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**EMC Test report for a Battery charger,
model FLD0721
Manufactured by Koninklijke Gazelle N.V.**

Arnhem, April 29, 2009

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By order of Koninklijke Gazelle N.V.at Dieren, The Netherlands

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CONCLUSION

The equipment under test (EUT) described in this test report meets the essential requirements of the EMC Directive 2004/108/EC.

The conclusion and results stated in this test report are based on a non-recurrent examination of sample(s) provided by the applicant.

The tests described in this report do not result in the right to use any approval mark as conferred by KEMA. As far as the tests were based on certain specifications, these are mentioned in the report.

SUMMARY

This chapter presents an overview of standards and results. Refer to the next chapters for details of measured test results and applied test levels.

APPLIED STANDARDS		
Standard	Year	Title
EN 55014-1	2006	Emission – Electrical motor-operated and thermal appliances for household and similar purposes, electrical tools and similar electrical apparatus
EN 61000-3-2	2006	Limits for harmonic currents emissions
EN 61000-3-3 + A1 + A2	1995 2001 2005	Limitation of voltage fluctuations and flicker
EN 55014-2 + A1	1997 2001	Immunity - Household appliances, electric tools and similar.
EN 61000-4-2 +A1 +A2	1995 1998 2001	Electrostatic discharge immunity test
EN 61000-4-4	2004	Electrical fast transient/burst immunity test
EN 61000-4-5 +A1	2006	Surge immunity test
EN 61000-4-6 +A1	1996 2001	Immunity to RF conducted disturbances
EN 61000-4-11	2004	Voltage dips, short interruptions and voltage variations immunity tests

Other EMC standards have been found not applicable for the EUT.

OVERVIEW EMISSION RESULTS	RESULT
Mains conducted disturbance voltage	PASS
Discontinuous disturbance (clicks) on AC power leads	PASS
Disturbance power	PASS
Harmonic current emission	PASS
Limitation of voltage fluctuations (flicker)	PASS

OVERVIEW IMMUNITY RESULTS	RESULT
Electrostatic discharges (ESD)	PASS
Electrical fast transient (EFT) / Burst transients	PASS
Surge transients	PASS
Conducted RF disturbances	PASS
Power supply voltage interruptions & dips	PASS

1 MODEL INFORMATION

1.1 Model description

The apparatus as supplied for the test is a Battery charger, model FLD0721. (for charging bicycle batteries). The device is intended for commercial and light industrial use.



Battery charger FLD0721



Bicycle battery

1.2 Environment

The requirements and standards apply to equipment intended for use in:

X	Residential (domestic) environment
X	Commercial and light-industrial environment
	Industrial environment

1.3 Classification

The standard EN 55014-2:1997 is subdivided in four categories. For each category specific immunity requirements are formulated.

	Category 1	Apparatus containing no electronic control circuitry
X	Category 2	Apparatus containing electronic control circuitry with no internal clock or oscillator frequency higher than 15 MHz.
	Category 3	Battery powered apparatus containing electronic control circuitry with no internal clock higher than 15 MHz.
	Category 4	All other apparatus.

The tested model is classified as category 2 equipment (due to active electronics) according to the EN 55014-2 standard immunity tests are applicable.

2 GENERAL INFORMATION

2.1 Product information

Equipment under test	Battery charger
Trade mark	Gazelle
Model	FLD0721
Serial number	Sample
U nominal	100 – 240 V _{AC} / 48 V _{DC} , 2A

2.2 Client information

Applicant	Koninklijke Gazelle N.V.
Contact person	Pim Bijvoet
Telephone	+31 (0)313 429 299
Telefax	+31 (0)313 429 357
Address	Wilhelminaweg 8
Postal Code	6951 BP
Place	Dieren
Country	The Netherlands

2.3 Test data

Location	KEMA Quality B.V., The Netherlands
Date	April 4, 2009
Engineer	Mr. R.W.T. Meulenbeek

2.4 Environmental conditions

Tests have been performed in a controlled laboratory environment, where the environmental conditions are maintained within the applicable ranges.

Ambient temperature	15 °C – 35 °C
Relative Humidity air	30% - 60%

2.5 Performance criteria

Performance criterion A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. 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 by what the user may reasonably expect from the equipment if used as intended.

