

CE TEST REPORT

Report Number : ETLE080619.495 Report issue date : July 21, 2008

Model / Serial No. : HWC-640 / NONE

Multiple Model Name : HWC-630, HWC-650, HWC-660, HWC-680

Product Type : Hot & Cold Water Purifier System

Applicant : HYUNDAI Wacor Tec Co., Ltd.

Address : 684-49, Gongreung-dong, Nowon-gu, Seoul, Korea

Manufacturer : HYUNDAI Wacor Tec Co., Ltd.

Address : 684-49, Gongreung-dong, Nowon-gu, Seoul, Korea

Test Standard(s) : EN 55014-1: 2006
EN 55014-2: 1997 + A1: 2001
EN 61000-3-2: 2006
EN 61000-3-3: 1995 + A1: 2001 + A2: 2005

Test Result : **Positive**

Total pages including Attachments : 35

Prepared by:

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(Test Engineer)



July 21, 2008

Reviewed by:

Hyung Seok, Lee
(Chief Engineer)



July 21, 2008

ETL Inc.

371-51, Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea
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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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EMC TEST STANDARD(S)

The emc tests were performed according to the following standards:

- EMC - Directive 2004/108/EC and its amendments
-

- EN 55014-1: 2006

- Household appliances and similar
 - Portable tools
 - Section 7.3.6 Electric and electronic toys Category B

- EN 61000-3-2: 2006

- EN 61000-3-3: 1995 + A1: 2001 + A2: 2005

- EN 55014-2: 1997 + A1: 2001

- Category - I Category – II

- Category – III Category - IV

- IEC 61000-4-2: 1995 + A1:1998 + A2:2000
- IEC 61000-4-3: 2002 + A1:2002
- IEC 61000-4-4: 2004
- IEC 61000-4-5: 1995 + A1:2000
- IEC 61000-4-6: 1996 + A1:2000
- IEC 61000-4-8: 1993 + A1:2000
- IEC 61000-4-11: 2004

Note: For undated references, the latest edition of the publication at the time of testing (including amendments) was applied.

ADDRESS OF THE TEST LABORATORY

■ ETL Inc. (Seoul office and EMC Laboratory)

#371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea

■ ETL Inc. (Yuju EMC Laboratory)

#584, Sangwhal-ri, Ganam-myeon, Yuju-gun, Gyeonggi-do, 469-885, Korea

ENVIRONMENTAL CONDITIONS

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

Temperature	:	15 °C - 35 °C
Humidity	:	30 %R.H. - 60 %R.H.
Atmospheric Pressure	:	86 kPa - 106 kPa

POWER SUPPLY SYSTEM UTILIZED

Power supply system ■ AC 220 V – 240 V; 50 Hz/60 Hz; 530 W – 560 W

Voltage Range Test

Preliminary test has been performed with two voltage conditions of 220 V and 240V at the frequencies of 160 kHz and 50 MHz to determine maximum disturbance voltage condition. The measurement result is no maximum disturbance voltage condition. So the test condition is normal AC 230 V, 50 Hz.

SHORT DESCRIPTION OF THE EQUIPMENT UNDER TEST (EUT)

Number of received / tested samples: 1 / 1
Serial Number: none

DEFINITIONS FOR SYMBOLS USED IN THIS TEST REPORT

- The black square indicates that the listed condition, standard or equipment is applicable for this report.
- Blank box indicates that the listed condition, standard or equipment was not applicable for this report.

Conducted Emission (Interference Voltage) Test

Conducted emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 kHz on the 230 V AC power and return leads of the EUT according to the methods defined in EN 55014-1.

The EUT was placed upon a non-metallic table 0.8 m above the horizontal metal reference plane and placed 40 cm from a vertical ground plane which is connected to the horizontal metal ground plane.

Test not applicable

Test area - shielded room

Anechoic chamber

Full compact chamber

Used test instruments and test accessories please see Attachment B.

Type	Frequency Range (MHz)	Quasi-Peak limit (dBuV)	Average limit (dBuV)
Mains terminals	0.15 to 0.5	66 to 56	59 to 46
	0.5 to 5	56	46
	5 to 30	60	50

Pass

Fail

Minimum limit margin 17.70 dB at 0.775 MHz

Maximum limit exceeding dB at MHz

Remarks: Please refer to the test data and graph in Attachment A.

Disturbance Power Emissions Test

Disturbance power emissions from 30 MHz to 300 MHz were measured with a bandwidth of 120 kHz according to the methods defines in EN55014-1. The EUT was placed on a nonmetallic stand in a shielded room, 0.8 m above the ground plane.

Test not applicable

■ Test area - Anechoic ferrite lined shielded room

Used test instruments and test accessories please see Attachment B.

Type	Frequency Range (MHz)	Quasi-Peak limit (dBpW)	Average limit (dBpW)
Household	30 - 300	45 - 55	35 - 45

■ Pass

Fail

Minimum limit margin 15.66 dB at 32.120 MHz

Maximum limit exceeding dB at MHz

Remarks: Please refer to the test data and graph in Attachment A.

Discontinuous Disturbance Emissions Test

Discontinuous disturbance emissions from 148.5 kHz to 30 MHz were measured with a bandwidth of 9 kHz according to the methods defined in EN55014-1. The EUT was placed on a nonmetallic stand in a shielded room, 0.8 m above the ground plane.

Test not applicable

■ Test area - Anechoic ferrite lined shielded room

Used test instruments and test accessories please see Attachment B.

■ Pass

Fail

Remarks: Please refer to the test data in Attachment A.

