



TEST REPORT

Test Report No.

2020-XD-1052

Sample Name

Keenon® M2 Intelligent Disinfection Robot

Applicant

Keenon Robotics Co., Ltd.

October 16, 2020

**Zhongguancun International Medical Inspection and
Certification Co., Ltd.**

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Zhongguancun International Medical
Inspection and Certification Co., Ltd.

Inspection
Report

Sample Acceptance No.: 2020-XD-1052

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Name of Sample	<u>Keenon® M2 Intelligent Disinfection Robot</u>	Sample Quantity	<u>1 Set</u>
Submitted for Inspection by	<u>Keenon Robotics Co., Ltd.</u>	Sample Property	<u>Machine</u>
Manufactured by	<u>Suzhou Wujiang Keenon Intelligent Manufacturing Technology Co., Ltd.</u>	Accepted on	<u>September 08, 2020</u>
Manufactured on or Batch No.	<u>KRM22009L20002</u>	Inspection Completed on	<u>October 10, 2020</u>
Specification or Model	<u>M2</u>	Entrusted by	<u>Zhang Haijian</u>

Inspection Bases:

Inspection has been carried out in accordance with Article 2.2.1.2.4, Article 2.2.1.4, Article 2.1.5.4.3, Article 2.1.3.4, Article 2.1.3.5, Article 2.1.1.2.4, Article 2.1.1.5.6, Article 2.1.1.7.5 (1) and Article 2.1.2.9 of *Technical Standard for Disinfection* (2002) and Annex C of WS/T 648-2019 *General Hygienic Requirement for Air Disinfecting Machine*.

Evaluation Bases:

Evaluation has been made in accordance with *Technical Standard for Disinfection* (2002).

Inspection Conclusion:

I. Physical and Chemical Indexes

1. In accordance with the testing results, the average content of hydrogen peroxide in disinfectant provided along with Keenon® M2 Intelligent Disinfection Robot is 426g/L.
2. In accordance with the testing results, the average pH value of disinfectant provided along with Keenon® M2 Intelligent Disinfection Robot is 4.28.
3. Testing has been carried out 5min after the ultraviolet (UV) lamp of Keenon® M2 Intelligent Disinfection Robot is turned on and becomes steady 1m away from the probe of the irradiator. In accordance with the testing results, average irradiation intensity of UV-C is 234 μ W/cm².

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II. Microorganism Sterilization Indexes

1. Testing has been carried out 5min after the ultraviolet (UV) lamp of Keenon® M2 Intelligent Disinfection Robot is turned on and becomes steady 1m away from the probe of the irradiator. In accordance with the testing results, average irradiation intensity of UV is $178\mu\text{W}/\text{cm}^2$, and the corrected value is $233\mu\text{W}/\text{cm}^2$.
2. It is found after 3 repeated tests that ordinary nutrient agar culture medium containing neutralizer (neutralizer: PBS containing sodium thiosulfate of 0.09g/L and catalase of 0.1g/L) used can effectively neutralize the residual effect of hydrogen peroxide disinfection carried out by Keenon® M2 Intelligent Disinfection Robot on staphylococcus albus, and the neutralizer contained in the culture medium and the neutralization products have no effect on the growth of staphylococcus albus basically.
3. The testing process is as follows: turn on Keenon® M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant, open spray nozzle to spray for 6min, and act to 60min. In accordance with the testing results of three repeated tests, the rate of sterilizing staphylococcus albus in the air of the aerosol chamber is $> 99.90\%$, thus conforming to provisions on qualified disinfection in *Technical Standard for Disinfection* (2002).
4. The testing process is as follows: turn on Keenon® M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant, open spray nozzle to spray for 6min, and act to 60min. In accordance with the testing results of three repeated tests, the rate of sterilizing natural bacteria in the air of a room with an area of 38m^3 is $> 90\%$, thus conforming to provisions on qualified disinfection in *Technical Standard for Disinfection* (2002).
5. The testing process is as follows: turn on Keenon® M2 Intelligent Disinfection Robot, turn on UV lamp, and disinfect for 20min. In accordance with the testing results of three repeated tests, the rate of sterilizing staphylococcus albus in the air of the aerosol chamber is $> 99.90\%$, thus conforming to provisions on qualified disinfection in *Technical Standard for Disinfection* (2002).
6. The testing process is as follows: turn on Keenon® M2 Intelligent Disinfection Robot, turn on UV lamp, and disinfect for 20min. In accordance with the testing results of three repeated tests, the rate of sterilizing natural bacteria in the air of a room with an area of 32m^3 is $> 90\%$, thus conforming to provisions on qualified disinfection in *Technical Standard for Disinfection* (2002).