Performance criterion B

After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. 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 by what the user may reasonably expect from the equipment if used as intended.

Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

2.6 **Monitored check**

	Motor speed		Illumination
	Switching		Display data
	Standby mode		Data storage
	Temperature		Sensor functions
	Power consumption		Audible signals
	Heating		Others: LED's
	Timing	X	Others: charging

3 EMISSION TEST RESULTS

3.1 Mains conducted disturbance voltage

Standard	EN 55014-1	
Frequency [MHz]	QP [dB(μV)]	AV [dB(μV)]
0,15 – 0,50	66 – 56 *)	59 – 46 *)
0,50 – 5	56	46
5 – 30	60	50

*) Limits decreasing linearly with the logarithm of the frequency

Port	AC mains input power
Test method	LISN
Mode	Charging battery

Results

Frequency [MHz]	QP [dB(μV)]		AV [dB(μV)]	
	Level	Limit	Level	Limit
0,150	39	66,0	--	56,0
0,210	31	63,2	22	55,4
1,090	32	56,0	17	46,0
1,260	30	56,0	<25	46,0
1,910	35	56,0	<25	46,0
2,180	35	56,0	<25	46,0
3,000	31	56,0	<25	46,0
18,580	36	60,0	31	50,0

QP" and "AV" are levels and limits referring to measurements with the quasi-peak and average detector. If the measured level "QP" does not exceed the limit for "AV", then no average measurement is necessary.

Conclusion

PASS

3.2 Click Disturbances

Standard	EN 55014-1
Port	AC Mains
Mode	Normal operation

Results

X	The amplitudes of the observed disturbances were all below the limit for continuous disturbance, these are not considered to be clicks.
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Conclusion

PASS

3.3 Disturbance power

Standard	EN 55014-1	
Frequency [MHz]	QP [dB(pW)]	AV [dB(pW)]
30 – 300	45 – 55 *)	35 – 45 *)

*) Limits increasing linearly with the frequency

Port	AC Mains
Mode	Normal on, charging battery

Results

Frequency [MHz]	QP [dB(pW)]		AV [dB(pW)]	
	Level	Limit	Level	Limit
40,00	39	45,3	32	35,3
52,40	43	45,8	35	35,8
53,70	41	45,8	36	35,8
71,20	32	46,5	27	36,5
80,00	33	46,8	28	36,8
126,00	31	48,4	26	38,4
135,20	32	48,8	<30	38,8
184,50	29	50,6	22	40,6
274,00	27	53,9	23	43,9

"QP" and "AV" are levels and limits referring to measurements with the quasi-peak and average detector. If the measured level "QP" does not exceed the limit for "AV", then no average measurement is necessary.

Conclusion

PASS

3.4 Harmonic currents

Standard	EN 61000-3-2
Port	AC Mains supply
Measured power	66,8 W
Mode	Charging battery
Measuring equipment	According to IEC 61000-4-7:1991

X	Class A	All apparatus not classified as Class B, C or D
	Class B	Portable tools
	Class C	Lighting equipment
	Class D	Personal computers, television receivers

Results

	Level [A] _{RMS}	Limits A [A] _{RMS}
1	0,305	---
2	<0,005	1,08
3	0,029	2,30
4	<0,005	0,43
5	0,019	1,14
6	<0,005	0,30
7	0,015	0,77
8	<0,005	0,23
9	<0,005	0,40
10	<0,005	0,18
11	<0,005	0,33
12	<0,005	0,15
13	<0,005	0,21
14	<0,005	0,13
15	<0,005	0,15

Conclusion

PASS

3.5 Voltage fluctuations (Flicker)

Standard	EN 61000-3-3
Port	AC Mains supply
Voltage	230 V _{AC}

Equipment intended to be connected to 230 V_{AC}, 50 Hz supply systems may not produce voltage fluctuations in the supply systems due to variation of the input current above the limits as stated below.

P _{ST}	≤ 1
P _{LT}	≤ 0,65
d _C	≤ 3,3 %
d _{MAX}	≤ 4,0%

Results

X	Tests are not necessary because the EUT is unlikely to produce significant voltage fluctuations or flicker (clause 6.1)
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Conclusion

PASS

4 IMMUNITY TEST RESULTS

4.1 Electrostatic discharge immunity

Electrostatic discharges (ESD) are the result of persons or objects that accumulate static electricity due to for instance walking on synthetic carpets. The ESD can influence the operation of equipment or damage its electronics, either by a direct discharge or indirectly by coupling or radiation. Both effects are simulated during the tests.