Harmonic Current Emissions and Flicker

Power Frequency Harmonics Tests: The measured values of the harmonics components of the input current, including line current and neutral current, shall be compared with the limits given in EN 61000-3-2.

Flicker Emission Tests: The total impedance of the test circuit, excluding the appliance under test, but including the internal impedance of the supply source, shall be equal to the reference impedance.

Test not applicable

■ Test area - ETL Harmonics test room

Anechoic chamber

Full compact chamber

Used test instruments and test accessories please see Attachment B.

■ **Pass**

Fail

Remarks: Please refer to the test data and graph in Attachment A.

Equipment Under Test (EUT) Test Operation Mode:

The equipment under test was operated under the following conditions during emissions testing:

Standby

During the test, EUT was the continuous cooling & heating mode hold down that the discharge water periodically

Configuration of the equipment under test:

See constructional data form in Attachment D - Page D2

See product information form(s) in Attachment D - Page D3

The following devices and interface cables were connected during the testing:

Peripheral devices

	Type	Model	Serial No.	Manufacturer
<input type="checkbox"/>	-	-	-	-

Type of Cables Used

Device from	Device to	Type of Cable(Port)	Length(m)	Type of shield
EUT	Power socket	AC Input	1.2	Unshielded

GENERAL REMARKS:

The Equipment Under Test (EUT) is the HYUNDAI Wacor Tec Co., Ltd. (model: HWC-640)

The model HWC-640 is basic model that was tested.

The multi models HWC-630, HWC-650, HWC-660 and HWC-680 is identical to basic model, except for external design and dimension.

Model	Dimension
HWC-640	310 mm (W) x 310 mm (D) x 970 mm (H)
HWC-630	370 mm (W) x 380 mm (D) x 1 025 mm (H)
HWC-650	320 mm (W) x 340 mm (D) x 1 035 mm (H)
HWC-660	310 mm (W) x 310 mm (D) x 970 mm (H)
HWC-680	310 mm (W) x 335 mm (D) x 985 mm (H)

SUMMARY:

All tests according to the regulations cited on page 3 were

- Performed
- Not Performed

The Equipment Under Test

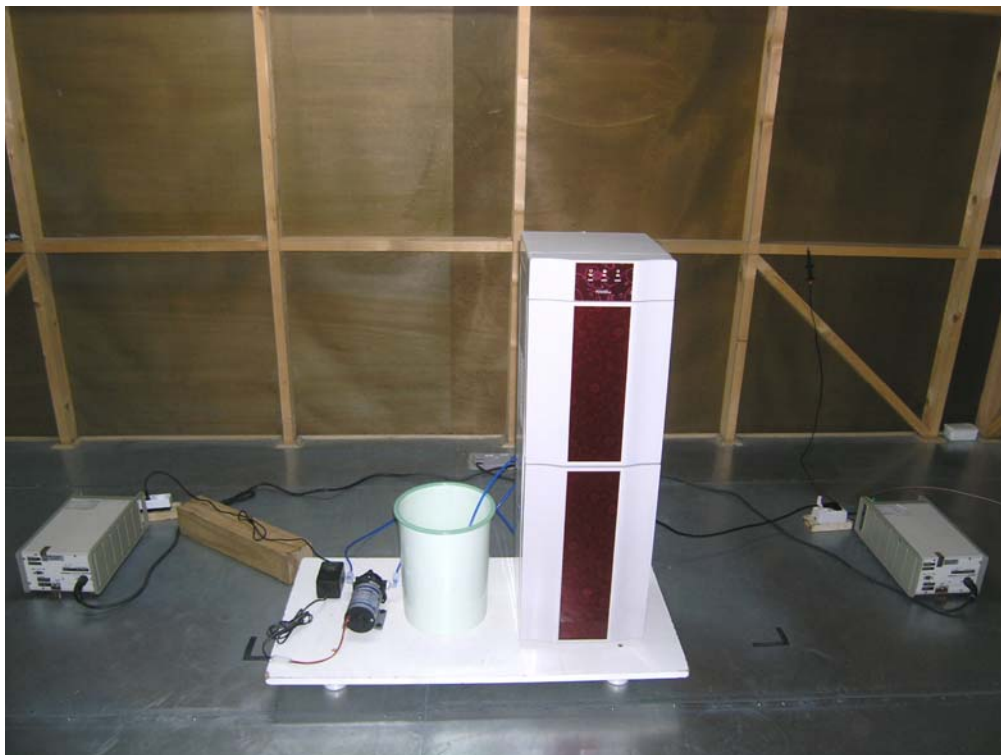
- Fulfills** the general approval requirements cited on page 3.
- Does not** fulfill the general approval requirements cited on page 3.

