



TEST REPORT
EN 55014-2 (1997) +A1 (2001)

Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus
 Part 2: Immunity

Report Reference No. : 99559-5TRFEMC
 Tested by : Daniele Guarnone 
 Approved by : Paolo Barbieri 
 Date of issue : 2008-01-16

Testing Laboratory : **Nemko Spa**
 Address : Via del Carroccio, 4
 I-20046 Biassono MI (Italy)
 Testing location/ procedure : Full application of Harmonised standards
 Partial application of Harmonised standards
 Other standard testing methods
 Non-standard testing methods
 SINAL accredited test report
 Testing location/ address : Nemko Spa - Via del Carroccio, 4 I-20046 Biassono MI (Italy)

Applicant's name : **ELCO S.P.A.**
 Address : Via Marconi, 1
 20065 Inzago Milano I

Test specification:
 Standard : **EN 55014-2 (1997) +A1 (2001)**
 Test procedure : Nemko WML1002 and WML0177
 Non-standard test method : N/A

Test Report Form No. : TRF EMC SpA
 TRF Originator : Nemko Spa
 Master TRF : 2005-04

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Test item description : Electronic Fan
 Trade Mark : 
 Manufacturer : **ELCO S.P.A.**
 Model/Type reference : MCE 20-25
 Ratings : 230 Vac (1600 rpm)

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EMC -- TEST REPORT

Test Report No. : 99559-5TRFEMC	2008-01-16
	Date of issue

Type / Model : MCE 20-25

Equipment : Electronic Fan

Applicant : **ELCO S.P.A.**

Address : Via Marconi, 1
20065 Inzago Milano I

Manufacturer : **ELCO S.P.A.**

Address : Via Marconi, 1
20065 Inzago Milano I

Test Result according to the standards on page 4:	Positive
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The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1 TEST STANDARDS

The tests were performed according to following standards:

Nemko WML0177: Use of measuring equipment to perform standards tests.

Nemko WML1002: Measurement Uncertainty - Policy and Statement

EN 55014-2 (1997) +A1 (2001)

Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus -- Part 2: Immunity

EN 61000-4-2 (1995) + A1 (1998) + A2 (2001)

Electromagnetic compatibility (EMC) -- Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test

EN 61000-4-4 (2004)

Electromagnetic compatibility (EMC) -- Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test

EN 61000-4-5 (2006)

Electromagnetic compatibility (EMC) -- Part 4-5: Testing and measurement techniques - Surge immunity test

EN 61000-4-6 (1996) + A1(2001)

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

EN 61000-4-11 (2004)

Electromagnetic compatibility (EMC) -- Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests

2 SUMMARY

GENERAL REMARKS:

//

FINAL ASSESSMENT:

The EMC requirements pertaining to the technical standards and tested operation modes are

- - fulfilled.

The equipment under test

- - fulfils the EMC requirements cited on page 4.

Date of receipt of test sample : 2007-12-06

Testing commenced on : 2007-12-06

Testing concluded on : 2007-12-06

3 EQUIPMENT UNDER TEST

3.1 Power supply system utilised

Power supply voltage : ■ 230V/50 Hz / 1φ

3.2 Short description of the Equipment under Test (EuT)

The EUT is a electronic fan

Number of tested samples: 1

Serial number: -

E.U.T. category: II according to EN 55014 (internal clock 4 MHz)

EuT operation mode:

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

- - Standby
- - According to standards requirements

Immunity tests: 1450 rpm

EuT configuration:

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

■ AC mains cable _____ Model : - _____

■ - unscreened power cables

■ - customer specific cables

3.3 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

Performance criterion A: The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance criterion C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

The following table 14 serves as a guide to formulate the permissible degradation of the equipment under test (EUT) caused by electromagnetic stress. Not all functions of the apparatus need to be tested. The selection, the specification of functions, and the permissible degradation is left to the responsibility of the manufacturer.

