



## CERTIFICATE OF ANALYSIS

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**TITANIUM WORLD TECHNOLOGY SDN. BHD.  
NO. 16-1, JALAN JALIL JAYA 6, BLOK 5, BUKIT  
JALIL, 57000 KUALA LUMPUR, MALAYSIA**

LAB NO. : CAW/1710/66705  
SAMPLE ID : CAW/1710/66705/182767  
SAMPLE MARKING : ARMOR 8  
RECEIVED DATE : 10TH OCTOBER 2017  
REPORTED DATE : 16TH OCTOBER 2017

**Test: Quantitative Suspension Test for Evaluation of Bactericidal Activity of Chemical Disinfectants and Antiseptics**

Test Standard: BS EN 1040:2005  
Product Appearance: Liquid, clear  
Active Substance: Titanium Dioxide  
Contact time: 30 minutes  
Test Temperature: 20°C  
Inhibition Method: Dilution-Neutralization  
Neutralizing Solution: Polysorbate 80  
Product Test Concentration: 80%

**Organisms used to challenge:**

- a) *Staphylococcus aureus* (ATCC 6538)
- b) *Escherichia coli* (ATCC 8739)
- c) *Pseudomonas aeruginosa* (ATCC 9027)
- d) *Listeria monocytogenes* (ATCC 7644)
- e) *Salmonella thyphimurium* (ATCC 14028)

**Procedures:**

- 1) The product used throughout the test is at highest test concentration which is 80%
- 2) The evaluation of basic bactericidal activity of the method is tested using dilution-neutralization method.  
The neutralizer used during the test is Polysorbate 80 which acts as neutralizer to inhibit the disinfectant property of the sample, so actual efficacy of sample can be studied for specific contact time.
- 3) Subculture the microorganisms from pure working culture onto non-selective media as follow:
  - a) *S. aureus*, *P. aeruginosa*, *L. monocytogenes*, *S. thyphimurium* and *E. coli* on Tryptic Soy Agar



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- 2) Incubate the bacteria culture at 35°C for 24 hours until sufficient growth is observed
- 3) Prepare inoculum suspension to be spiked into sample
- 4) Dilute and plate out the inoculum onto their respective media to determine microbial count of inoculum suspension.
- 5) Pipette 1ml of 10<sup>8</sup> cfu/ml inoculum suspension into the sample.
- 6) Mix vigorously and leave the initial suspension for 30 min. The product is left under light source during the contact time.
- 7) After the contact time, inoculate 1ml from the initial suspension into another tube with neutralizer and left for 5 minute before plating out onto TSA in duplicate. The plate is incubate at 37°C for 48 hour
- 8) Number of surviving organisms is enumerated and log reduction of organisms killed during contact time is calculated.
- 9) Beside testing the product, the following is carried out to validate the test efficacy
  - a) Validation of the selected experimental conditions and/or verification of the absence of any lethal effect in the test conditions
  - b) Verification of the absence of toxicity of the neutralizer
  - c) Dilution-neutralization method validation

### Validation and Controls

| Test Microorganisms               | Validation Suspension (N <sub>v</sub> )<br>(CFU/mL)<br>Criteria: 300 ≤ N <sub>v</sub> ≤ 1600 | Method Validation<br>Criteria: ≥ 0.05 N <sub>v</sub> | Validity |
|-----------------------------------|--|--|----------|
| a) <i>Staphylococcus aureus</i>   | 390  | 35   | Valid    |
| b) <i>Escherichia coli</i>        | 300  | 27   | Valid    |
| c) <i>Pseudomonas aeruginosa</i>  | 440  | 39   | Valid    |
| d) <i>Listeria monocytogenes</i>  | 1200   | 100  | Valid    |
| e) <i>Salmonella thyphimurium</i> | 360  | 32   | Valid    |



# CHEMSIL AIR & WATER SDN BHD (515400-V)

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### Result:

| Test Microorganisms               | Initial Suspension (N)<br>(CFU/ml)<br><br>Criteria:<br>$1.5 \times 10^8 \leq N \leq 5 \times 10^8$ | Final Count<br>(CFU/ml) | R<br>(Log Reduction)<br><br>Criteria:<br>At least 5 log <sub>10</sub><br>reduction | Assessment |
|-----------------------------------|--|-------------------------|--|------------|
| a) <i>Staphylococcus aureus</i>   | $3.9 \times 10^8$  | NG (<10)                | > 7.6  | Pass       |
| b) <i>Escherichia coli</i>        | $3.0 \times 10^8$  | NG (<10)                | > 7.5  | Pass       |
| c) <i>Pseudomonas aeruginosa</i>  | $4.4 \times 10^8$  | NG (<10)                | > 7.6  | Pass       |
| d) <i>Listeria monocytogenes</i>  | $1.2 \times 10^8$  | NG (<10)                | > 7.1  | Pass       |
| e) <i>Salmonella thyphimurium</i> | $3.6 \times 10^8$  | NG (<10)                | > 7.6  | Pass       |

**Remark:** Product shall demonstrate at least a 5 decimal log (lg) reduction as according to BS EN 1040:2004

### Note:

- 1) NG means No Growth
- 2) Opinion and Interpretation expressed herein are outside the scope of SAMM accreditation. The above results relate only to the items tested.  
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### Approved Signatories

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**Microbiologist**





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Test Standard: BS EN 1040:2005  
Product Appearance: Liquid, clear  
Active Substance: Titanium Dioxide  
Contact time: 60 minutes  
Test Temperature: 20°C  
Inhibition Method: Dilution-Neutralization  
Neutralizing Solution: Polysorbate 80  
Product Test Concentration: 80%

#### **Organisms used to challenge:**

- a) *Staphylococcus aureus* (ATCC 6538)
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| c) <i>Pseudomonas aeruginosa</i> | 440   | 40                                       | Valid    |
| d) <i>Listeria monocytogenes</i> | 1200  | 95                                       | Valid    |
| e) <i>Salmonella typhimurium</i> | 360   | 35                                       | Valid    |



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