EMC – TEST REPORT

Test Report No. : A32573-00-00WB	05. May 2008 Date of issue

Type / Model Name : TAKO2000

Product Description : Electronic Tachograph

Applicant : NORM ELEKTRONIK SAN.DIS TIC. A. S.

Address : ATB IS MERKEZI NO:189-190

MACUNKOY ANKARA TURKEY

Manufacturer : NORM ELEKTRONIK SAN.DIS. TIC. A.S.

Address : ATB IS MERKEZI NO:189-190

MACUNKOY ANKARA TURKEY

Test Result according to the standards listed in clause 1 test standards:	**POSITIVE**

Deutscher Akkreditierungs Rat

DAT-P-207/05-00

Contents

1 TEST STANDARDS

The tests were performed according to following standards:

☐	EN 13309	: 2000
☐	EN 1789	: 1999
☐	EN 50148	: 1995
☐	EN ISO 14982	: 1998
☐	EVOBus	: 2000
☐	GMW3097	: 2001
☐	GMW3100	: 2001
☐	GS 95002	: 2001
☐	ISO 13766	: 1999
☐	JCB 7800/0107	: 2001
☐	M 3285	: 2001
☐	MBN 22100-2	: 1999
☐	TL 965	: 1999
☐	TL 820 66	: 1997
☐	TL 821 66	: 1998
☒	72/245/EEC	: 1972
☒	95/54/EC	: 1995
☒	2004/104/EC	: 2004
☒	2006/28/EC	: 2006
☐	applicant specific	

☐	CISPR 12	: 2002
☐	CISPR 25	: 1995
☒	CISPR 25	: 2002
☐	EN 55025	: 1999
☐	VDE 0879 Part 2	: 1999

☐	DIN ISO 11451-1	: 2000
☐	DIN ISO 11451-2	: 2000
☐	DIN ISO 11451-3	: 2000
☐	DIN ISO 11451-4	: 2000
☐	DIN ISO 11452-1	: 2000
☒	DIN ISO 11452-2	: 2000
☐	DIN ISO 11452-3	: 2000
☐	DIN ISO 11452-4	: 2000
☐	DIN ISO 11452-5	: 2000
☐	DIN 40839 Part 4	: 1990
☐	IEC 801-3	: 1984

☐	DIN 40839 Part 1	: 1992
☐	DIN 40839 Part 3	: 1991
☐	ISO 7637 Part 1	: 1990
☐	ISO 7637 Part 2	: 1990
☐	ISO 7637 Part 3	: 1999
☒	ISO 7637-2	: 2004

☐	IEC 801-2	: 1991
☐	ISO 10605	: 2001
☐	ISO/TR 10605	: 1994
☐	EN 61000-4-2	: 1995 +A1: 1998 + A2: 2001
☐	EN 61000-4-8	: 1993 +A1: 2001
☐	SAE J1113/22	
☐	SAE J1113/27	

2 SUMMARY

2.1 General remarks

None

2.2 Final assessment

The equipment under test **fulfills** the EMC requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : April 17th 2008

Testing concluded on : April 23th 2008

Checked by:

Harald Buchwald
I confirm the correctness and integrety of this document
2008.05.08 11:03:20 +02'00'

Harald Buchwald
Dipl. Ing.(FH)
Head of Department EMC

Tested by:

Walter G. Bosin
Ich bin der Verfasser dieses Dokuments
2008.05.08 08:57:21 +02'00'

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3 EQUIPMENT UNDER TEST

3.1 Photo documentation of the EuT

3.2 Power supply system utilised

Power supply voltage : 12 V_{DC} and 24 V_{DC}

3.3 Short description of the Equipment under Test (EuT)

The EuT is a tachograph for use in cars, trucks and busses. It records and reports drivers's activity according to the rules of local Legislations of Turkey.

The test has been made with 12 Volt $_{DC}$ and 24 Volt $_{DC}$ powersuply.

Number of tested samples: 1
Serial number: 90218

EuT operation mode:

The equipment under test was operated during the measurement under the following conditions:

- Simulated drive mode with given input signals

EuT configuration:

(The CDF filled by the applicant can be viewed at the test laboratory.)

The following peripheral devices and interface cables were connected during the measurements:

- Function Generator Model : Agilent 33120A
- _____ Model : _____
- _____ Model : _____
- _____ Model : _____
- _____ Model : _____
- _____ Model : _____

3.4 Performance level

The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance level defined by its manufacturer or the requestor of the test, or agreed between the manufacturer and the purchaser of the product.