Date of receipt of test sample: June 19, 2008

Test start date: June 24, 2008

Test end date: June 25, 2008

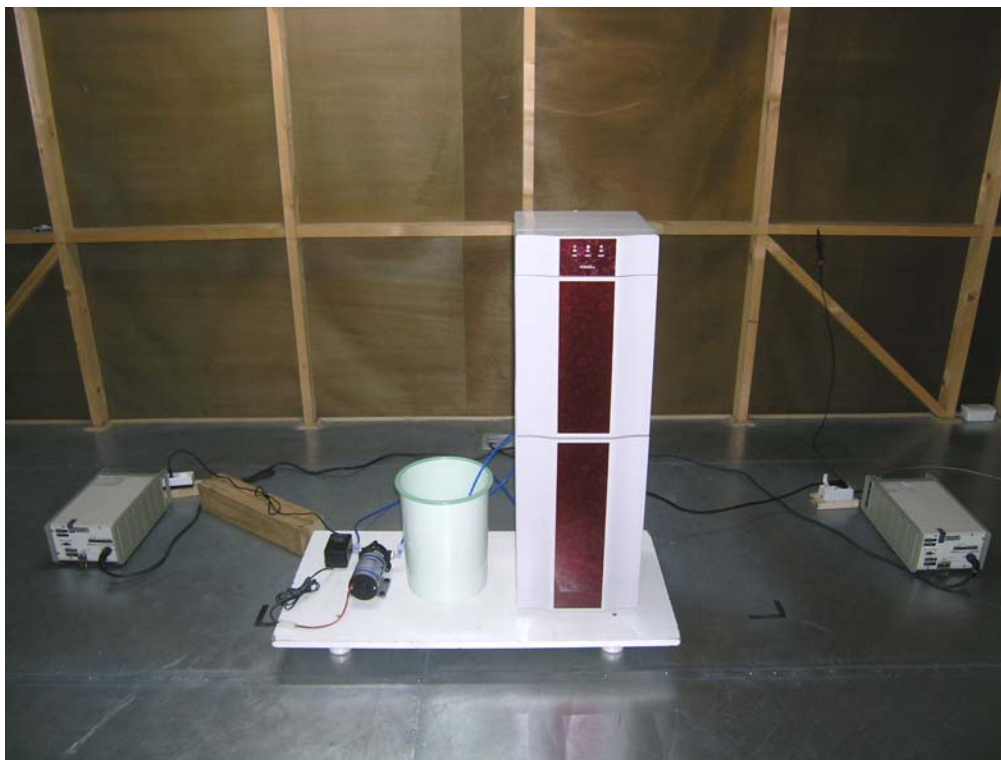
Photograph of test setup: Conducted emissions



Photograph of test setup: Disturbance Power emissions



Photograph of test setup: Discontinuous Disturbance Emissions



Photograph of test setup: Harmonic current/ flicker



Attachment A

Test Data

and

Test Setup Drawing(s)

Conducted Emissions Measurement

EUT	Hot & Cold Water Purifier System / HWC-640 (S/N: N/A)
Limit apply to	EN 55014-1
Test Date	June 24, 2008
Operating Condition	Water is continuous cooling & heating mode
Result	Passed by 17.70 dB

Conducted Emission Test Data

The following table shows the highest levels of conducted emissions on both polarizations of hot and neutral line.
Detector mode: CISPR Quasi-Peak mode (6 dB Bandwidth: 9 kHz)

Frequency [MHz]	Result [dB μ V]		Phase (*H/**N)	Limit [dB μ V]		Margin [dB]	
	Quasi-peak	Average		Quasi-peak	Average	Quasi-peak	Average
0.306	31.40	26.90	N	63.90	56.20	32.50	29.30
0.775	33.50	28.30	H	56.00	46.00	22.50	17.70
0.913	33.90	26.10	N	56.00	46.00	22.10	19.90
14.850	26.00	13.30	N	60.00	50.00	34.00	36.70
15.755	24.30	12.90	N	60.00	50.00	35.70	37.10
18.067	19.90	13.70	N	60.00	50.00	40.10	36.30

NOTES:

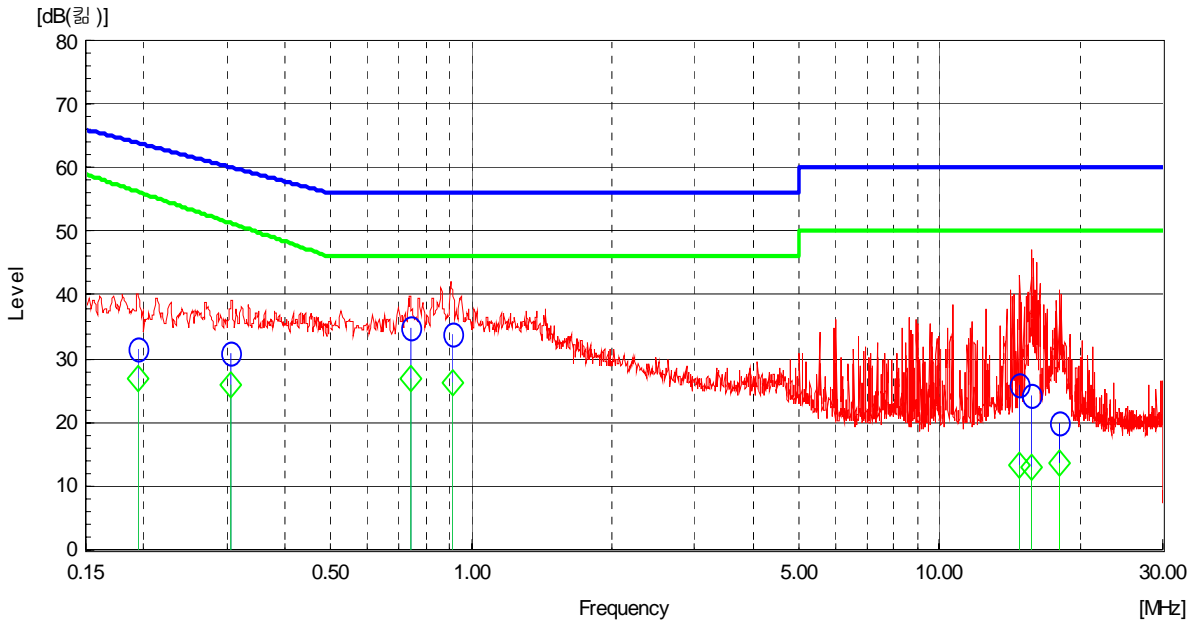
1. H : HOT Line , **N : Neutral Line
2. Margin value = Limit – Result
3. All conditions were investigated and the worst-case emissions are reported.