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7. The testing process is as follows: turn on Keenon® M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant, and open spray nozzle and turn on UV lamp (spray for 6min, act to 30min, and carry out UV disinfection for 10min). In accordance with the testing results of three repeated tests, the rate of sterilizing staphylococcus albus in the air of the aerosol chamber is $> 99.90\%$, thus conforming to provisions on qualified disinfection in *Technical Standard for Disinfection* (2002).
8. The testing process is as follows: turn on Keenon® M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant, and open spray nozzle and turn on UV lamp (spray for 6min, act to 30min, and carry out UV disinfection for 10min). In accordance with the testing results of three repeated tests, the rate of sterilizing natural bacteria in the air of a room with an area of 40m^3 is $> 90\%$, thus conforming to provisions on qualified disinfection in *Technical Standard for Disinfection* (2002).
9. In accordance with the testing results, neutralizer solution containing PBS containing sodium thiosulfate of 5g/L and catalase of 0.1g/L used can effectively neutralize the residual effect of aerosol generated from spray hydrogen peroxide disinfectant contained in Keenon® M2 Intelligent Disinfection Robot on black spore variants of bacillus subtilis (ATCC 9372), and the neutralizer solution and the neutralization products have no adverse effect on the culture medium and have no effect on the growth of black spore variants of bacillus subtilis (ATCC 9372) basically.

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10. The testing process is as follows: turn on Keenon® M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant, open spray nozzle to spray for 30min, and act to 90min. In accordance with the testing results, the logarithm values of sterilizing black spore variants of bacillus subtilis (ATCC 9372) on 30 steel sheets in different positions of an enclosed room with an area of 20m^3 are all > 3.00 , thus conforming to provisions on qualified disinfection in *Technical Standard for Disinfection* (2002).

11. The testing process is as follows: turn on Keenon® M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant, and turn on UV lamp and open spray nozzle (spray for 30min, act to 90min, and carry out UV disinfection for 90min). In accordance

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with the testing results, the logarithm values of sterilizing black spore variants of bacillus subtilis (ATCC 9372) on 30 steel sheets in different positions of an enclosed room with an area of 20m³ are all > 3.00, thus conforming to provisions on qualified disinfection in *Technical Standard for Disinfection* (2002).

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10-26, 2020

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Inspection Report

Sample Acceptance No.: 2020-XD-1052

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Name of Sample	Keenon® M2 Intelligent Disinfection Robot	Sample Accepted on	September 08, 2020
Inspection Item	Hydrogen Peroxide Content Determination	Inspection Completed on	September 18, 2020

I. Equipment

- Keenon® M2 Intelligent Disinfection Robot (machine; batch No.: KRM22009L20002).
- Pipette (1mL, 5mL, 25mL), burette (25mL acid burette), iodine flask (250mL), volumetric flask (100mL).
- Sulfuric acid solution (2mo/L), manganese sulfate solution (100g/L), distilled water.
- Potassium permanganate volumetric solution (0.02482mol/L).
- Matching disinfectant: Shuangxiong chemical hydrogen peroxide disinfectant (active composition: hydrogen peroxide; batch No.: 20200426).

II. Method

- Testing basis: Article 2.2.1.2.4 of *Technical Standard for Disinfection* (2002).
- Testing method: Precisely pipette 5.00mL of matching disinfectant of the sample, place into a volumetric flask with a volume of 100mL, and add water to dilute to corresponding scale. Precisely pipette 1.00mL of diluent, place into an iodine flask with a volume of 250mL, add 20mL of sulfuric acid with a concentration of 2mol/L and 3 drops of manganese sulfate with a concentration of 100g/L, and shake well. Titrate with potassium permanganate volumetric solution until the solution becomes pink, and record the consumption amount of potassium permanganate volumetric solution.
- Take 3 bottles of sample of the same batch, and repeatedly determine each bottle for twice.
- Ambient temperature of testing: 25.0°C, relative humidity (RH): 37.0%.