Definition related to the performance level:

☒ based on the used product standard
☐ based on the declaration of the manufacturer, requestor or purchaser

Criterion A:
Definition: normal performance within limits specified by the manufacturer, requestor or purchaser:

No communications failures or any other errors are detected on the ESA during exposure to disturbance

Criterion B:
Definition: temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention:

Device is switching off and on for a short time period, but returns automaticly to normal function without operators

Intervention after disturbance is removed. No data loss.

Criterion C:
Definition: temporary loss of function or degradation of performance, the correction of which requires operator intervention:

Criterion D:
Definition: loss of function or degradation of performance, which is not recoverable, owing to damage to hardware or software, or loss of data:

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

mikes-testingpartners gmbh
Ohmstrasse 2-4

94342 Strasskirchen
Germany

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	86-106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 /11.2003 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

5 TEST CONDITIONS AND RESULTS

5.1 Transient emission test

For test instruments and accessories used see section 6 Part **AES**.

5.1.1 Description of the test location

Test location: AREA 5

5.1.2 Photo documentation of the test set-up

5.1.3 Test result

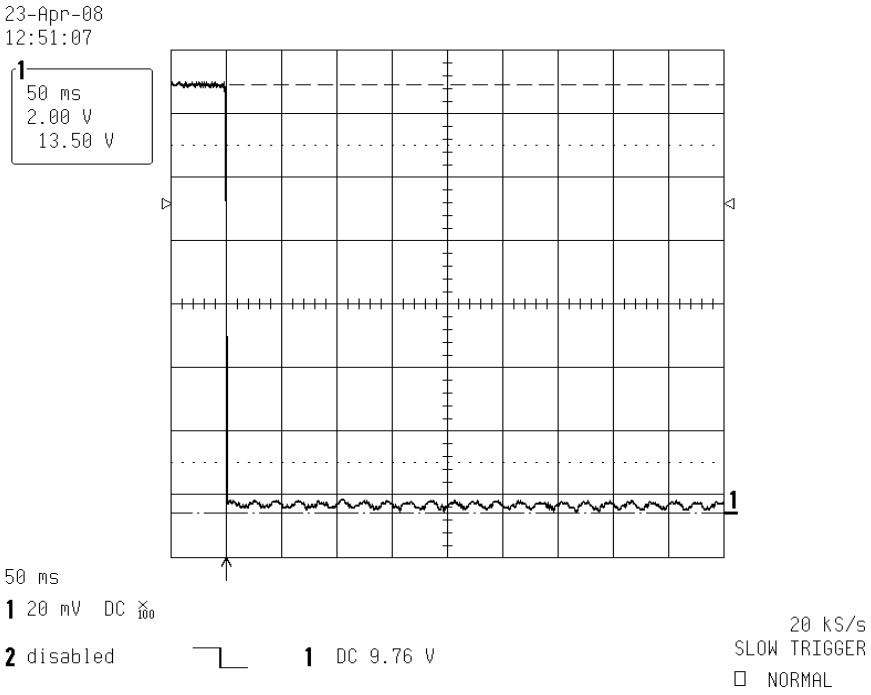
The requirements are **FULFILLED.**

Remarks: For detailed results, please see the following page(s).

5.1.4 Test protocol

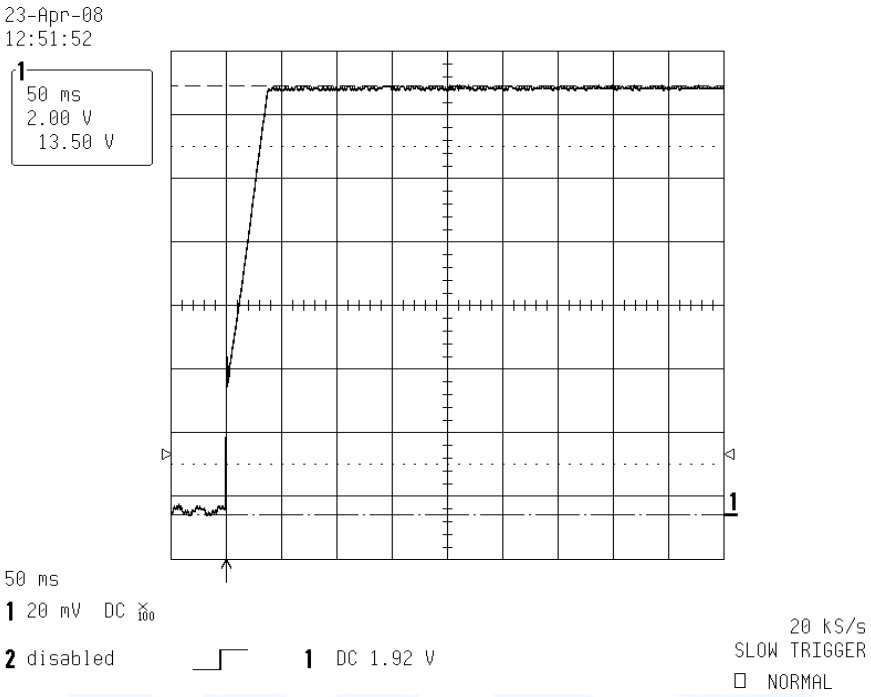
Operation mode: Simulated drive mode with given input signals Result: passed
Remarks: --
Date: April 23th 2008
Tested by: Walter G. Bosin