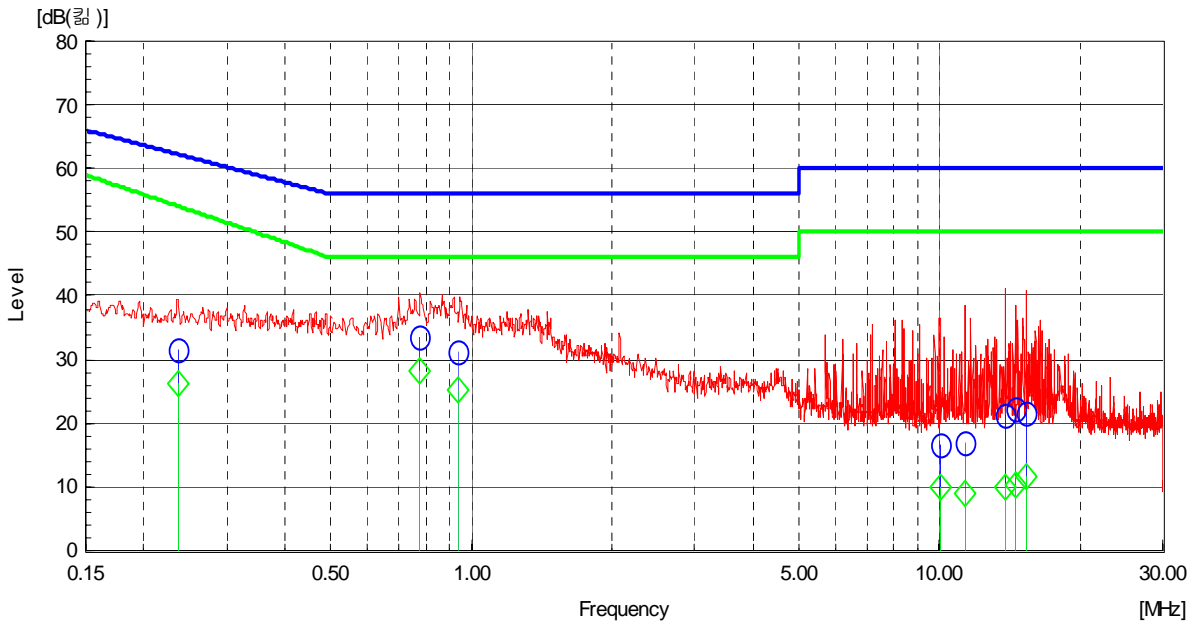
Jae Young, Kwon
Test Engineer

Conducted Emission
Line : Neutral

Limit : — Quasi-peak
 — Average



Line : Hot



Quasi-peak Average

Disturbance Power Measurement

EUT	Hot & Cold Water Purifier System / HWC-640 (S/N: N/A)
Limit apply to	EN 55014-1
Test Date	June 24, 2008
Operating Condition	Water is continuous cooling & heating mode
Result	Passed by 15.66 dB

Disturbance Power Test Data

Frequency [MHz]	Result [dBuV]		Limit [dBuV]		Margin [dB]	
	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
32.120	25.67	19.41	45.07	35.07	19.40	15.66
38.520	24.65	18.27	45.31	35.30	20.66	17.03
68.200	23.95	17.08	46.41	36.43	22.46	19.35



