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# Wellis Co., Ltd.
# OZONE TEST REPORT

**SCOPE OF WORK**
Ozone Emissions Testing of Household Electrostatic Air Cleaners for Model: WADU-02

**REPORT NUMBER**
103502990CRT-001

**ISSUE DATE**
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# TEST REPORT FOR WELLIS CO., LTD.

Report No.:103502990CRT-001
Date: April 30, 2018

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## SECTION 1

## SUMMARY

The representative sample(s) have been tested, investigated, and found to comply with the requirements of the following Standard(s):

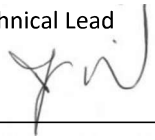
> *Electrostatic Air Cleaners, UL 867*, ***Section 40***, *Fifth Edition, August 4, 2011 revision: September 16, 2016.*

The equipment identified in this report has been found to meet the criteria for emittance of ozone not exceeding a concentration of 0.050 ppm. Furthermore, a second sample was not required to be tested, according to UL 867, as the first sample's maximum emissions were less than 0.030 ppm, which satisfies the exception in the Section 40.1.1.

This report completes our evaluation covered by Intertek Project Number G103502990 which has been authorized by Intertek intercompany agreement. If there are any questions regarding the results contained in this report, or any of the other services offered by Intertek, please do not hesitate to contact the undersigned.

**OZONE EMISSIONS SUMMARY**

| FAN SPEED | FILTER(S) | 03/VOLTAGE SETTING | $C(t)_{max}$ [ppm] |
|---|---|---|---|
| Operating | No | - | 0.012 |
| Night | No | - | 0.015 |
| Operating | Yes | - | 0.016 |
| Night | Yes | - | 0.015 |

| | | | |
|---|---|---|---|
| Completed by: | Joseph Hartley | Reviewed by: | James Diescher |
| Title: | Technician III | Title: | Technical Lead |
| Signature: |  | Signature |  |
| Date | 4/30/2018 | Date: | 4/30/2018 |

SECTION 2

# INDEX



## CHAMBER EQUIPMENT INFORMATION

TEST EQUIPMENT LIST

| Instrument | Model | Intertek Ctrl # | Cal Due Date |
|---|---|---|---|
| Teledyne – Advanced Pollution Instrumentation Ozone Calibrator | 703E | O200 | 02-08-2019 |
| Teledyne – Advanced Pollution Instrumentation Ozone Monitor | 400E | O202 | * |
| Vaisala – Temperature & Humidity Transducer | HMD-70Y | T1307 | 06-09-2018 |
| Fluid Components International- Flow meter | ST75V | D713 | 08-16-2018 |

***** The 400E Ozone Monitor is calibrated using the 703E calibrator.

## SECTION 3

# UNIT UNDER TEST INFORMATION

| MODEL INFORMATION | | | |
|---|---|---|---|
| Manufacturer: | Wellis Co., Ltd. | Pre-Filter: | No |
| Model Number: | WADU-02 | HEPA Filter: | No |
| Production/Prototype/ Design | Production | ESP Filter: | No |
| Fan Speeds: | 2 | Carbon Filter: | No |
| O3/Voltage Settings: | - | UV Light: | No |
| O3 Monitor: | - | Ionizer: | Yes |
| Model Notes: | Unit uses Hydrogen Peroxide as a filter | | |