Requirements

Standard	EN 55014-2
Basic standard	EN 61000-4-2
Port	Enclosure
Performance criterion	B; During the test degradation is allowed. No change of operating state or stored data is allowed.
Air discharges	2, 4 and 8 kV
Contact discharges	2 and 4 kV
Number of discharges	≥ 10 per polarity with ≥ 1 sec interval

Performed tests

Air discharges	X	2 kV	X	4 kV	X	8 kV		
Contact discharges	X	2 kV	X	4 kV		6 kV		
Via coupling planes	X	Horizontal			X	Vertical		
Polarity	X	Positive			X	Negative		
Set-up	X	Table-top				Floor standing		
Ambient temperature	24°C							
Relative Humidity air	35 %							

Observations

During the test no loss of performance has been observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.

Conclusion

PASS

4.2 Electrical Fast Transient immunity

The EFT immunity test simulates disturbances by bursts of very short transients caused for example by switching off loads such as an AC motor or bouncing relay contacts.

The transients are likely to disturb electronics but less likely to cause damage.

Requirements

Standard	EN 55014-2		
Basic standard	EN 61000-4-4		
Performance criterion	B; During the test degradation is allowed. No change of operating state or stored data is allowed.		
Pulse characteristics	5/50 ns		
Peak Voltage; Port	1 kV; AC input power port		
Repetition frequency	X	5 kHz	2,5 kHz

Performed tests

Tested Voltage; Port	1 kV; AC input power port		
Injection method	X	CDN	Capacitive clamp
Polarity	X	Positive	X Negative
Set-up	X	Table-top	Floor standing

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.

Conclusion

PASS

4.3 Surge transient immunity

The surge transient immunity test simulates the surges that are caused by over-voltages due to indirect (induced) lightning transients. The pulse is a slow transient with high-energy contents and due to its long duration may cause damage to an unprotected EUT.

Requirements

Standard	EN 55014-2
Basic standard	EN 61000-4-5
Performance criterion	B; During the test degradation is allowed. No change of operating state or stored data is allowed.
Pulse characteristics	1,2/50 μ s
Peak Voltage; Port	1 kV; AC input power port (line to line)

Performed tests

Tested Voltage; Port	1 kV; AC input power port (line to line)			
Polarity	X	Positive	X	Negative
Set-up	X	Table-top		Floor standing

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.

Conclusion

PASS

4.4 RF Conducted immunity

During this test the immunity of the equipment for induced or conducted electromagnetic fields is checked. Fields generated by radio and other transmitters cause RF voltages in long cables like the mains network. This test reproduces these induced disturbing voltages by injecting them to the EUT via the cabling.

Requirements

Standard	EN 55014-2
Basic standard	EN 61000-4-6
Performance criterion	A; Operation as intended
Frequency range	0,15 – 230 MHz
Modulation	1 kHz – 80% AM
Test level; Port	3 Vrms; AC input power port

Performed tests

Tested level; Port	3 Vrms; AC input power port		
Frequency range	0,15 – 230 MHz		
Dwell time	1 second		
Injection method	X	CDN-M2	EM clamp

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.

Conclusion

PASS

4.5 Power supply interruptions and dips

Requirements

Basic standard	EN 61000-4-11
Performance criterion	B; During the test degradation is allowed. No change of operating state or stored data is allowed. C; Temporary, self-recoverable loss of function is allowed.

Standard	EN 55014-2
AC input power port	C $U_{NOM} - 30\%$ (50 periods)
	C $U_{NOM} - 60\%$ (10 periods)
	C $U_{NOM} - 100\%$ (0,5 period)

Performed tests

Tested voltage	AC input power port, 230 V _{AC}
AC input power port	$U_{NOM} - 30\%$ (50 periods)
	$U_{NOM} - 60\%$ (10 periods)
	$U_{NOM} - 100\%$ (0,5 period)

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.

Conclusion

PASS

5 IDENTIFICATION OF THE EQUIPMENT UNDER TEST

The photographs show the tested apparatus.



Battery charger



Rating label