III. Result

In accordance with the result of test on matching disinfectant of Keenon® M2 Intelligent Disinfection Robot when the ambient temperature and RH are 25.0°C and 37.0% respectively, the average content of hydrogen peroxide is 426g/L, and the scope is 426g/L-427g/L (see the attached table).

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Attached Table: Hydrogen Peroxide Content Determination Result

Sample Serial No.	Test Serial No.	Consumption Amount of Volumetric Solution (mL)	Content of Active Composition (g/L)	Average Content (g/L)
1	1-1	10.10	426.4	427
	1-2	10.12	427.3	
2	2-1	10.08	425.6	426
	2-2	10.10	426.4	
3	3-1	10.06	424.7	426
	3-2	10.10	426.4	

IV. Conclusion

In accordance with the testing result, the average content of hydrogen peroxide in matching disinfectant of Keenon® M2 Intelligent Disinfection Robot is 426g/L.

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Name of Sample	<u>Keenon® M2 Intelligent Disinfection Robot</u>	Sample Accepted on	<u>September 08, 2020</u>
Inspection Item	<u>pH Value Determination</u>	Inspection Completed on	<u>September 18, 2020</u>

I. Equipment

1. Keenon® M2 Intelligent Disinfection Robot (machine; batch No.: KRM22009L20002).
2. pH meter (No.: DL011).
3. pH test paper, measuring cylinder, beaker.
4. Standard phosphate buffer (pH6.86, 25°C), standard potassium hydrogen phthalate buffer (pH4.00, 25°C).
5. Matching disinfectant: Shuangxiong chemical hydrogen peroxide disinfectant (active composition: hydrogen peroxide; batch No.: 20200426).

II. Method

1. Testing basis: Article 2.2.1.4 of *Technical Standard for Disinfection* (2002).
2. Testing method: Correct pH meter with standard phosphate buffer (pH6.86, 25°C) and standard potassium hydrogen phthalate buffer (pH4.00, 25°C). Take appropriate amount of matching disinfectant of the sample into a beaker, immerse the electrode into the tested solution for 4cm, and record its pH value after the displayed value becomes stable.
3. Take 3 bottles of sample of the same batch, and repeatedly determine each bottle for twice.
4. Ambient temperature of testing: 25.0°C, RH: 37.0%.

III. Result

In accordance with the result of test on matching disinfectant of Keenon® M2 Intelligent Disinfection Robot when the ambient temperature and RH are 25.0°C and 37.0% respectively, the average pH value is 4.28, and the scope is 4.27-4.28 (see the attached table).

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Attached Table: pH Value Determination Result

Sample Serial No.	Test Serial No.	pH Value	Average Value
1	1-1	4.28	4.28
	1-2	4.28	
2	2-1	4.27	4.27
	2-2	4.27	
3	3-1	4.28	4.28
	3-2	4.28	

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IV. Conclusion

In accordance with the testing result, the average pH value of matching disinfectant of Keenon® M2 Intelligent Disinfection Robot is 4.28.

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Name of Sample	Keenon® M2 Intelligent Disinfection Robot	Sample Accepted on	September 08, 2020
Inspection Item	Ultraviolet (UV) Irradiation Intensity	Inspection Completed on	September 09, 2020

I. Equipment

1. Tested instrument: Keenon® M2 Intelligent Disinfection Robot, specification/model: M2, manufacturing date/batch No.: KRM22009L20002.
2. ZY-010-type UV radiometer (No.: LH010).

II. Method

1. Testing basis: Article 2.1.5.4.3 of *Technical Standard for Disinfection* (2002).
2. Testing method: Place Keenon® M2 Intelligent Disinfection Robot in a room, fix the probe of the UV radiometer on the wall, and keep a vertical distance of 1m from the probe of the UV radiometer to the UV lamp of the Keenon® M2 Intelligent Disinfection Robot. Turn the machine on, and determine irradiation intensity 5min after the UV lamp has been turned on. Repeatedly determine for three times.
3. Ambient temperature of testing: 21.6°C, RH: 46%.