Pulse type	Limit [V]	Result [V]
negative	- 450	0



Operation mode: Simulated drive mode with given input signals Result: passed
Remarks: --
Date: April 23th 2008
Tested by: Walter G. Bosin

Pulse type	Limit [V]	Result [V]
positive	+ 150	0



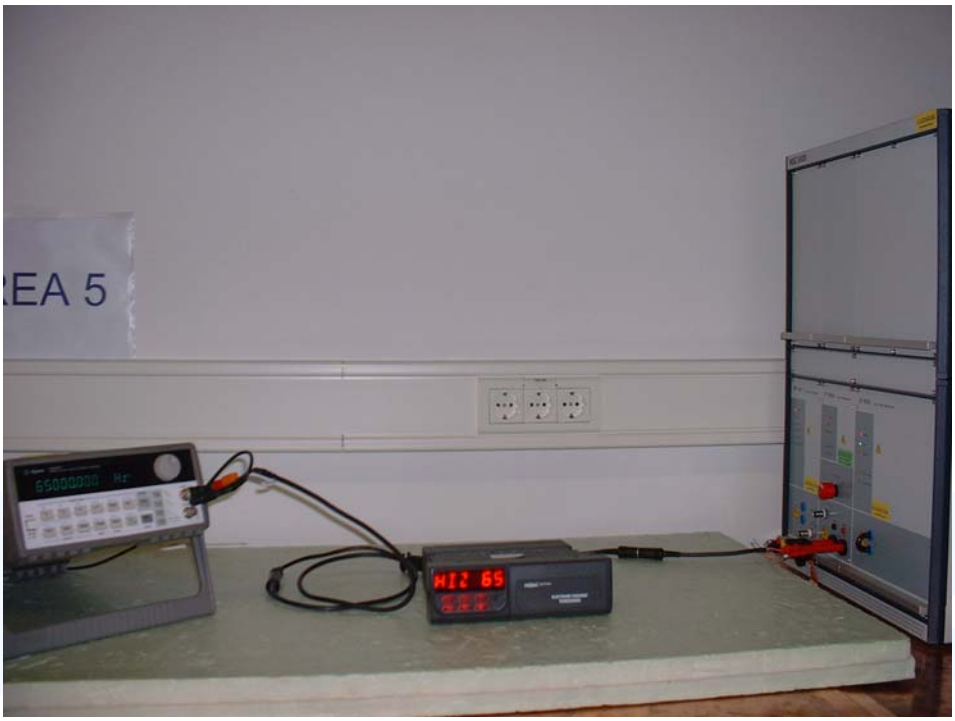
5.2 Transient immunity test (12V power line)

For test instruments and accessories used see section 6 Part **APU**.

5.2.1 Description of the test location

Test location: AREA 5

5.2.2 Photo documentation of the test set-up



5.2.3 Test specification

Pulse 1a:	Level:	III
	Test level:	-150 V
	Number of pulses:	5000
Pulse 2a:	Level:	III
	Test level:	+ 37 V
	Number of pulses:	5000
Pulse 2b	Level:	III
	Test level:	+ 20 V
	Number of pulses:	10
Pulse 3a:	Level:	III
	Test level:	-150 V
	Coupling duration:	1 h
Pulse 3b:	Level:	III
	Test level:	+150 V
	Coupling duration:	1 h
Pulse 4:	Level:	III
	Test level:	-12 V
	Number of pulses:	1

5.2.4 Coupling points

Cable description: DC power line

Screening: unscreened
Status: active
Signal transmission: analogue
Length: 0.5 m

5.2.5 Test result

Test pulse number		*required functional status*	*functional status of the systems during the test*
1		C	**A**
2a		B	**A**
2b		C	**B**
3a		A	**A**
3b		A	**A**
4		B	**A**

The requirements are **FULFILLED.**

Remarks: Pulse 2b - A very short flickering of the display was detected.

