

Document number:

TesLab 099156F-A

Customer:

Matromarine Products srl

Address:

**Via Sereghé, 1
Isola del Cantone (GE)**

Equipment under test:

12 Vdc Blower code 5500001212

Reference standards

EN 55014

ISO 9097

Summary of test results

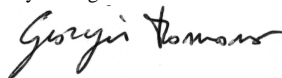
6.1.1	Terminal voltage disturbance	Pass
6.1.2	Measurement of Disturbance Power	Pass
6.2.1	ISO 9097 verification	Pass

Prepared by

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signature

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signature

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General Manager: **M. Rognini**

24.11.09

date

signature

This Test Report complies with ISO/IEC 17025 (2005)

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The contents of this Test Report are only pertaining to the equipment delivered to the laboratory and listed hereinafter

CONTENTS

1	EQUIPMENT UNDER TEST (EUT)	3
1.1	EUT identification	3
1.2	Ports identification	3
1.3	Modification embodied in the EUT	3
1.4	Sampling.....	3
1.5	EUT storing and handling	3
2	SCOPE	4
3	APPLICABLE DOCUMENTS	4
3.1	Reference standards	4
3.2	Other documents	4
3.3	Glossary of terms, abbreviations and acronyms	4
4	GENERAL PRODUCT INFORMATION AND TEST CONDITIONS	6
4.1	Operating test modes and test conditions	6
4.2	Pass / Fail criteria.....	6
5	SUMMARY OF THE TEST PERFORMED.....	7
5.1	Electromagnetic Emission tests	7
5.2	Check list.....	7
6	TEST RESULTS	8
6.1	Electromagnetic Emission tests	8
6.1.1	Terminal voltage disturbance	8
6.1.2	Measurement of Disturbance Power.....	12
6.2	Check list.....	16
6.2.1	ISO 9097 verification.....	16

List of Annexes

- Annex n.1: Photographs
Annex n.2: Fan Airflow data

1 EQUIPMENT UNDER TEST (EUT)

1.1 EUT identification

Laboratory identification code	099156F-a
EUT single or system	Single

Equipment	EUT
Trademark and model	Matromarine code 5500001212
Product code	5500001212
Serial number	--
EUT tested as	Table top
Power requirements	DC 12 V; 4.5A
EUT description	Blower

1.2 Ports identification

This section contains the description of all the power and signal ports, the length and type of the conductors or cables provided or suggested by the manufacturer for testing purposes.

Port n°	Type	Description	Connector	Cable lenght	Cable shield
1	Enclosure	material of the enclosure: plastic, metallic	Screw	--	--
2	DC power	EUT \leftrightarrow 12 V battery 2 wires	Plug	0.5m	No

1.3 Modification embodied in the EUT

The following items are the modifications embodied in the EUT to fulfil the requirements of the applicable standards:

Modification n°	Description
0	none
1	Insert 22 μ F capacitor between posite and negative motor contact

Test results are referred only to the EUT configurations/modifications reported in each test section (see chapter n°6).

1.4 Sampling

The EUT has been selected by the customer itself before to be delivered to the laboratory.
The extension of the test results to the whole production is up to the manufacturer/importer.

1.5 EUT storing and handling

The EUT and their auxiliary equipments when they are delivered to TesLab are recorded in the storehouse register and label with an identification code number.
Inside the laboratories the EUT are kept anonymous as far as possible.

2 SCOPE

Scope of this Test Report is to provide the customer with useful information to evaluate the EUT compliance to the requirements of the reference standards.

According to the customer requirement only chapters 4 and 5 of ISO 9097 have been verified for compliance .

3 APPLICABLE DOCUMENTS

3.1 Reference standards

Reference	Title
EN 55014-1 (2006)	Electromagnetic compatibility Requirements for household appliances, electric tools and similar apparatus. Part 1: Emission.
ISO 9097 (1991)	Small craft - Electric fans

3.2 Other documents

These documents are provided by customer and used/analyzed to check the conformity to the reference standards.