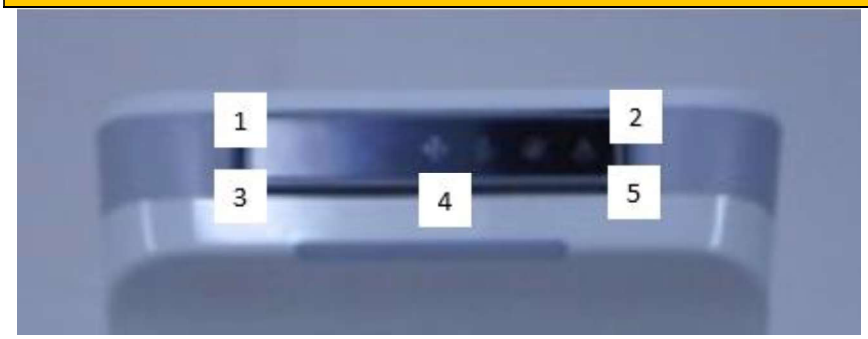
| RUN-IN TEST | | | |
|---|---|---|---|
| FIRST SAMPLE | | | |
| Run-in Start: | 4/25/2018 3:11 PM | Run-in End: | 4/27/2018 3:30 PM |
| Run-in Temperature: | 77 ± 4 degF | Tracking Number: | CRT1804251435-001 |
| Serial Number: | NA | Manufacture Date: | NA |
| Sample Notes: | | | |
| SECOND SAMPLE | | | |
| Run-in Start: | NA | Run-in End: | NA |
| Run-in Temperature: | NA | Tracking Number | NA |
| Serial Number | NA | Manufacture Date: | CRT1804251435-002 |
| Sample Notes: | Per the exception listed under clause 40.1.1 of UL 867, the second sample was not required to be tested | | |

## SECTION 4

# PEAK OZONE TEST

| GRILL AND AIR PERIPHERY DIMENSIONS | | | |
|---|---|---|---|
| | | Date of Test: | 4/27/2018 |
| Grill Height: | 1.0 | Air Periphery Height: | 1.0 |
| Grill Width: | 5.0 | Air Periphery Width: | 5.0 |
| Estimated Grill Area: | 5 Sq. In | Est. Air Periphery Area: | 5 Sq. In. |
| Notes: | Measurements are in Inches | | |

**PEAK LOCATION**




| Loc. | X | Y |
|---|---|---|
| - | [inches] | [inches] |
| 1 | -2.5 | 1 |
| 2 | 2.5 | 1 |
| 3 | -2.5 | 0 |
| 4 | 0 | 0 |
| 5 | 2.5 | 0 |

* Location measurements are coordinates in reference to the center point.

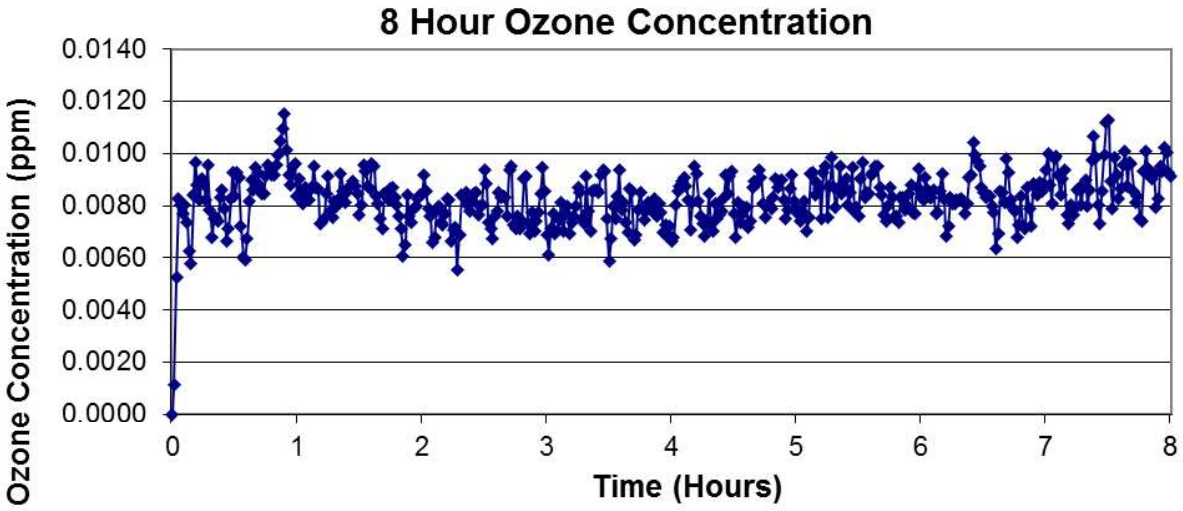
| PEAK OZONE CONCENTRATIONS (ppm) | | | | |
|---|---|---|---|---|
| Location | *Without Solution* | | *With Solution* | |
| | *Highest* | *Lowest* | *Highest* | *Lowest* |
| 1 | 0.0082 | **0.0123** | **0.0113** | **0.0105** |
| 2 | **0.0102** | 0.0110 | 0.0069 | 0.0085 |
| 3 | 0.0038 | 0.0031 | 0.0028 | 0.0038 |
| 4 | 0.0006 | 0.0008 | 0.0005 | 0.0003 |
| 5 | 0.0008 | 0.0012 | 0.0007 | 0.0011 |