No data loss, the given input signals to control the proper operation of the ESA weren't affected.

5.3 Radiated emissions - ALSE

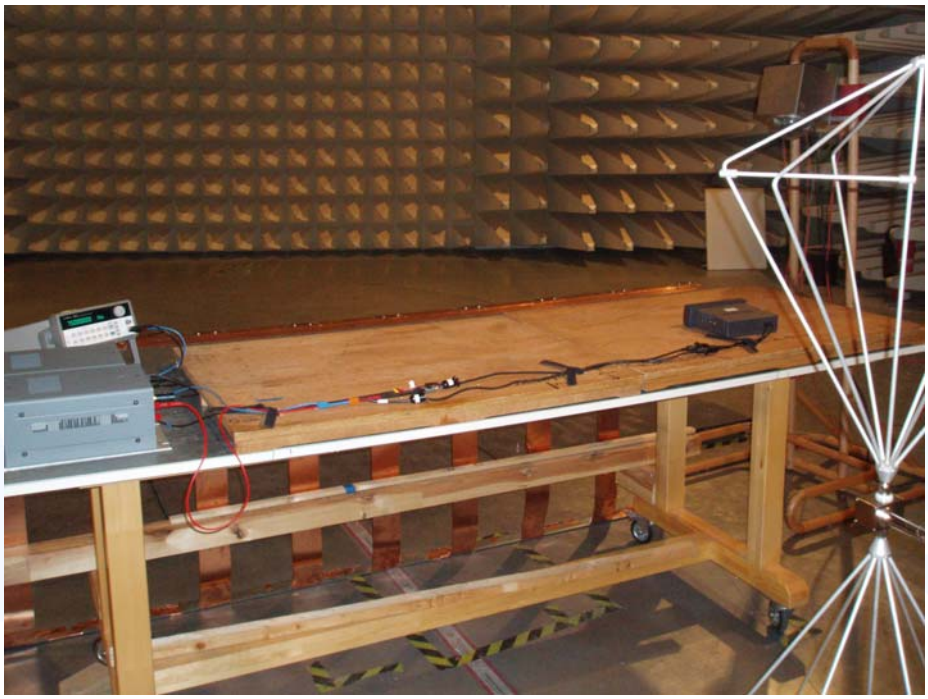
For test instruments and accessories used see section 6 Part **ARE**.