Document	Title	(n°, edition, date,)
Technical manual	BILGE BLOWER	--
RINA document	EC Type Examination certificate	N° DIP010109Y1 12/03/2009
Matromarine document	Distinta componenti	3/12/009

3.3 Glossary of terms, abbreviations and acronyms

– EN	European Standard EN...
– EUT	Equipment Under Test
– AE	Auxiliary Equipment
– EMC	Electromagnetic Compatibility
– EMI	Electromagnetic Interference
– CE	Conducted Emission
– CE-HB	Conducted Emission – High Band
– RE	Radiated Emission
– HARMONIC	Harmonic Current
– FLICKER	Flicker
– CS	Conducted Susceptibility
– RS	Radiated Susceptibility
– ESD	Electrostatic Discharge
– BURST	Electrical fast transient/Burst
– SURGE	Surge
– DIPS	Dips
– HCP	Horizontal Coupling Plane
– VCP	Vertical Coupling Plane
– GRP	Ground reference plane
– PK	Peak detector
– AV	Average detector
– QP	Quasi-peak detector
– LISN	Line Impedance Stabilization network
– CDN	Coupling/decoupling network
– Pass	Within the limits

– Fail	Not within the limits
– BH	Biconical antenna horizontal polarization
– BV	Biconical antenna vertical polarization
– LH	Logperiodic antenna horizontal polarization
– LV	Logperiodic antenna vertical polarization
– BLOGH	BiconiLog antenna horizontal polarization
– BLOGV	BiconiLog antenna vertical polarization
– NA	Not applicable
– EM	ElectroMagnetic
– RF	Radio Frequency
– AM	Amplitude Modulated
– PM	Pulse Modulated
– U _T	Rate voltage for EUT
– CAP	Capacitive Coupling
– I/O	Input/ output

4 GENERAL PRODUCT INFORMATION AND TEST CONDITIONS

4.1 Operating test modes and test conditions

In the following table are listed the operating conditions and check parameters, selected by customer, used for testing and monitoring the EUT during the immunity tests:

Operating condition	Description	Representative parameter
# 1	EUT powered	Air flow

4.2 Pass / Fail criteria

ELECTROMAGNETIC EMISSION TESTS

The EUT shall meet the limits reported in the reference documents, as specified in section 6.1 of this document.

5 SUMMARY OF THE TEST PERFORMED

5.1 Electromagnetic Emission tests

Port	Type of test	Applicable Standard
DC power	Terminal voltage disturbance	EN 55014-1
	Disturbance power	EN 55014-1

5.2 Check list

ISO 9097 verification (only § 4, 5)	ISO 9097
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6 TEST RESULTS

6.1 Electromagnetic Emission tests

6.1.1 Terminal voltage disturbance

Reference standards	EN 55014-1
Basic standards	EN 55014-1
Date (dd.mm.yy)	28.10.09
Test setup	According to the reference / basic standard §6.4
Test procedure	According to the reference / basic standard §7
Test location	Shielded, semianechoic chamber
Tested port	See § 5.1
Frequency range	0.15-30 MHz
Measurement uncertainty	± 2dB
Acceptance criterion/emission limits	EUT's emission shall meet the limits of the reference standard
Modification embodied in the EUT	See § 1.4 – modification n°1

Environmental test conditions and main supply voltage	Measured
Temperature:	20°C
Relative humidity	50%
Voltage:	230Vac

OPERATING CONDITION (Rif. § 4.1): #1

RESULT: PASS

TesLab code number	Equipment	Manufacturer	Model
ST002A	L.i.s.n.	PMM	L2-25
ST091A	Emi receiver	Hewlett Packard	85422E
ST092A	Transient limiter	Hewlett Packard	11947°
ST078F02	Semi-anechoic shielded chamber	Panashield	5.4MX8.4MX3M