III. Result

Determination has been carried out 5min after the UV lamp of Keenon® M2 Intelligent Disinfection Robot 1m away from the probe of the radiometer has been turned on and become stable. In accordance with the result of 3 repeated tests, average UV irradiance intensity is 178μW/cm², and the corrected value is 233μW/cm² (see the attached table).

Attached Table: UV Irradiation Intensity Determination Result

Distance (m)	Irradiance Value of Three Repeated Tests (μW/cm²)			Average Value (μW/cm²)	Corrected Value* (μW/cm²)
	1	2	3		
1	180	179	176	178	233

Note: * Correction coefficient of UV radiometer is 1.31.

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IV. Conclusion

Determination has been carried out 5min after the UV lamp of Keenon® M2 Intelligent Disinfection Robot 1m away from the probe of the radiometer has been turned on and become stable. In accordance with the testing result, average UV irradiance intensity is $178\mu\text{W}/\text{cm}^2$, and the corrected value is $233\mu\text{W}/\text{cm}^2$.

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Name of Sample	<u>Keenon® M2 Intelligent Disinfection Robot</u>	Sample Accepted on	<u>September 08, 2020</u>
Inspection Item	<u>Neutralizer Identification Test</u>	Inspection Completed on	<u>September 21, 2020</u>

I. Equipment

1. Test strain: staphylococcus albus (8032), 7th generation.
2. Keenon® M2 Intelligent Disinfection Robot, specification/model: M2, manufacturing date/batch No.: KRM22009L20002.
3. Volume of aerosol chamber: 20m³.
4. Active composition and batch No. of disinfectant: hydrogen peroxide; 20200426.
5. Sampler: impinger with Stage-six sieve pore.
6. Culture medium: ordinary nutrient broth culture medium, ordinary nutrient agar culture medium, ordinary nutrient agar culture medium containing neutralizer (neutralizer: PBS containing sodium thiosulfate with a concentration of 0.09g/L and catalase with a concentration of 0.1g/L).
7. Biological safety cabinet, cultivation cabinet, vortex mixer, pipette, sterile equipment, electronic timer, etc.

II. Method

1. Testing basis: Annex C of WS/T 648-2019 *General Hygienic Requirement for Air Disinfecting Machine*.
2. Bacterial suspension preparation: Wash off the bacterial lawn on the slant of staphylococcus albus (8032) which has been cultured for 18h-24h with nutrient broth by utilizing the conventional method, filter with sterile gauze, and then carry out suitable dilution with nutrient broth culture medium to prepare bacterial suspension for testing.
3. Neutralizer identification test: The test has been carried out in four groups. Before the test, place plates containing the same neutralizer culture medium in 2 impingers with Stage-six sieve pore, and place a piece of nutrient agar culture medium plate in the 3rd sampler. Spray bacteria in left aerosol chamber, place Keenon® M2 Intelligent

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Disinfection Robot containing hydrogen peroxide disinfectant in right aerosol chamber, turn the Disinfection Robot on, open spray nozzle to spray for 6min, and act to 60min. First place one impinger with Stage-six sieve pore containing a piece of neutralizer plate in right aerosol chamber, sample at a gas flow rate of 28.3 L /min, and the sampling volume is 200 L (neutralization product group). 10min later, place the sampler containing neutralizer, neutralization products and a piece of ordinary nutrient agar plate in the aerosol chamber where bacteria are sprayed, and sample in sequence. After the bacteria have been sampled, place all plates for sampling bacteria, unused nutrient agar culture media of the same batch and nutrient agar culture medium plates containing neutralizer (negative control group) in a cultivation cabinet at 37°C to culture for 48 h. Later, record testing result, and calculate the rate of difference in the number of bacterial colonies among these three groups. Repeat the test for three times.