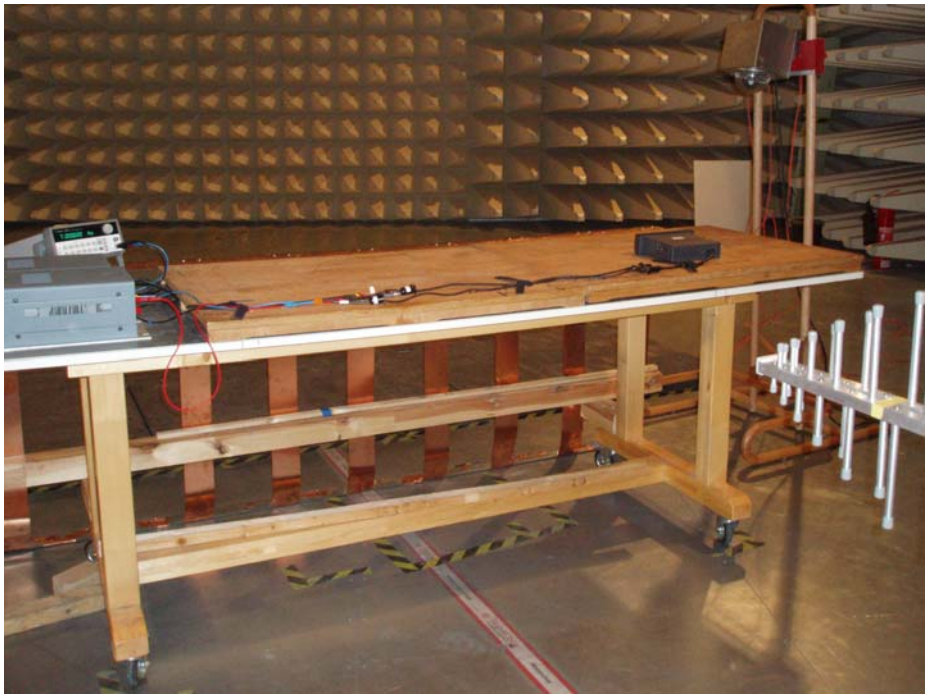
5.3.1 Description of the test location

Test Stand: **ARE(A1)** Test location: Anechoic Chamber A1

Test distance: 1 metre

5.3.2 Photo documentation of the test set-up





5.3.3 Test result

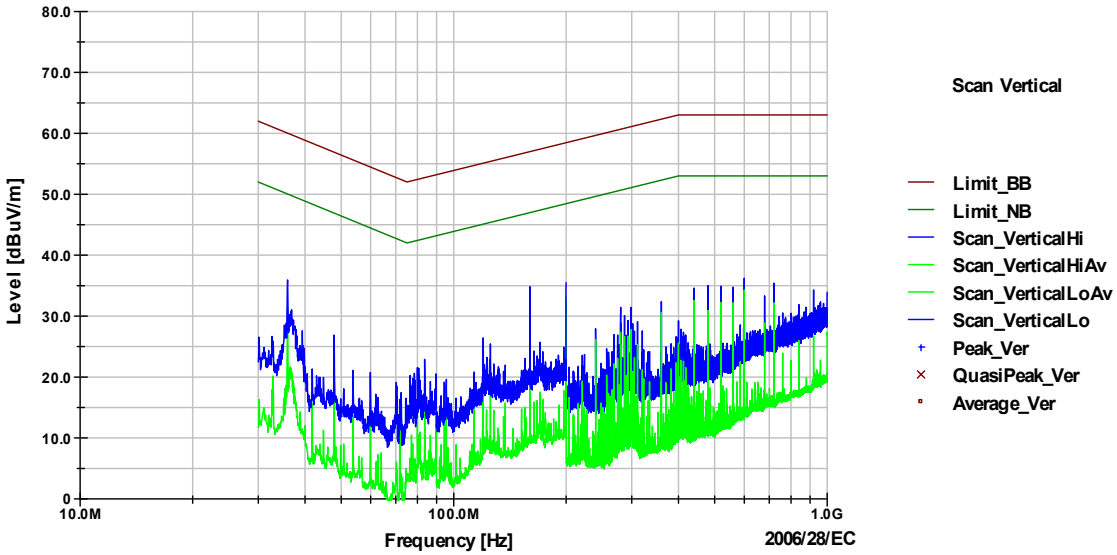
Frequency range: 30 MHz - 1000 MHz

The requirements are **FULFILLED.**

Remarks: The limits are met.

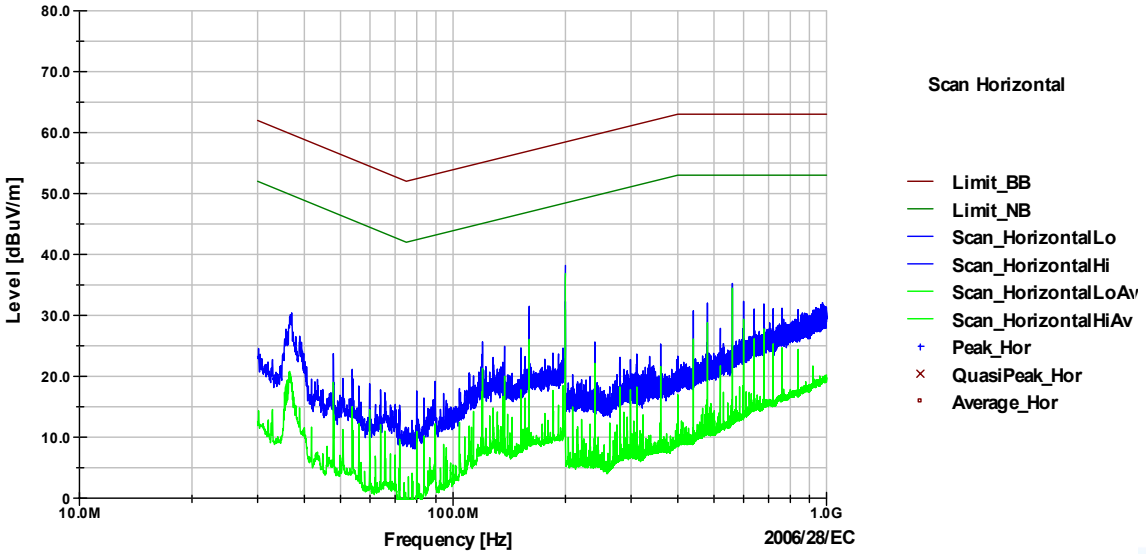
Test protocol

antenna position: front Result: passed
antenna polarisation: vertical
Operation mode: Simulated drive mode with given input signals
Remarks: --
Date: April 17th 2008
Tested by: Walter G. Bosin



antenna position: front
antenna polarisation: horicontal
Operation mode: Simulated drive mode with given input signals
Remarks: --
Date: April 17th 2008
Tested by: Walter G. Bosin