Conducted Voltage Emission

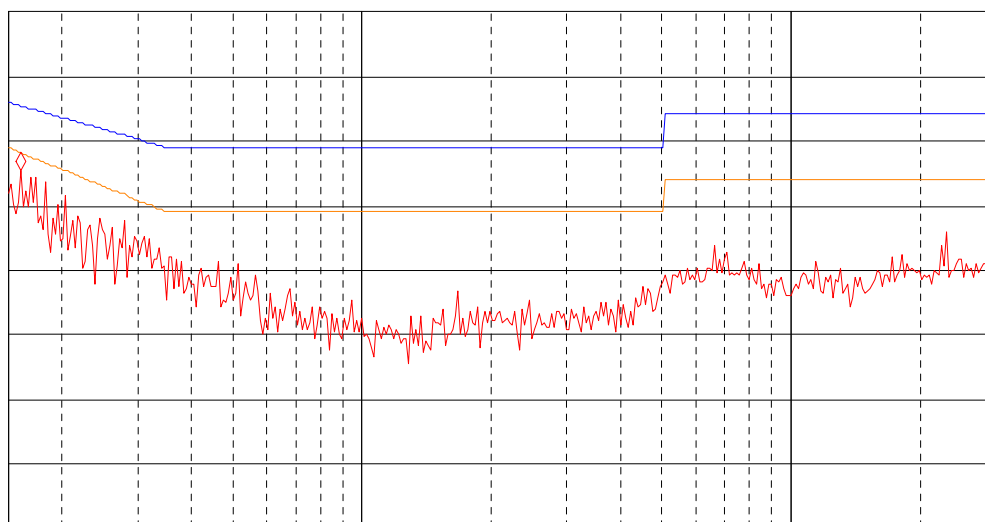


ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 160 kHz
55.50 dB μ V

LOG REF 80.0 dB μ V

10
dB/
ATN
10 dB

VA SB
SC FC
ACORR



START 150 kHz

RL IF BW 9.0 kHz

AVG BW 30 kHz

STOP 30.00 MHz

#SWP 10.0 sec

PORT N°	Line	Sensor
2	--	ST002A
Detector:	Peak QP AVG Measure	
Note:	Max hold measure on positive and negative line	
Result:	PASS	

Conducted Voltage Emission



Use EXIT MEASURE to
return to normal operation.
Soft keys, COPY key, step
keys, and knob are active.

FREQ 150.0 kHz
PEAK 54.3 dB μ V
QP NOT SELECTED
AVG 30.3 dB μ V

Limit
Lines

Correctn
Factors

RESTART

MARKER

ADD TO
LIST

FREQ
STEP

MEAS
SNG CONT

EXIT
MEASURE

LOG REF 80.0 dB μ V

10
dB/
ATN
10 dB

VA SB
VC FC
ACORR

START 150.0 kHz

RL IF BW 9.0 kHz

AVG BW 30 kHz

STOP 400.0 kHz

SWP 50.0 msec

PORT N°	Line	Sensor
2	Pos	ST002A
Detector:	Peak AVG Measure	
Note:		
Result:	PASS	