Jae Young, Kwon
Test Engineer

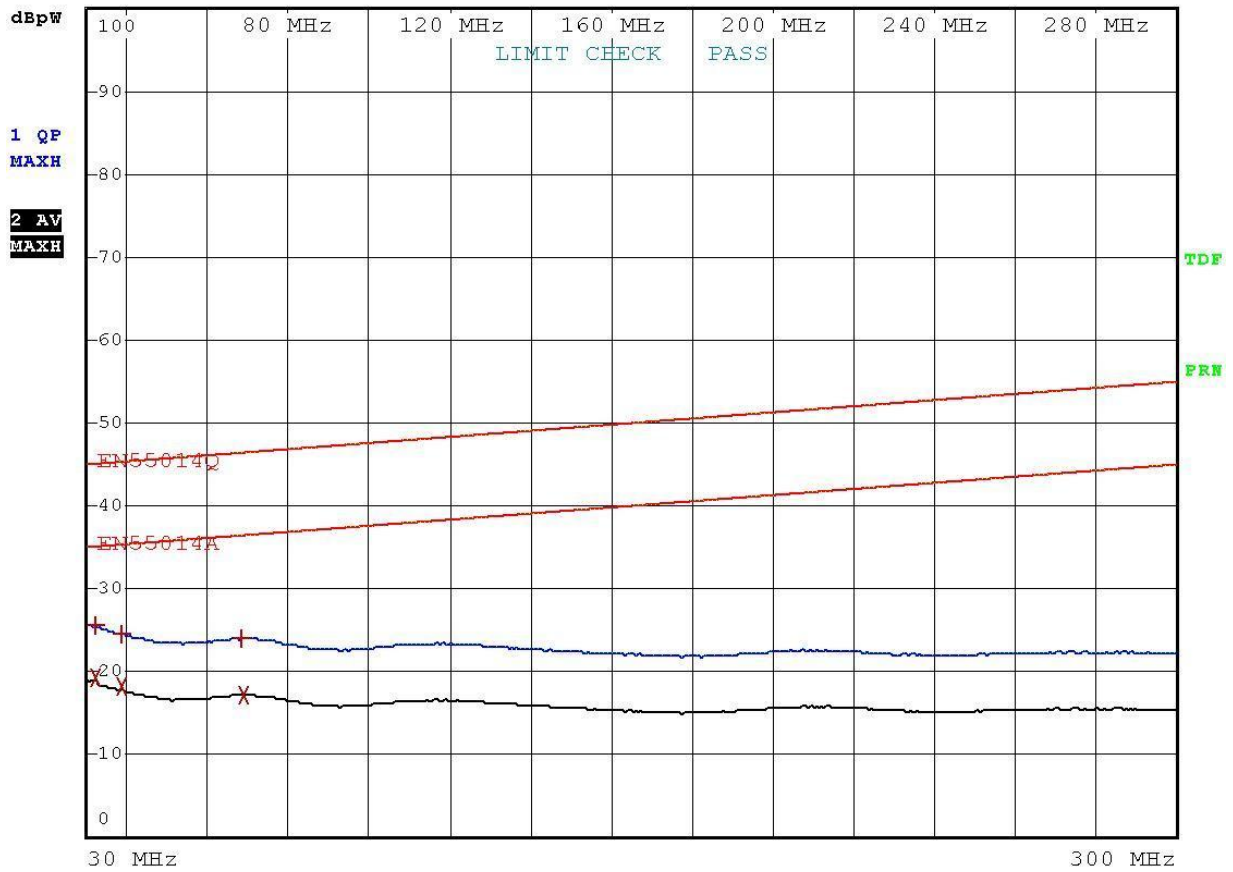


RBW 120 kHz

MT 50 ms

Att 10 dB

PREAMP OFF



Discontinuous Disturbance Measurement

EUT	Hot & Cold Water Purifier System / HWC-640 (S/N: N/A)
Limit apply to	EN 55014-1
Test Date	June 24, 2008
Operating Condition	Water is continuous cooling & heating mode
Result	Passed

Phase : Hot(dB μ V)

Click	150 kHz	500 kHz	1,4 MHz	30 MHz
1	O	O	O	O
2	O	O	O	O
3	O	O	O	O
4	O	O	O	O
5	O	O	O	O
6	O	O	O	O
7	O	O	O	O
8	O	O	O	O
9	O	O	O	O
10	O	O	O	O
11	O	O	O	O
12	O	O	O	O
13	O	O	O	O
14	O	O	O	O
15	O	O	O	O
16	O	O	O	O
17	O	O	O	O
18	O	O	O	O
19	O	O	O	O
20	O	O	O	O

Click	150 kHz	500 kHz	1,4 MHz	30 MHz
21	O	O	O	O
22	O	O	O	O
23	O	O	O	O
24	O	O	O	O
25	O	O	O	O
26	O	O	O	O
27	O	O	O	O
28	O	O	O	O
29	O	O	O	O
30	O	O	O	O
31	O	O	O	O
32	O	O	O	O
33	O	O	O	O
34	O	O	O	O
35	O	O	O	O
36	O	O	O	O
37	O	O	O	O
38	O	O	O	O
39	O	O	O	O
40	O	O	O	O

$L_c = 20 \log (30/N) =$

$N = \text{Click} / \text{min}$

Click = 10 ms < C time < 200 ms

(Industry machine + 10 dB)

Measurement Relay Time; 5 min

$N < 0.2$

$0.2 < N < 30$

$N > 30$

(5min) + 44 dB

+ L_c

(2sec) + 0 dB

Click Frequency	150 kHz	500 kHz	1.4 MHz	30 MHz
Contin.Limit L _{st}	66	56	56	60
Click Rate	O	O	O	O
Click level L _c	44	44	44	44
L = L _c + L _{st}	110	100	100	104
Number of Click	O	O	O	O
Numer over limit	O	O	O	O
Passed	PASS	PASS	PASS	PASS

REMARKS:

Phase : Neutral(dB, μV)

Click	150 kHz	500 kHz	1.4 MHz	30 MHz
1	O	O	O	O
2	O	O	O	O
3	O	O	O	O
4	O	O	O	O
5	O	O	O	O
6	O	O	O	O
7	O	O	O	O
8	O	O	O	O
9	O	O	O	O
10	O	O	O	O
11	O	O	O	O
12	O	O	O	O
13	O	O	O	O
14	O	O	O	O
15	O	O	O	O
16	O	O	O	O
17	O	O	O	O
18	O	O	O	O
19	O	O	O	O
20	O	O	O	O

Click	150 kHz	500 kHz	1.4 MHz	30 MHz
21	O	O	O	O
22	O	O	O	O
23	O	O	O	O
24	O	O	O	O
25	O	O	O	O
26	O	O	O	O
27	O	O	O	O
28	O	O	O	O
29	O	O	O	O
30	O	O	O	O
31	O	O	O	O
32	O	O	O	O
33	O	O	O	O
34	O	O	O	O
35	O	O	O	O
36	O	O	O	O
37	O	O	O	O
38	O	O	O	O
39	O	O	O	O
40	O	O	O	O

$L_c = 20 \log(30/N) =$

$N = \text{Click} / \text{min}$

Click = 10ms < C time < 200ms

(Industry machine + 10dB)

