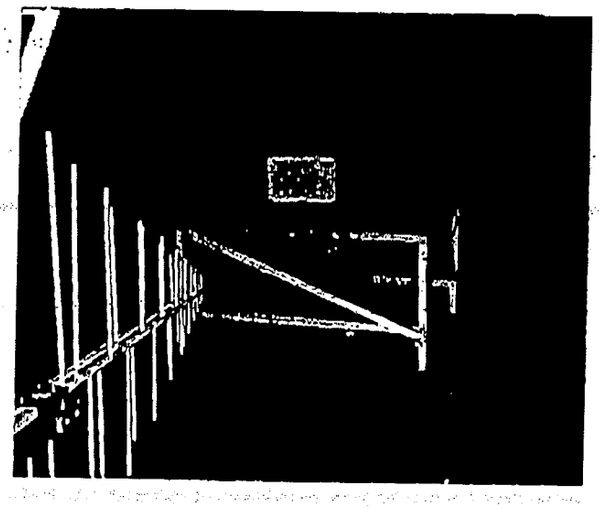


Photo 1: Radiated emission testing, front view

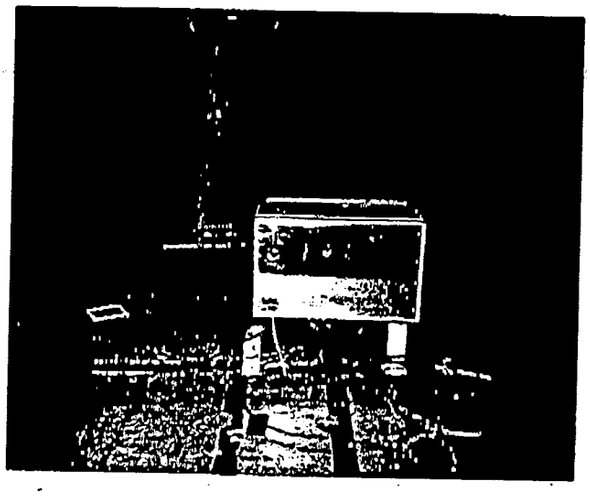


Photo 2: Radiated emission testing, rear view

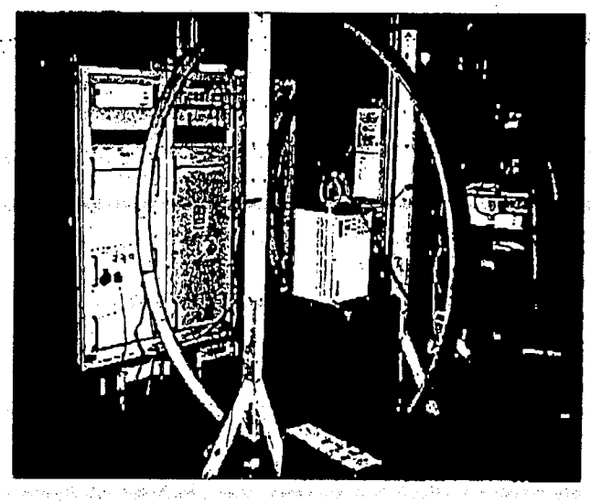
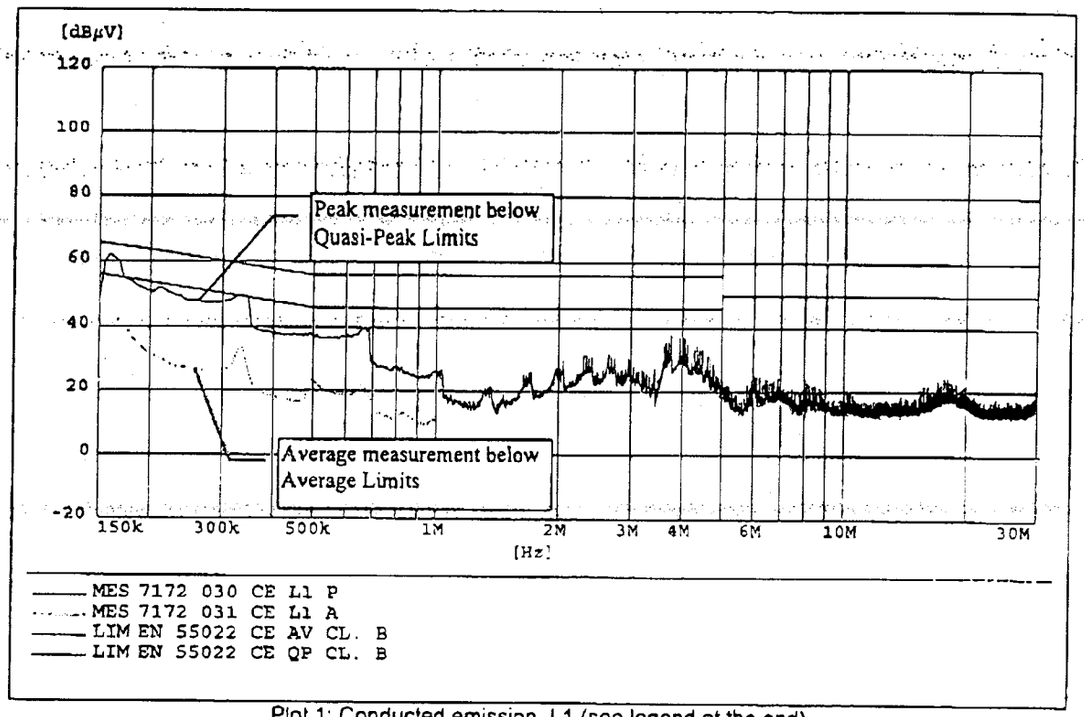