Conducted Voltage Emission



MARKER

FREQ 303.0 kHz
PEAK 52.5 dB μ V
QP NOT SELECTED
AVG 32.4 dB μ V

Limit
Lines

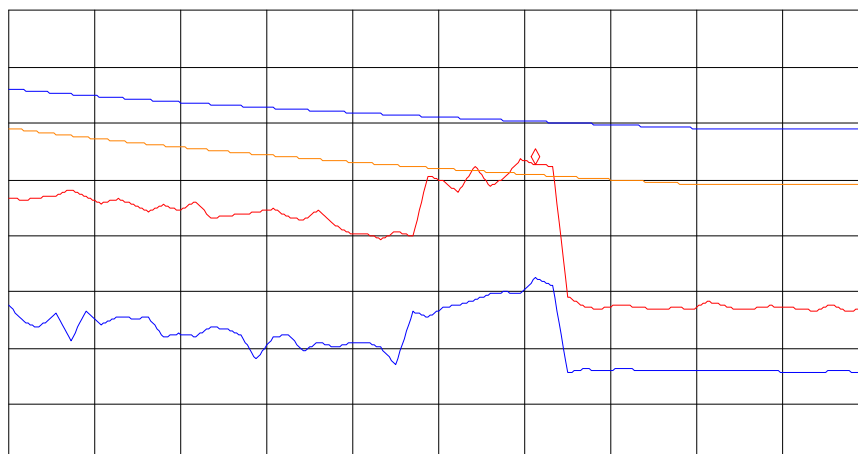
Correctn
Factors

RESTART

LOG REF 80.0 dB μ V

10
dB/
ATN
10 dB

VA SB
VC FC
ACORR



MARKER

ADD TO
LIST

FREQ
STEP

MEAS
SNG CONT

START 150.0 kHz

RL IF BW 9.0 kHz

AVG BW 30 kHz

STOP 400.0 kHz

SWP 50.0 msec

EXIT
MEASURE

PORT N°	Line	Sensor
2	Neg	ST002A
Detector:	Peak QP Measure	
Note:		
Result:	PASS	

6.1.2 Measurement of Disturbance Power

Reference standards	EN 55014-1
Basic standards	EN 55014-1
Date (dd.mm.yy)	08.10.09
Test setup	According to the reference / basic standard § 6
Test procedure	According to the reference / basic standard § 6
Test location	Shielded, semianechoic chamber
Tested port	See § 5.1
Frequency range	30 MHz - 300 MHz
Measurement uncertainty	± 2.2 dB
Acceptance criterion/emission limits	EUT's emission shall meet the limits of the reference standard
Modification embodied in the EUT	See § 1.4 – modification n°0

Environmental test conditions and main supply voltage		Measured
Temperature:	15 – 35 °C	23°C
Relative humidity	25 – 75 %	55%
Voltage:	230 Vac \pm 3%	230Vac

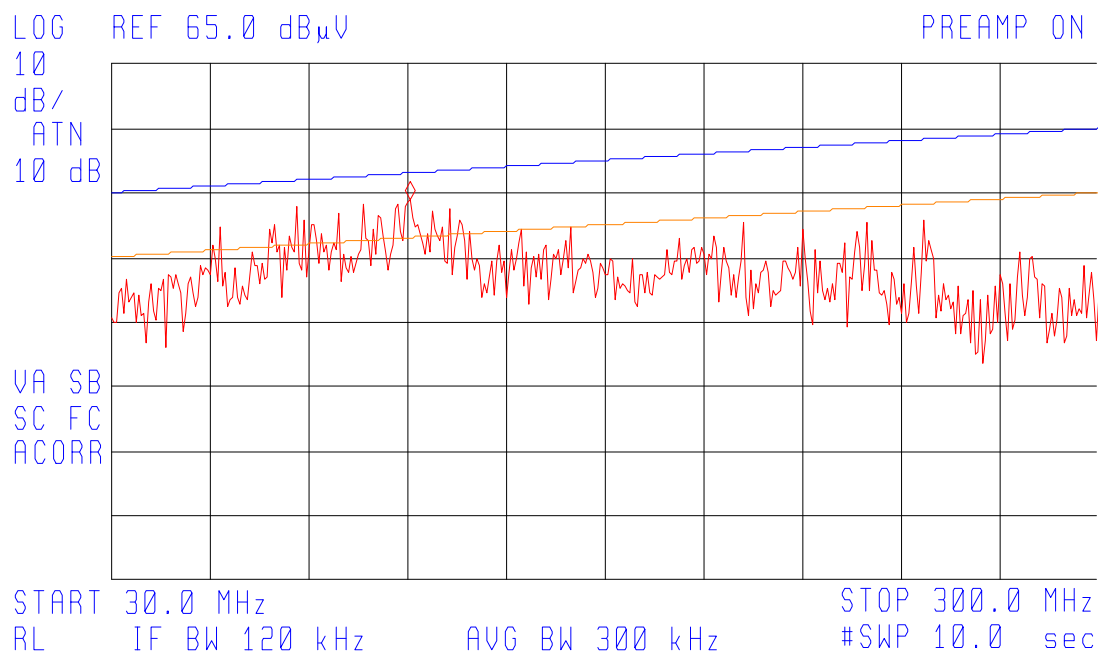
OPERATING CONDITION (Rif. § 4.1): #1**RESULT: PASS**