Table 14 – Examples of degradations

Functions (non-exhaustive)	Criteria			
	A	B ²⁾	C1 ³⁾	C2 ³⁾
Motor speed	10 % ¹⁾	–	+	–
Torque	10 % ¹⁾	–	+	–
Movement	10 % ¹⁾	–	+	–
Power (consumption, input)	10 % ¹⁾	–	+	–
Switching (change of state)	–	–	+	–
Heating	10 % ¹⁾	–	+	–
Timing (programme, delay, duty cycle)	10 % ¹⁾	–	+	–
Stand-by	–	–	4)	–
Data storage	–	–	5)	5)
Sensor functions (signal transmission)	6)	–	7)	–
Indicators (visual and acoustic)	6)	–	7)	–
Audio function	6)	–	7)	–
Illumination	6)	–	7)	–

– No change allowed.
+ Change allowed.
¹⁾ Values are exclusive of the measurement accuracy.
²⁾ For criterion B, measurement or verification is performed during the stable operations of the Equipment Under Test before and after the application of the specified phenomenon.
³⁾ For criterion C, distinction is made between
C1: before resetting and
C2: after resetting.
⁴⁾ Switching-off is allowed, switching-on is not allowed.
⁵⁾ Loss or change of data is allowed.
⁶⁾ Lower performance as specified by the manufacturer is allowed, but no loss of correct function.
⁷⁾ Loss of correct functions allowed.

Category II

Category II apparatus shall fulfil the following requirements:

- electrostatic discharge with performance criterion B (5.1);
- fast transients with performance criterion B (5.2);
- injected currents up to 230 MHz with performance criterion A (5.3);
- surges with performance criterion B (5.6);
- voltage dips and interruptions with performance criterion C (5.7).

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

Nemko Spa
Via del Carroccio, 4
I-20046 Biassono MI

4.2 Environmental conditions

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

Temperature: 18-28 °C

Humidity: 30-60 %

Atmospheric pressure: 86-106 kPa

4.3 Definitions of symbols used in this test report

- - The black square indicates that the listed condition, standard or equipment is applicable for this report.
- - The empty circle indicates that the listed condition, standard or equipment is **not** applicable for this report.

4.4 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 according to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Nemko Spa Technical Procedure **Nemko WML1002**. 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.

Hereafter the best measurement capability for Nemko Spa laboratory is reported:

<i>Test</i>	<i>Range</i>	<i>Measurement Uncertainty</i>	<i>Notes</i>
Radiated Emission	Antenna distance 3m (30÷200) MHz	± 5.2 dB	(1)
	Antenna distance 3m (200÷1000) MHz	± 4.9 dB	(1)
	Antenna distance 10m (30÷200) MHz	± 5.0 dB	(1)
	Antenna distance 10m (200÷1000) MHz	± 4.8 dB	(1)
Conducted Emission	9 kHz ÷ 30 MHz	± 2.8 dB	(1)
Clicks	9 kHz ÷ 30 MHz	± 2.8 dB	(1)
Radiated Power Emission	(30÷300) MHz	± 4.0 dB	(1)
Harmonic Current Emission	50 Hz ÷ 2 kHz	± 2%	(1)
Voltage Fluctuation Emission	--	± 2%	(1)
Radiated Immunity	20 MHz ÷ 2.5 GHz	(0.0 ÷ 6.0) dB	(1)
Conducted RF Immunity	9 kHz ÷ 230 MHz	± 2.0 dB	(1)
ESD Immunity	--	± 6%	(1)
Burst Immunity	--	± 2%	(1)
Surge Immunity	--	± 2%	(1)
Dips Immunity	--	± 2%	(1)
Magnetic Field Immunity	50 Hz	± 2.0dB	(1)
Damped Magnetic Field Immunity	100 kHz, 1 MHz	± 3 dB ampl. ± 10% freq.	(1)
Oscillatory Wave Immunity	100 kHz, 1 MHz	± 20%	(1)
Low Frequency Immunity	15 Hz ÷ 150 kHz	± 2.0 dB	(1)

NOTES:

- (1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$ which has been derived from the assumed normal probability distribution with infinite degrees of freedom and for a coverage probability of 95 %;

5 TEST CONDITIONS AND RESULTS

5.1 Electrostatic discharge

For test instruments and accessories used see section 6.