Note: Peak Ozone Test concentrations are shown with background subtracted.

## SECTION 5

# MAX OZONE TEST

START DATE OF TEST: 4/27/2018
SAMPLE: First Sample
FAN SPEED: Operation Mode
FILTER(S): Ionizer ON, Peroxide Solution not open

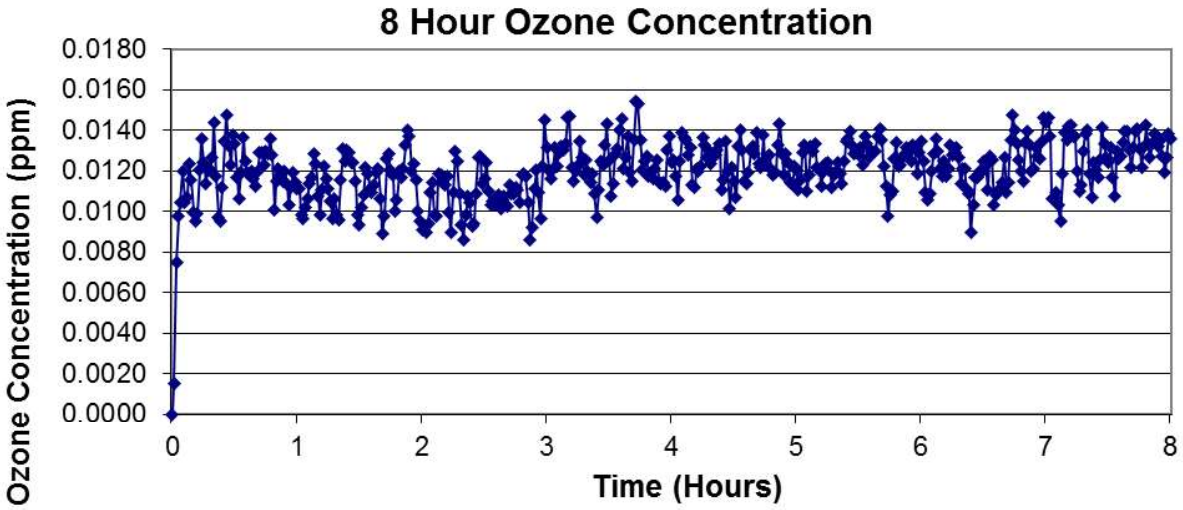



| MAXIMUM OZONE TEST RESULTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **UL Ref.** | **Pass/Fail** | **Mean** | **Min** | **Max** | **Delta** | **Units** |
| Background C(t) O3: | 40.4.3 | PASS | 0.002 | 0.001 | 0.002 | 0.001 | [ppm] |
| Test 1min C(t) O3: | 40.1.2 | PASS | 0.008 | 0.000 | **0.012** | 0.012 | [ppm] |
| Test 5min C(t) O3: | 40.1.2 | PASS | 0.008 | 0.001 | 0.011 | 0.009 | [ppm] |
| Chamber Temperature: | 40.4.2 | PASS | 77 | 77 | 77 | 0 | [degF] |
| Chamber Humidity: | 40.4.2 | PASS | 50 | 49 | 51 | 2 | [%RH] |
| Chamber Static Pressure: | - | PASS | 0.02 | 0.01 | 0.03 | 0.02 | ["H2O] |
| Chamber Supply Air Flow: | - | - | 20 | 19 | 20 | 0 | [SCFM] |
| Required to Test 2nd Sample: | 40.1.1 | NO | | | | | |