Result: passed



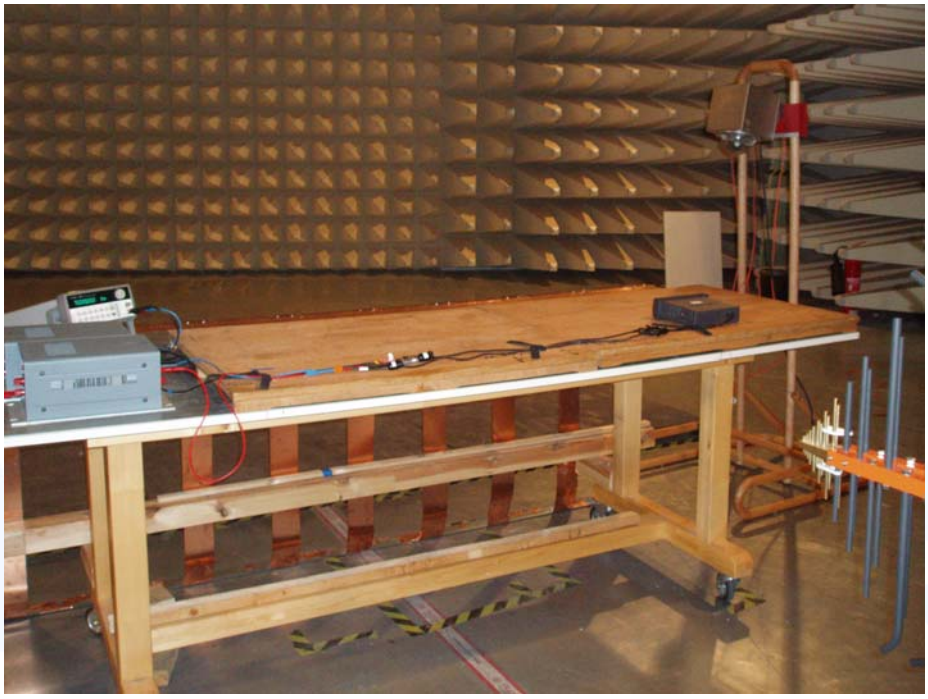
5.4 Radiated electromagnetic energy – absorber lined chamber

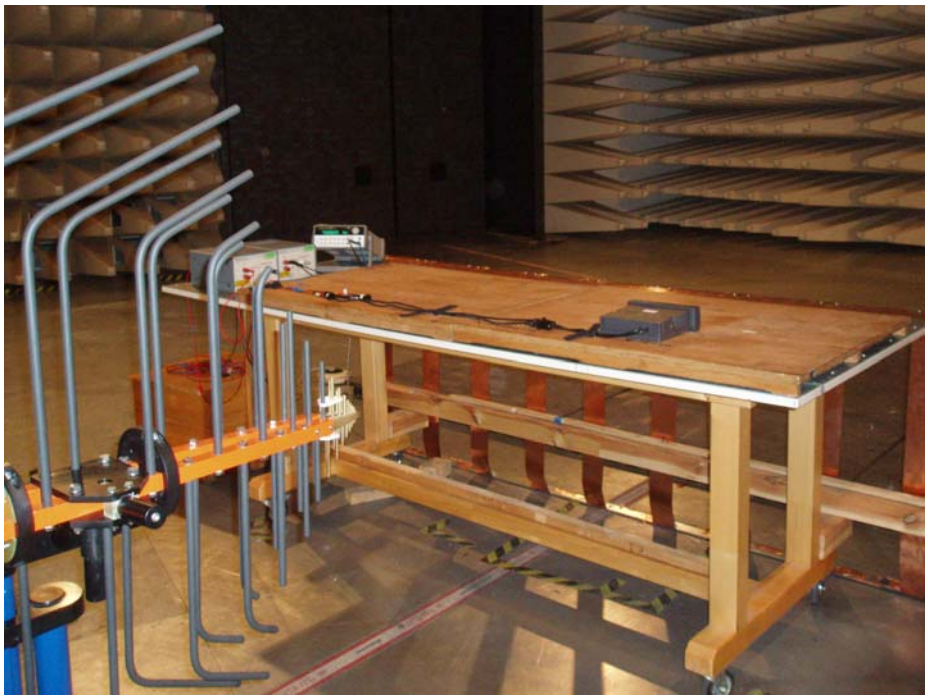
For test instruments and accessories used see section 6 Part **ARI**.