TesLab code number	Equipment	Manufacturer	Model
ST007A	Absorbing Clamp	Rodhe & Schwarz	MDS-21
ST091A	Emi receiver	Hewlett Packard	85422E
ST093S06	Decoupling clamp	Fischer	FCC-2031-DCN

Conducted Disturbance Power Emission



ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 111.7 MHz
43.81 dB μ V



PORT N°	Sensor Absorbing clamp	Position (m)
2	ST007A	0.5
Detector:	Peak measure	
Note:	1db μ V=1 db(pW)	
Result:	See next graphs	

Conducted Disturbance Power Emission



MARKER

FREQ 99.56 MHz
PEAK 48.0 dB μ V
QP NOT SELECTED
AVG -.7 dB μ V

Limit
Lines

Correctn
Factors

RESTART

LOG REF 65.0 dB μ V

PREAMP ON

10
dB/
ATN
10 dB

VA SB
VC FC
ACORR

START 50.0 MHz
RL IF BW 120 kHz

AVG BW 300 kHz

STOP 150.0 MHz
SWP 46.9 msec

MARKER

ADD TO
LIST

FREQ
STEP

MEAS
SNG CONT

EXIT
MEASURE

PORT N°	Sensor Absorbing clamp	Position (m)
2	ST007A	0.5
Detector:	AVGmeasure	
Note:	1db μ V=1 db(pW)	
Result:	PASS	

Conducted Disturbance Power Emission



MARKER

FREQ 103.8 MHz
PEAK 50.9 dB μ V
QP 29.1 dB μ V
AVG NOT SELECTED

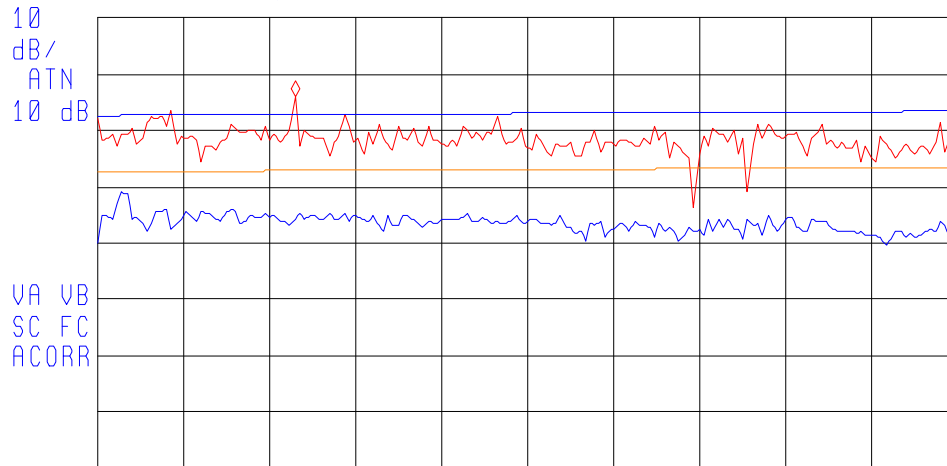
Limit
Lines

Correctn
Factors

RESTART

LOG REF 65.0 dB μ V

PREAMP ON



MARKER

ADD TO
LIST

FREQ
STEP

MEAS
SNG CONT

START 99.00 MHz

STOP 120.00 MHz

RL IF BW 120 kHz

AVG BW 300 kHz

SWP 20.0 msec

EXIT
MEASURE

PORT N°	Sensor Absorbing clamp	Position (m)
2	ST007A	0.5
Detector:	Peak measure	
Note:	1db μ V=1 db(pW)	
Result:	See next graphs	