| Test Duration: | *40.4.6 | 8 hours | | | | | |

NOTES: Peak Test Location 2

# MAX OZONE TEST

START DATE OF TEST: 4/28/2018
SAMPLE: First Sample
FAN SPEED: Night Mode
FILTER(S): Ionizer ON, Peroxide Solution not open

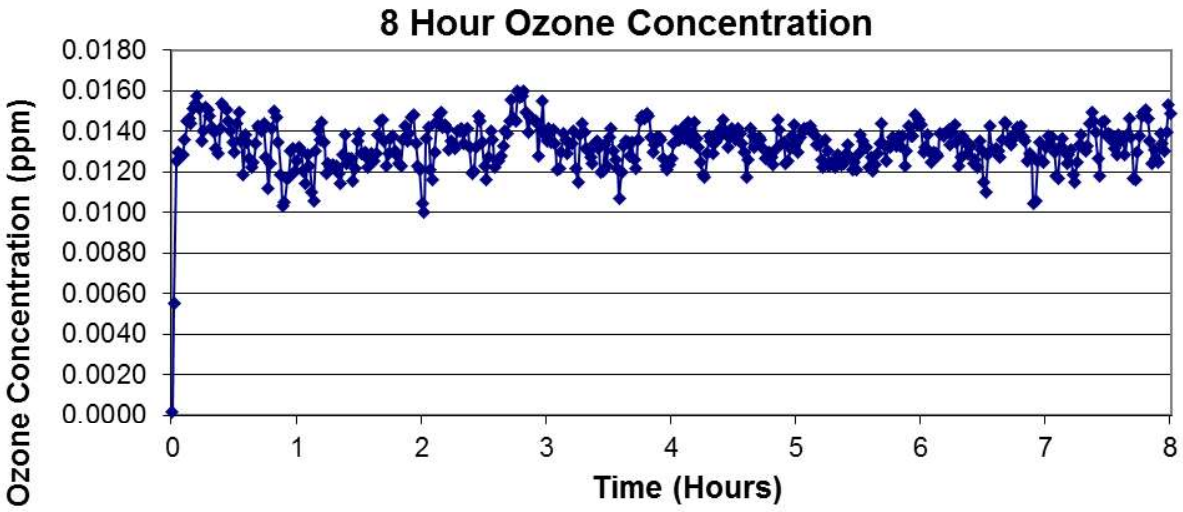



| MAXIMUM OZONE TEST RESULTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **UL Ref.** | **Pass/Fail** | **Mean** | **Min** | **Max** | **Delta** | **Units** |
| Background C(t) O3: | 40.4.3 | PASS | 0.002 | 0.001 | 0.002 | 0.001 | [ppm] |
| Test 1min C(t) O3: | 40.1.2 | PASS | 0.012 | 0.000 | **0.015** | 0.015 | [ppm] |
| Test 5min C(t) O3: | 40.1.2 | PASS | 0.012 | 0.001 | 0.014 | 0.013 | [ppm] |
| Chamber Temperature: | 40.4.2 | PASS | 77 | 77 | 77 | 1 | [degF] |
| Chamber Humidity: | 40.4.2 | PASS | 50 | 49 | 50 | 1 | [%RH] |
| Chamber Static Pressure: | - | PASS | 0.02 | 0.01 | 0.03 | 0.02 | ["H2O] |
| Chamber Supply Air Flow: | - | - | 20 | 20 | 20 | 0 | [SCFM] |
| Required to Test 2nd Sample: | 40.1.1 | NO | | | | | |
| Test Duration: | *40.4.6 | 8 hours | | | | | |