5.4.1 Description of the test location

Test stand: **ARI(A1)** Test location: Anechoic Chamber A1

5.4.2 Photo documentation of the test set-up





5.4.3 Test specification

Frequency range:	80 MHz to 800 MHz
	800 MHz to 2000 MHz
Field strength:	30 V/m
EuT - antenna distance:	1 m
Modulation:	AM: 80 % / sinusoidal: 1000Hz
	PM, t_{on} 577 µs, period 4600 µs
Frequency step:	2 MHz from 80 - 400 MHz 5 MHz from 400 - 800 MHz 10 MHz from 800 -2000 MHz
Dwell time:	2 sec.
Antenna polarisation:	- vertical

5.4.4 Test result

The requirements are **FULFILLED.** Performance Criterion: **A**

Remarks: No data loss, the given input signals to control the proper operation of the ESA weren't affected.

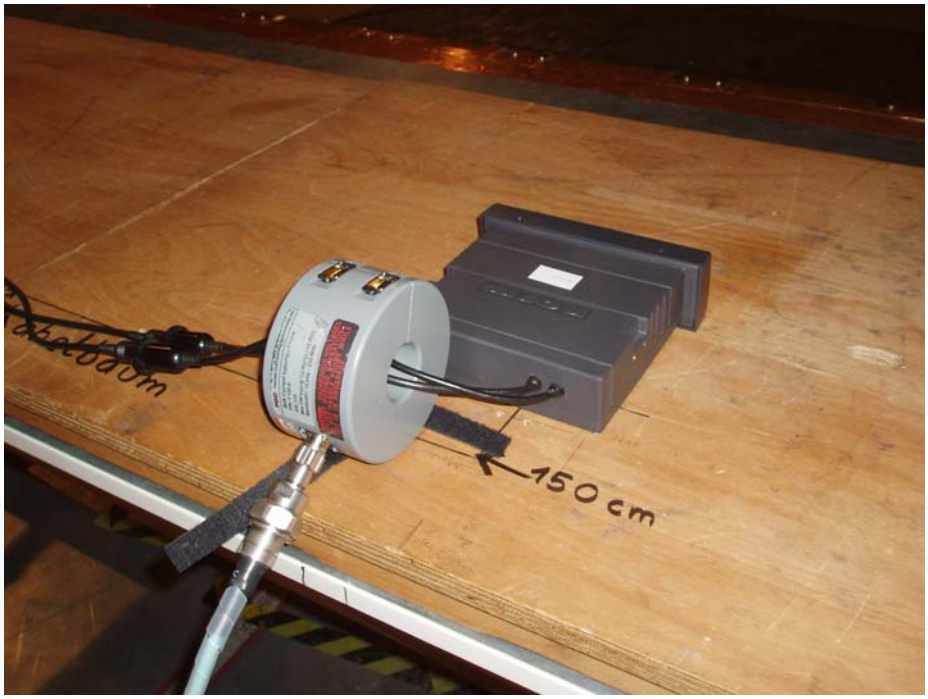
5.5 Radiated electromagnetic energy – bulk current injection

For test instruments and accessories used see section 6 Part I 6.

5.5.1 Description of the test location

Test location: Anechoic Chamber A1

5.5.2 Photo documentation of the test set-up



5.5.3 Test specification

Frequency range:	20 MHz to 80 MHz
Current:	60 mA
Modulation:	AM: 80 % / sinusoidal: 1000Hz
Frequency step:	1 MHz from 20 - 80 MHz
Dwell time:	2 sec.

5.5.4 Coupling points

Cable description: DC power line

Screening: unscreened
Status: active
Signal transmission: analogue
Length: 2.0 m

5.5.5 Test result

The requirements are **FULFILLED.** Performance Criterion: **A**

Remarks: No data loss, the given input signals to control the proper operation of the ESA weren't affected.

6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used, in addition to the test accessories, are calibrated and verified regularly.