Measurement Relay Time; 5 min

$N < 0.2$

$0.2 < N < 30$

$N > 30$

(5min) + 44dB

+ L_c

(2sec) + 0dB

Click Frequency	150 kHz	500 kHz	1.4 MHz	30 MHz
Contin.Limit L st	66	56	56	60
Click Rate	O	O	O	O
Click level L_c	44	44	44	44
$L = L_c + L_{st}$	110	100	100	104
Number of Click	O	O	O	O
Numer over limit	O	O	O	O
Passed	PASS	PASS	PASS	PASS

REMARKS:

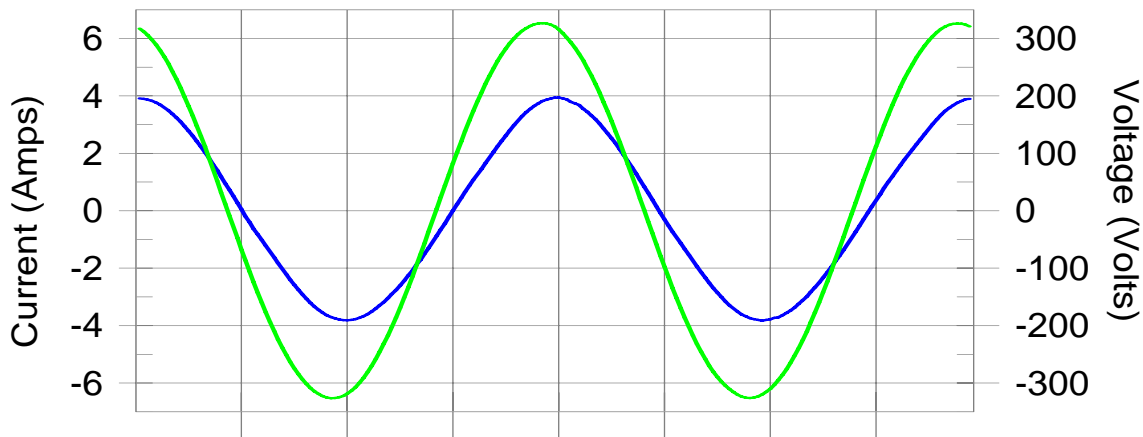
Harmonics – Class-A

EUT: HWC-640
Test category: Class-A
Test date: 2008-06-25
Test duration (min): 10
Comment:
Customer: HYUNDAI Wacor Tec Co., Ltd.

Tested by: Jae Young, Kwon
Test Margin: 100
Start time: 17:19:21
End time: 17:29:34
Data file name: H-000044.cts_data

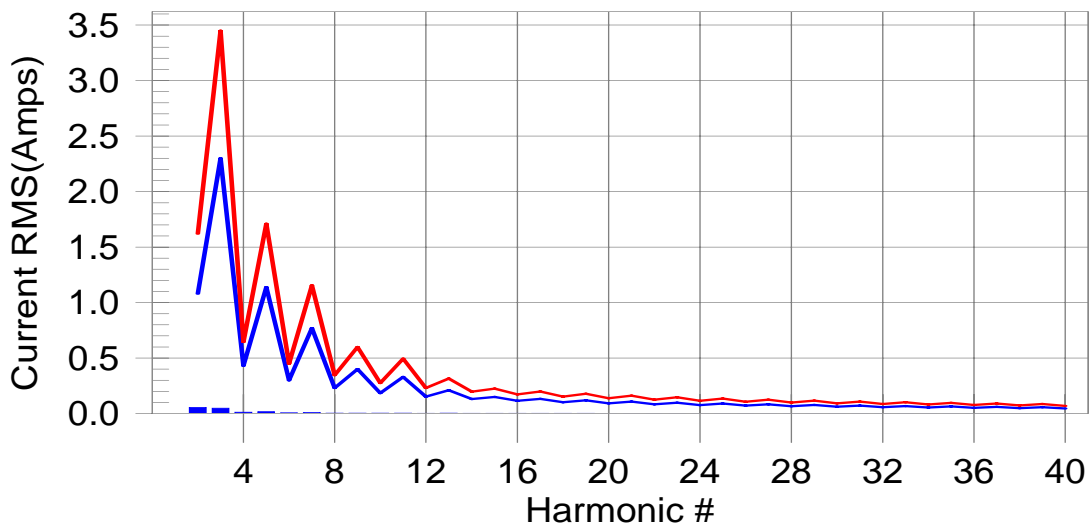
Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line

European Limits



Test result: Pass Worst harmonic was #2 with 3.49% of the limit.



EMC TEST REPORT

Current Test Result Summary

EUT: HWC-640
 Test category: Class-A
 Test date: 2008-06-25
 Test duration (min): 10
 Comment:
 Customer: HYUNDAI Wacor Tec Co., Ltd.

Tested by: Jae Young, Kwon
 Test Margin: 100
 End time: 17:29:34
 Start time: 17:19:21
 Data file name: H-000044.cts_data

Test Result: Pass Source qualification: Normal
 THC(A): 0.07 I-THD(%): 2.65 POHC(A): 0.002 POHC Limit(A): 0.251
 Highest parameter values during test:

V_RMS (Volts): 230.97 Frequency(Hz): 50.00
 I_Peak (Amps): 3.947 I_RMS (Amps): 2.681
 I_Fund (Amps): 2.677 Crest Factor: 1.650
 Power (Watts): 599.3 Power Factor: 0.968