NOTES: Peak Test Location 2

## MAX OZONE TEST

START DATE OF TEST: 4/28/2018
SAMPLE: First Sample
FAN SPEED: Operating Mode
FILTER(S): Ionizer ON, Peroxide solution open

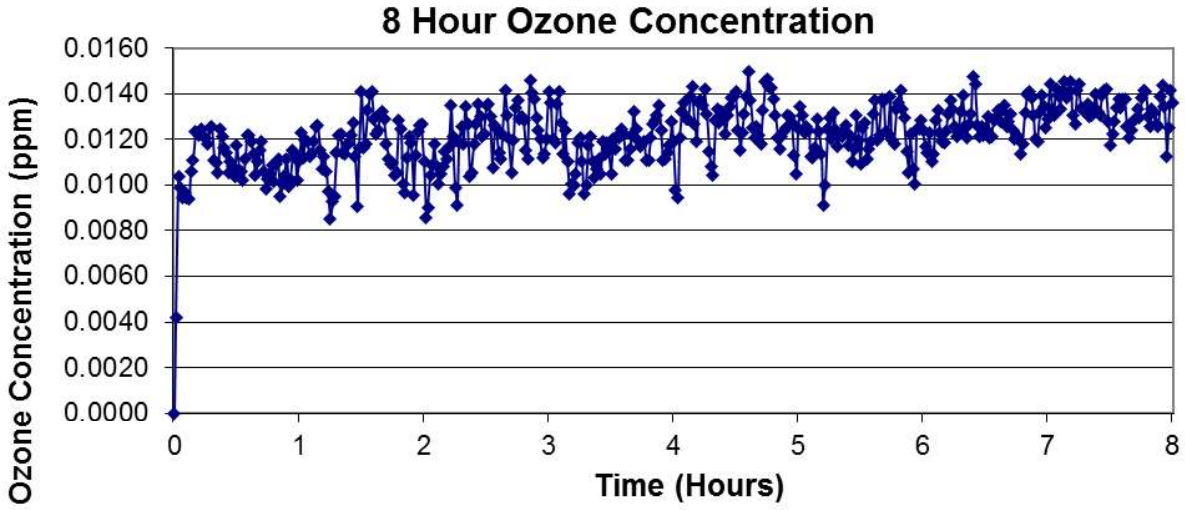



| MAXIMUM OZONE TEST RESULTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| | UL Ref. | Pass/Fail | Mean | Min | Max | Delta | Units |
| Background C(t) O3: | 40.4.3 | PASS | 0.002 | 0.001 | 0.002 | 0.001 | [ppm] |
| Test 1min C(t) O3: | 40.1.2 | PASS | 0.013 | 0.000 | **0.016** | 0.016 | [ppm] |
| Test 5min C(t) O3: | 40.1.2 | PASS | 0.013 | 0.001 | 0.016 | 0.014 | [ppm] |
| Chamber Temperature: | 40.4.2 | PASS | 77 | 77 | 77 | 1 | [degF] |
| Chamber Humidity: | 40.4.2 | PASS | 50 | 49 | 51 | 2 | [%RH] |
| Chamber Static Pressure: | - | PASS | 0.02 | 0.01 | 0.03 | 0.01 | ["H2O] |
| Chamber Supply Air Flow: | - | - | 20 | 20 | 20 | 0 | [SCFM] |
| Required to Test 2nd Sample: | 40.1.1 | NO | | | | | |
| Test Duration: | *40.4.6 | 8 hours | | | | | |