Photo 3: Magnetic field testing

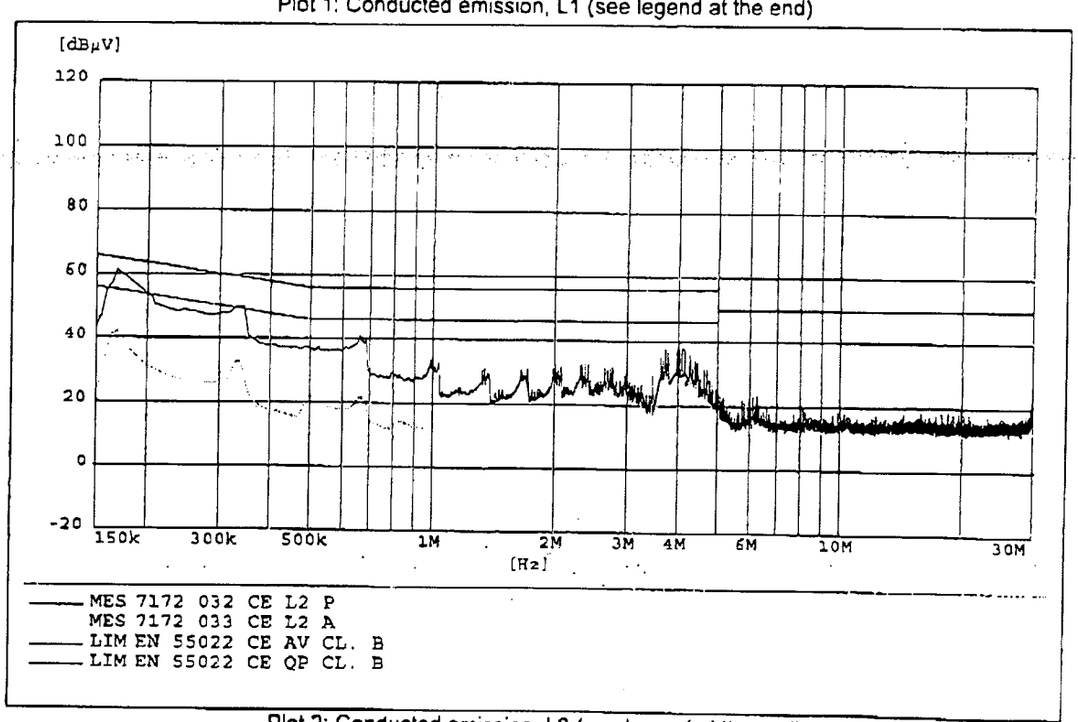
Photo 4: Burst testing

APPENDIX II

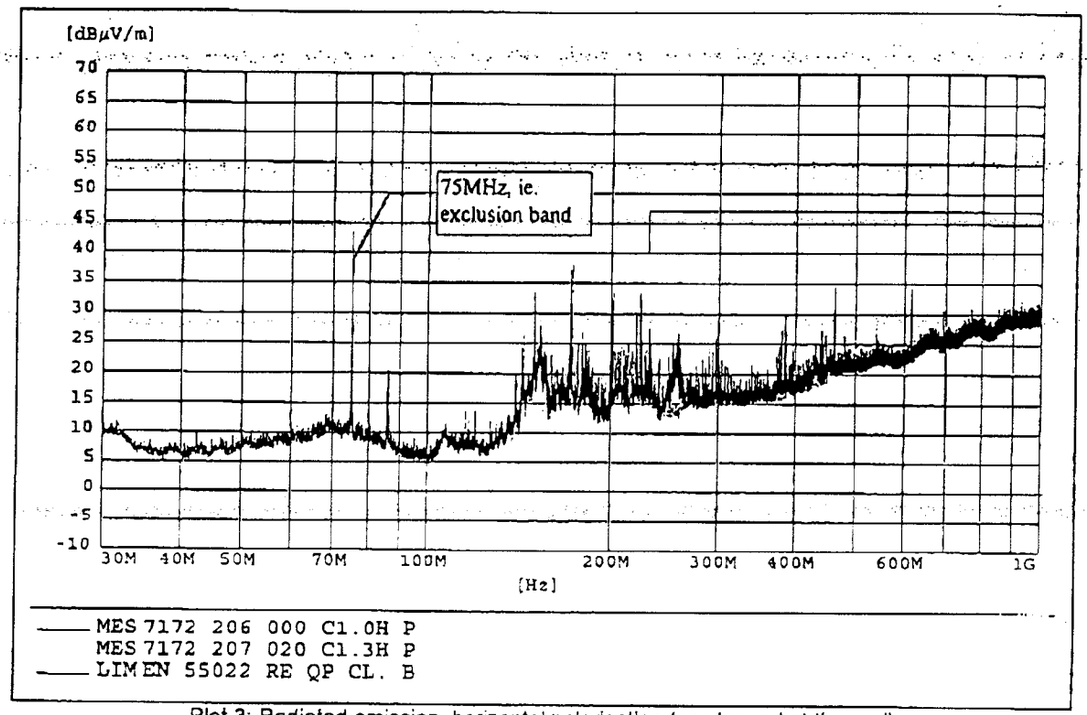
Plots



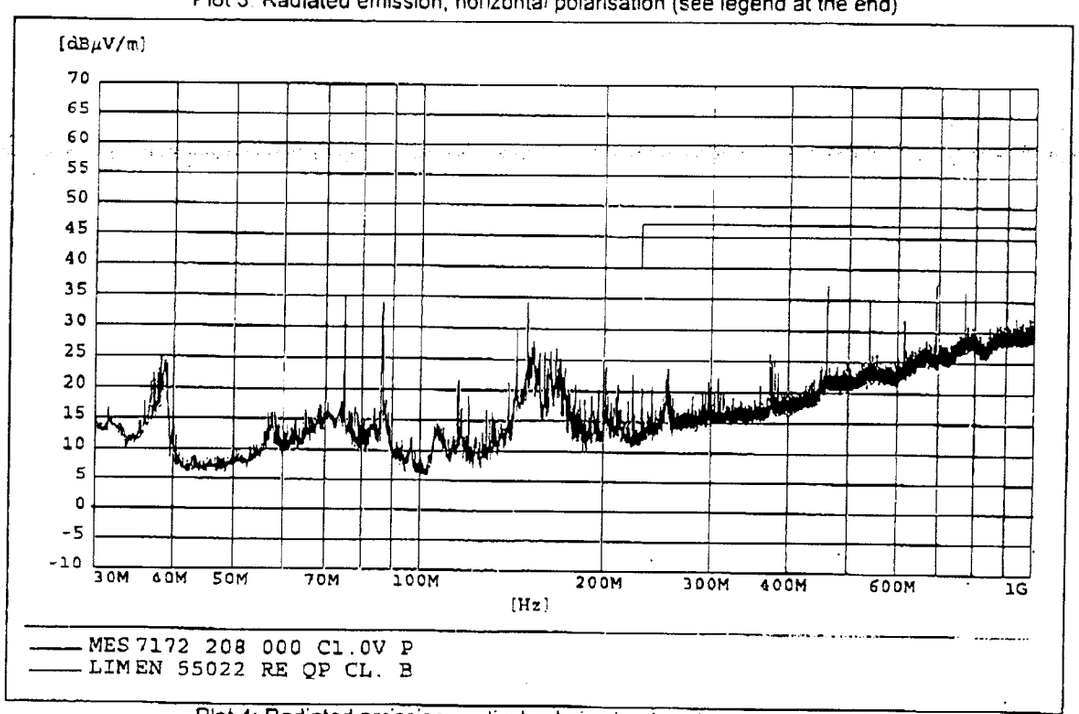
Plot 1: Conducted emission, L1 (see legend at the end)



Plot 2: Conducted emission, L2 (see legend at the end)



Plot 3: Radiated emission, horizontal polarisation (see legend at the end)



Plot 4: Radiated emission, vertical polarisation (see legend at the end)

Legend

MES: Measured value
LIM: Limit value (requirement)

Label of measurement for radiated emission: nnnn mmm ttt sh.hp q

Letters	Explanation	Example
nnnn	Four last figures of project No	
mmm	Measurement number	
ttt	Position of turntable	(000-360)
a	Type of antenna	C: Log periodic B: Biconical antenna L: Logarithmic antenna
h.h	Height of antenna	(in metres)
p	Polarization	H: Horisontal V: Vertical
q	Detection mode	A: Average P: Peak Q: Quasi peak

Label of measurement for conducted emission: nnnn mmm xx q

Letters	Explanation	Example
nnnn	Four last figures of project No	
mmm	Measurement number	
xx	Line	L1 L2 N
q	Detection mode	A: Average P: Peak Q: Quasi peak