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.045	1.080	4.2	0.057	1.620	3.49	Pass
3	0.044	2.300	1.9	0.048	3.450	1.40	Pass
4	0.006	0.430	1.5	0.012	0.645	1.81	Pass
5	0.014	1.140	1.2	0.017	1.710	1.01	Pass
6	0.003	0.300	1.1	0.007	0.450	1.47	Pass
7	0.007	0.770	0.9	0.010	1.155	0.83	Pass
8	0.002	0.230	0.7	0.004	0.345	1.28	Pass
9	0.002	0.400	0.5	0.004	0.600	0.71	Pass
10	0.002	0.184	1.0	0.004	0.276	1.31	Pass
11	0.002	0.330	0.5	0.004	0.495	0.74	Pass
12	0.001	0.153	1.0	0.003	0.230	1.34	Pass
13	0.001	0.210	0.7	0.003	0.315	1.03	Pass
14	0.001	0.131	0.9	0.003	0.197	1.36	Pass
15	0.001	0.150	0.9	0.003	0.225	1.28	Pass
16	0.001	0.115	0.8	0.002	0.173	1.34	Pass
17	0.001	0.132	0.7	0.002	0.199	1.17	Pass
18	0.001	0.102	0.8	0.002	0.153	1.36	Pass
19	0.001	0.118	0.7	0.002	0.178	1.17	Pass
20	0.001	0.092	0.9	0.002	0.138	1.39	Pass
21	0.001	0.107	0.7	0.002	0.161	1.18	Pass
22	0.001	0.084	1.2	0.002	0.125	1.58	Pass
23	0.001	0.098	0.8	0.002	0.147	1.18	Pass
24	0.001	0.077	1.2	0.002	0.115	1.62	Pass
25	0.001	0.090	0.9	0.002	0.135	1.24	Pass
26	0.001	0.071	1.1	0.002	0.106	1.54	Pass
27	0.001	0.083	1.0	0.002	0.125	1.29	Pass
28	0.001	0.066	1.9	0.002	0.099	1.99	Pass
29	0.001	0.078	1.1	0.002	0.116	1.39	Pass
30	0.001	0.061	1.3	0.002	0.092	1.76	Pass
31	0.001	0.073	1.0	0.001	0.109	1.30	Pass
32	0.001	0.058	1.2	0.001	0.086	1.63	Pass
33	0.001	0.068	1.0	0.001	0.102	1.34	Pass
34	0.001	0.054	1.2	0.001	0.081	1.62	Pass
35	0.001	0.064	1.0	0.001	0.096	1.38	Pass
36	0.001	0.051	1.3	0.001	0.077	1.72	Pass
37	0.001	0.061	1.1	0.001	0.091	1.39	Pass
38	0.001	0.048	1.3	0.001	0.073	1.76	Pass
39	0.001	0.058	1.1	0.001	0.087	1.44	Pass
40	0.000	0.046	1.1	0.001	0.069	1.38	Pass



EMC TEST REPORT

Voltage Source Verification Data

EUT: HWC-640
 Test category: Class-A
 Test date: 2008-06-25
 Test duration (min): 10
 Comment:
 Customer: HYUNDAI Wacor Tec Co., Ltd.

Tested by: Jae Young, Kwon
 Test Margin: 100
 Start time: 17:19:21
 End time: 17:29:34
 Data file name: H-000044.cts_data

Test Result: Pass Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms):	230.97	Frequency(Hz):	50.00
I_Peak (Amps):	3.947	I_RMS (Amps):	2.681
I_Fund (Amps):	2.677	Crest Factor:	1.650
Power (Watts):	599.3	Power Factor:	0.968

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.165	0.462	35.78	OK
3	0.704	2.078	33.90	OK
4	0.093	0.462	20.19	OK
5	0.083	0.924	8.95	OK
6	0.065	0.462	13.97	OK
7	0.058	0.693	8.33	OK
8	0.051	0.462	11.09	OK
9	0.052	0.462	11.19	OK
10	0.044	0.462	9.59	OK
11	0.039	0.231	16.76	OK
12	0.133	0.231	57.71	OK
13	0.033	0.231	14.48	OK
14	0.030	0.231	13.18	OK
15	0.027	0.231	11.71	OK
16	0.037	0.231	16.16	OK
17	0.029	0.231	12.36	OK
18	0.032	0.231	14.05	OK
19	0.024	0.231	10.20	OK
20	0.034	0.231	14.67	OK
21	0.019	0.231	8.39	OK
22	0.020	0.231	8.77	OK
23	0.019	0.231	8.25	OK
24	0.036	0.231	15.81	OK
25	0.018	0.231	7.82	OK
26	0.018	0.231	7.92	OK
27	0.016	0.231	6.75	OK
28	0.017	0.231	7.22	OK
29	0.016	0.231	6.86	OK
30	0.015	0.231	6.29	OK
31	0.014	0.231	6.28	OK
32	0.013	0.231	5.79	OK
33	0.013	0.231	5.77	OK
34	0.011	0.231	4.74	OK
35	0.011	0.231	4.61	OK
36	0.016	0.231	6.96	OK
37	0.011	0.231	4.75	OK
38	0.010	0.231	4.29	OK
39	0.011	0.231	4.56	OK
40	0.022	0.231	9.70	OK