5.1.1 Description of the test location

Test location: Open area

5.1.2 Photo documentation of the test set-up



Legend

C: Contact discharge

A: Air discharge

5.1.3 Test specification:

<u>Contact discharge voltage:</u>	<input checked="" type="checkbox"/> 2 kV	<input checked="" type="checkbox"/> 4 kV	<input type="checkbox"/> 6 kV	<input type="checkbox"/> 8 kV
<u>Air discharge voltage:</u>	<input checked="" type="checkbox"/> 2 kV	<input checked="" type="checkbox"/> 4 kV	<input checked="" type="checkbox"/> 8 kV	<input type="checkbox"/> 15 kV
<u>Discharge impedance:</u>	<input checked="" type="checkbox"/> 330 Ω / 150 pF			
<u>Discharge factor:</u>	<input checked="" type="checkbox"/> ≥ 1 sec.			
<u>Number of discharges:</u>	<input checked="" type="checkbox"/> ≥ 10			
<u>Type of discharge:</u>	Direct discharge	<input type="checkbox"/> Air discharge		
		<input checked="" type="checkbox"/> Contact discharge		
	Indirect discharge	<input checked="" type="checkbox"/> Air discharge		
<u>Polarity:</u>	<input checked="" type="checkbox"/> Positive	<input checked="" type="checkbox"/> Negative		
<u>Discharge location:</u>	<input type="checkbox"/> see photo documentation of the test set-up			
	<input checked="" type="checkbox"/> all external locations accessible by hand			
	<input checked="" type="checkbox"/> horizontal plate (HCP)			
	<input checked="" type="checkbox"/> vertical coupling plate (VCP)			

5.1.4 Test result

The requirements are **Fulfilled**

Performance Criterion **B**

Remarks: During the test no deviation was detected to the selected operation mode(s).

5.2 Electrical fast transients / Burst

For test instruments and accessories used see section 6.

5.2.1 Description of the test location

Test location: Open area

5.2.2 Photo documentation of the test set-up



5.2.3 Test specification:

Coupling network: 0.5 kV 1 kV 2 kV 4 kV

Coupling clamp: 0.5 kV 1 kV

Burst frequency: 5.0 kHz

Coupling duration: 120 s

Polarity: positive negative

5.2.4 Coupling points

Cable description (Port1):

AC mains

Screening:

screened
 passive
 analogue

unscreened
 active
 digital

Status:

Signal transmission:

Length:

1 m

5.2.5 Test result

The requirements are **Fulfilled**

Performance Criterion **B**

Remarks: During the test no deviation was detected to the selected operation mode(s).

5.3 Conducted disturbances induced by radio-frequency fields

For test instruments and accessories used see section 6.

5.3.1 Description of the test location

Test location: Open area

5.3.2 Photo documentation of the test set-up



5.3.3 Test specification:

- Frequency range: ■ 0.15 MHz to 230 MHz
- Test voltage: ■ 3 V
- Modulation: ■ AM: 80 %
■ sinusoidal 1000Hz
- Frequency step: ■ 1 % with 3 s dwell time

5.3.4 Coupling points

Cable description (Port1): AC mains

Screening: screened unscreened
 passive active
 analogue digital

Status:

Signal transmission:

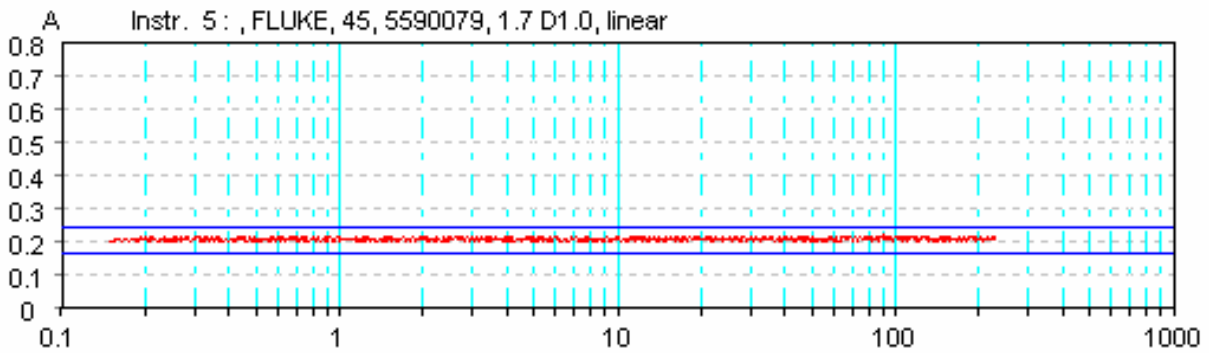
Length: 1 m

5.3.5 Test result

The requirements are **Fulfilled** Performance Criterion **A**

Remarks: During the test no deviation was detected to the selected operation mode(s).

Current consumption: 0.2 A



5.4 Voltage dips and short interruptions

For test instruments and accessories used see section 6.

5.4.1 Description of the test location

Test location: Open area

5.4.2 Photo documentation of the test set-up



5.4.3 Test specification:

- Nominal Mains Voltage (V_N): ■ 230 V AC
- Number of voltage fluctuations: ■ 3
- Level of reduction(dip) / duration: ■ > 95 % / 10ms
- Level of reduction(dip) / duration: ■ 60 % / 200ms
- Level of reduction(dip) / duration: ■ 30 % / 1000ms

Environmental phenomena	Test level in % U_T	Duration (in periods of the rated frequency)	Test set-up
Interruptions	0	0,5	IEC 1000-4-11 Voltage shift shall occur at zero crossing
Voltage dips in % U_T	60	40	
	30	70	

U_T is the rated voltage for the equipment.

5.4.4 Test result

The requirements are **Fulfilled**

Performance Criterion **C**

Remarks: During the test no deviation was detected to the selected operation mode(s).

5.5 Surge

For test instruments and accessories used see section 6.

5.5.1 Description of the test location

Test location Open area

5.5.2 Photo documentation of the test set-up



5.5.3 Test specification:

Pulse amplitude-Power line sym.: 0.5 kV 1 kV 2 kV 4 kV
Source impedance: 2 Ω + 18 μ F

Pulse amplitude-Power line unsym.: 0.5 kV 1 kV 2 kV 4 kV
Source impedance: 12 Ω + 9 μ F

Number of surges: 5 Surges/Phase angle

Phase angle: 0° 90° 180° 270°

Repetition rate: 60 s

Polarity: positive negative

5.5.4 Coupling points

Cable description (Port1):

AC mains

Screening:

screened

unscreened

passive

active

analogue

digital

Status:

Signal transmission:

Length:

1 m

5.5.5 Test result

The requirements are **Fulfilled**

Performance Criterion **B**

Remarks: During the test no deviation was detected to the selected operation mode(s).

6 USED TEST EQUIPMENT

<i>Equipment</i>	<i>Model</i>	<i>Manufacturer</i>	<i>Serial N°</i>
ESD Test system	ESD3000	EMC Partner	252
Mainframe	NSG 200C	Schaffner	00861
Burst generator	NSG 225A	Schaffner	1484 9222
RF Conducted immunity test equipment	CWS500 CSI	EM Test	V0710102305
Attenuator 6dB	ATT6/75	EM Test	0206-18
Shielded room	Conducted immunity test room	Siemens	68
Coupling/decoupling network	CDN M2	EM Test	0307-16
Pulse generator	NSG 651	Schaffner	172
Coupling network	CDN 110	Schaffner	255 9401
AC power source	6834	HP	3432A-00125
Thermohygrometer data loggers	175-H2	TESTO	20012380/305

7 PHOTOS