Test ID	Model / Type	Kind of Equipment	Manufacturer	Equipment No.
AES	9350	Storage Oscilloscope	LeCroy Europe GmbH	02-02/13-05-002
	NNB-5 µH / 100 A-115 V	LISN	SBF electronic	02-02/20-05-006
	100x	Tastkopf Oscilloscope	Conrad Elektronic GmbH	02-02/50-05-239
	ES35/300V3S	Electronic Switch	SBF electronic	02-02/50-07-027
APU	FG5620	Function Generator	WEETECH GmbH	02-02/05-07-002
	TC5650	Transf. Conducted Coupler	WEETECH GmbH	02-02/05-07-003
	FT 5530	Burst Generator	WEETECH GmbH	02-02/09-07-001
	LD5505	Load Dump Generator	WEETECH GmbH	02-02/09-07-002
	MT5511	Micro Transient Generator	WEETECH GmbH	02-02/09-07-003
	PA 5640	Power Amplifier	WEETECH GmbH	02-02/17-07-002
	DS5630	DC Switch	WEETECH GmbH	02-02/50-07-020
ARE	ESCI	EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-004
	AM-1300-N	Amplifier	PARZICH GMBH	02-02/17-06-001
	NNB-5 µH / 100 A-115 V	LISN	SBF electronic	02-02/20-05-006
	NNB-5 µH / 100 A-115 V	LISN	SBF electronic	02-02/20-05-007
	BBA 9106 / VHA 9103	Biconical Antenna	Schwarzbeck Mess-Elektronik	02-02/24-05-001
	VULB 9165	Trilog-Broadband Antenna	Schwarzbeck Mess-Elektronik	02-02/24-05-017
	N-11000-NW	RF Cable	mikes-testingpartners gmbh	02-02/50-05-188
	N-3000-N	RF Cable	mikes-testingpartners gmbh	02-02/50-05-192
	Sucofeed 1/2	RF Cable	Huber + Suhner	02-02/50-06-033
	Automotive Ground Plane	Automotive Ground Plane	mikes-testingpartners gmbh	02-02/50-06-049
ARI	SME 03	Signal Generator	Rohde & Schwarz München	02-02/05-05-010
	NRVD	Dual Channel Power Meter	Rohde & Schwarz München	02-02/07-05-019
	URV 5 - Z 2	RF Probe 10 V	Rohde & Schwarz München	02-02/07-05-021
	URV 5 - Z 2	RF Probe 10 V	Rohde & Schwarz München	02-02/07-05-022
	1000W1000C	RF Amplifier	Amplifier Research	02-02/17-05-011
	BTA 0122-2000	RF Amplifier	Bonn Elektronik GmbH	02-02/17-05-014
	100S1G4	RF Amplifier	Amplifier Research	02-02/17-05-018
	NNB-5 µH / 100 A-115 V	LISN	SBF electronic	02-02/20-05-006
	NNB-5 µH / 100 A-115 V	LISN	SBF electronic	02-02/20-05-007
	F-120-9	RF Clamp	FCC Fischer Custom Comm.	02-02/22-05-014
	AT 5080	Log. Per. Antenna	Amplifier Research	02-02/24-05-024
	CTR-1001A	RadiSense/ E-Field Sensor	DARE	02-02/50-05-034
	DC62080AM1	Coupler	Amplifier Research	02-02/50-05-101
	7/16-1500-7/16	RF Cable	mikes-testingpartners gmbh	02-02/50-05-102
	50 Ohm / 10 dB	Attenuator	Huber + Suhner	02-02/50-05-106
	7/16-6000-7/16	RF Cable	Rosenberger HF-Technik	02-02/50-05-109
	NW-2000-NW	RF Cable	mikes-testingpartners gmbh	02-02/50-05-193
	N-2000-N	RF Cable	mikes-testingpartners gmbh	02-02/50-06-045
	N-2000-N	RF Cable	mikes-testingpartners gmbh	02-02/50-06-046
	Automotive Ground Plane	Automotive Ground Plane	mikes-testingpartners gmbh	02-02/50-06-049
	Relaismatrix	Relaismatrix	mikes-testingpartners gmbh	02-02/50-06-050
	NW-5000-NW	RF Cable	mikes-testingpartners gmbh	02-02/50-07-024
	NW-2000-NW	RF Cable	mikes-testingpartners gmbh	02-02/50-07-025
	NW-3500-NW	RF Cable	mikes-testingpartners gmbh	02-02/50-07-026