Flicker Test Summary

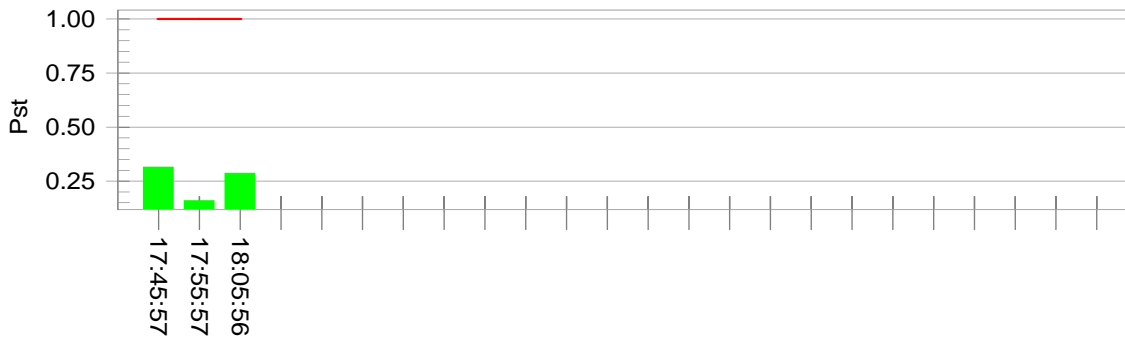
EUT: HWC-640	Tested by: Jae Young, Kwon
Test category: All parameters (European limits)	Test Margin: 100
Test date: 2008-06-25	Start time: 17:35:36
Test duration (min): 30	End time: 18:05:57
Comment:	Data file name: F-000046.cts_data
Customer: HYUNDAI Wacor Tec Co., Ltd.	

Test Result: Pass

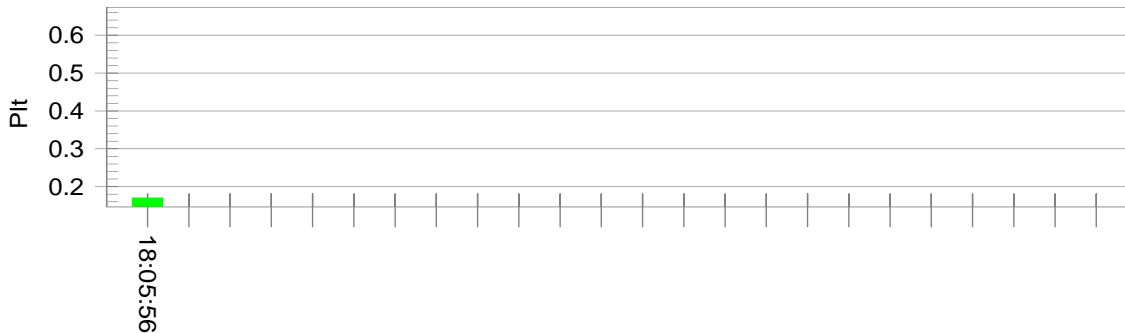
Status: Test Completed

Pst_i and limit line

European Limits



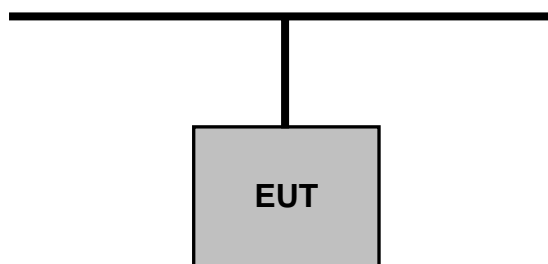
Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt):	230.15		
Highest dt (%):	-1.45	Test limit (%):	3.30 Pass
Time(mS) > dt:	0.0	Test limit (mS):	500.0 Pass
Highest dc (%):	0.61	Test limit (%):	3.30 Pass
Highest dmax (%):	-1.43	Test limit (%):	4.00 Pass
Highest Pst (10 min. period):	0.316	Test limit:	1.000 Pass
Highest Plt (2 hr. period):	0.170	Test limit:	0.650 Pass

The setup drawing(s)



————— : DATA LINE

————— : POWER LINE

Attachment B

List of Test Equipment

Emission Test Equipments

	Description	Model Number	Manufacturer	Serial Number	Cal Due Date
■	EMI TEST Receiver	ESPI3	R & S	100478	08.10.04
■	LISN	3816-2	EMCO	1001	08.10.05
■	LISN	3816-2	EMCO	1002	08.10.05
■	Flicker Meter	CCN1000-1LR1	Schaffner	X71836	N/A
■	AC Power Source	ProfLine 2105-400	Schaffner	HK53887	08.10.05
■	Absorbing Clamp	MDS-21	R & S	831676/013	09.04.04
■	Turn-Table	DETT-03	Daeil EMC	-	N/A
■	Antenna Master	DEAM-03	Daeil EMC	-	N/A

Attachment C

Constructional Photographs
of
Equipment Under Test (EUT)

View of front



View of rear



Internal view of EUT





Attachment D

Constructional Data Form

and

Product Information Form(s)

CONSTRUCTION DATAFORM FOR EMC – TESTING

Applicant : HYUNDAI Wacor Tec Co., Ltd.
Address : 684-49, Gongreung-dong, Nowon-gu, Seoul, Korea
Factory : HYUNDAI Wacor Tec Co., Ltd.
Address : 684-49, Gongreung-dong, Nowon-gu, Seoul, Korea

Type : Hot & Cold Water Purifier System

Rated voltage	: AC 220 V – 240 V; 50 Hz/60 Hz		
Serial No.	: NONE	Rated input power	: 530 W – 560 W
Protection type	:	Protection class	:

Configuration of equipment:

_____	Rev.	:	_____
_____	Rev.	:	_____
_____	Rev.	:	_____

Source of interference : _____
Internal frequency : _____
Noise suppression components : _____
Measures for electromagnetic shielding : _____

_____	_____	_____
Place of issue	date	Seal and signature of applicant

If applicable, if necessary complete overleaf

End of test report