NOTES: Peak Test Location 1

MAX OZONE TEST

START DATE OF TEST: 4/29/2018
SAMPLE: First Sample
FAN SPEED: Night Mode
FILTER(S): Ionizer ON, Peroxide solution open




| MAXIMUM OZONE TEST RESULTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **UL Ref.** | **Pass/Fail** | **Mean** | **Min** | **Max** | **Delta** | **Units** |
| Background C(t) O3: | 40.4.3 | PASS | 0.002 | 0.001 | 0.003 | 0.001 | [ppm] |
| Test 1min C(t) O3: | 40.1.2 | PASS | 0.012 | 0.000 | **0.015** | 0.015 | [ppm] |
| Test 5min C(t) O3: | 40.1.2 | PASS | 0.012 | 0.002 | 0.014 | 0.013 | [ppm] |
| Chamber Temperature: | 40.4.2 | PASS | 77 | 77 | 77 | 1 | [degF] |
| Chamber Humidity: | 40.4.2 | PASS | 50 | 48 | 51 | 3 | [%RH] |
| Chamber Static Pressure: | - | PASS | 0.02 | 0.01 | 0.03 | 0.02 | ["H2O] |
| Chamber Supply Air Flow: | - | - | 20 | 20 | 20 | 0 | [SCFM] |
| Required to Test 2nd Sample: | 40.1.1 | NO | | | | | |
| Test Duration: | *40.4.6 | 8 hours | | | | | |

NOTES: Peak Test Location 1

# SECTION 6
# APPENDIX

## DATA FILES

| TEST NAME | RAW DATA FILE |
|---|---|
| Model Half Life | 3494 Halflife Ozonelog.csv |
| Max Ozone: Operating Mode without solution | 3495 Max High without solution ozonelog.csv |
| Max Ozone: Night Mode without solution | 3496 Max Low without solution ozonelog.csv |
| Max Ozone: Operating Mode with solution | 3497 Max high with solution ozonelog.csv |
| Max Ozone: Night Mode with Solution | 3498 Max Low with Solution ozonelog.csv |

## ATTACHMENT DOCUMENTS

| DOCUMENT | SOFT-COPY FILE NAME |
|---|---|
| ARB Application | NA |
| Chain of Custody: Sample 1 | COC_CRT1804251435-001,002.pdf |
| Chain of Custody: Sample 2 | COC_CRT1804251435-001,002.pdf |

## UUT PHOTOGRAPHS


UUT

**No Namplate**

Nameplate

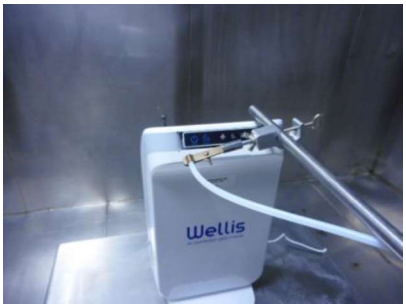
## UUT PHOTOGRAPHS: PEAK TEST


**Location 2**

Operating Mode without solution

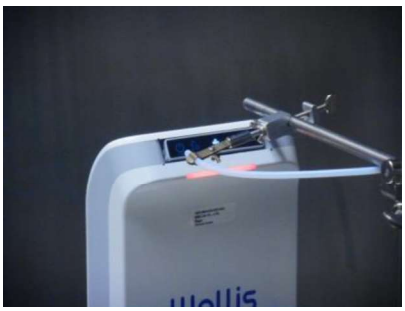

**Location 1**

Night Mode without solution




**Location 1**

Operating Mode with solution



**Location 1**

**Night mode with solution**

## UUT PHOTOGRAPHS: MAX OZONE TESTS


**Location 2**

Operating Mode without solution


**Location 1**

Night Mode without solution


**Location 1**

Operating Mode with Solution


**Location 1**

**Night Mode with solution**

7.0 REVISION SUMMARY

| Date/Proj # Site ID | Project Handler/ Reviewer | Section | Description of Change |
|---|---|---|---|
| | | | None |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
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