6.2 Check list

6.2.1 ISO 9097 verification

Reference Standard	ISO 9097 chapters 4 and 5
Date (dd.mm.yy)	03.11.09
Modification embodied in the EUT	See § 1.3: modification n°0

Environmental test conditions and main supply voltage	Measured
Temperature:	20°C
Relative humidity	50%
Voltage: 230 Vac \pm 3%	230 Vac

Reference	Comment	Verdict
§ 4.1 Fans shall be designed to operate continuously at 120 % of nominal voltage.		Pass
§ 4.2 Fans shall be ignition-protected in accordance with the requirements of ISO 8846.	See RINA document n° N° DIP010109Y1	Pass
§ 4.3 Fans shall be rated for airflow. Fan airflow shall be measured in accordance with clause 6, and performante curves shall be available.	See Annex n°2 Measure performed by costumer	Na
§ 4.4 Materials used for fan blades or rotor and the housing shall be selected to prevent the creation of a spark should they contact each other.	Plastic enclosure Sealed motor See RINA document n° N° DIP010109Y1	Pass
§ 4.5 Moving Parts of fans shall, when necessary, be enclosed or fitted with guards for protection against injury. Enclosures shall be provided with drains to prevent the accumulation of water in all mounting positions. Enclosures and guards are not needed if contact with the fan's moving Parts is judged not to be harmful.		Pass
§ 4.6 Fans shall be provided with a means for securely mounting them to the boat.		Pass
§ 4.7 Components of fans shall be selected to be galvanically compatible in the presence of seawater.	Plastic enclosure Sealed motor See RINA document n° N° DIP010109Y1	Pass
§ 4.8 Components of fans shall be selected or coated to be resistant to corrosion in the presence of sea-water.	Plastic enclosure Sealed motor See RINA document n° N° DIP010109Y1	Pass
§ 4.9 Installation instructions including a fan performante curve shall be available for each fan (see 6.2)		Pass
§ 5.1 Fans shall be of the 2-wire type, with both the power and return lines insulated from the motor and fan housing.		Pass
§ 5.2 Conductors used for connection to the power supply shall be stranded toppe.		Pass
§ 5.3 If external terminals are provided, they shall be designed or shielded to prevent short-circuiting that could result from accidental contact by a conductive Object.		Pass
§ 5.4 If external motor leads are provided with the fan, they shall be sized in accordance with the power requirement but not less than a nominal 1 mm ² Conductor insulation shall be rated to be used in	External leads size is 1.5 mm ² No document	Pass

damp places and be suitable for 60 °C ambient temperature at 120 % of nominal voltage.		
<p>§ 5.5 A fan shall be protected against continuous locked rotor conditions by</p> <ul style="list-style-type: none">– integral overcurrent protection; or,– overcurrent protection in the circuit sized to protect the fan motor-; or,– being capable of sustaining Operation locked rotor for 7 h without generating surface temperatures in excess of 150 °C at an ambient temperature of 60 °C, and without evidente of charring, burning or melting.	<p>No overcurrent protection Fan stop to work after 30 minutes at 60 °C. No temperature surface over 150°C</p>	<p>PASS</p>

RESULT: PASS

Annex n° 1





Annex n° 2

cd:55000001212 BLOWER 12V. 280 M3/H

GIRI	AMP	VOLT	VELOCITA'	MC3/H	CFM
800	0,74	2,28	2,3	32	19
1100	0,81	3,07	3,5	49	29
1400	0,92	3,85	4	56	33
1800	1,15	5	6,2	86	51
2500	1,6	6,94	9,4	131	77
3000	1,96	8,16	11,2	156	92
4500	3,95	13	20,2	282	166
5200	5,26	14,72	21,5	301	177