4. Ambient temperature of testing: 22.1°C-23.0°C; RH: 45%-46%.

III. Result

The neutralizer identification result of 3 repeated tests of turning Keenon® M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant on to spray hydrogen peroxide for disinfection is as follows: The average number of bacterial colonies growing in the 1st group is 150077cfu/m³, the average number of bacterial colonies growing in the 2nd group is 150548cfu/m³, the average number of bacterial colonies growing in the 3rd group is 163978cfu/m³, the difference rate among these three groups is 4.05%, and the 4th group is negative control group (see the attached table).

Attached Table: Result of Neutralizer Identification Test

Group No.	The Number of Bacterial Colonies Growing in Each Group in Three Tests (cfu/m ³)			The Average Number of Bacterial Colonies (cfu/m ³)	Difference Rate among Group 1, Group 2 and Group 3 (%)
	1	2	3		
1	119803	169632	160797	150077	4.05
2	124750	165745	161150	150548	
3	137119	173166	181648	163978	
4	0	0	0	0	

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IV. Conclusion

It is found after 3 repeated tests that ordinary nutrient agar culture medium containing neutralizer (neutralizer: PBS containing sodium thiosulfate with a concentration of 0.09g/L and catalase with a concentration of 0.1g/L) used can effectively neutralize the residual effect of hydrogen peroxide disinfection carried out by Keenon® M2 Intelligent Disinfection Robot on staphylococcus albus, and the culture medium's neutralizer and the neutralization products have no effect on the growth of staphylococcus albus basically.

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Name of Sample	<u>Keenon® M2 Intelligent Disinfection Robot</u>	Sample Accepted on	<u>September 08, 2020</u>
Inspection Item	<u>Air Disinfection Field Simulation Test</u>	Inspection Completed on	<u>September 26, 2020</u>

I. Equipment

1. Test strain: staphylococcus albus (8032), 7th generation.
2. Keenon® M2 Intelligent Disinfection Robot, specification/model: M2, manufacturing date/batch No.: KRM22009L20002.
3. Active composition and batch No. of disinfectant: hydrogen peroxide; 20200426.
4. Aerosol generator: BGI Collison MRE-type atomizer.
5. Volume of aerosol chamber: 20m³.
6. Sampling device: impinger with Stage-six sieve pore.
7. Culture medium: ordinary nutrient broth culture medium, ordinary nutrient agar culture medium, ordinary nutrient agar culture medium containing neutralizer (neutralizer: PBS containing sodium thiosulfate with a concentration of 0.09g/L and catalase with a concentration of 0.1g/L).
8. Biological safety cabinet, cultivation cabinet, vortex mixer, sterile equipment, electronic timer, etc.

II. Method

1. Testing basis: Article 2.1.3.4 of *Technical Standard for Disinfection* (2002).
2. Bacterial suspension preparation: Wash off the bacterial lawn on the slant of staphylococcus albus which has been cultured for 18h-24h with nutrient broth by utilizing the conventional method, filter with sterile gauze, then dilute to the required concentration with nutrient broth, and add to two aerosol generators evenly.
3. Testing method: Turn the computer on, start the aerosol chamber control software, start air conditioner control button for air supply and air return, adjust the temperature and RH in two aerosol chambers with a volume of 20m³ well, place Keenon® M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant in right aerosol chamber, connect aerosol generator to bacteria spraying pipe of aerosol chamber closely, close the door of aerosol chamber, and start the aerosol bacteria spraying button of aerosol chamber control software. When the pressure is 30PSI, the aerosol generator sprays bacteria to two

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aerosol chambers simultaneously for 5min. At the same time of spraying, the software automatically turns mixing fan on and is set to continue mixing for 10min after spraying comes to an end. After bacteria spraying and mixing come to an end, let stand for 5min, place the sampler fully loaded with plates in the center of aerosol chamber at 1m, and carry out pre-disinfection sampling of two aerosol chambers respectively (sampling flow rate: 28.3L/min). Turn Keenon® M2 Intelligent Disinfection Robot on, open spray nozzle to spray for 6min, let stand to 60min, act to the preset time, and later, carry out post-disinfection sampling as per the above method. Take plates in the sampler out, place in a cultivation cabinet at 37°C to culture for 48h. Later, count the number of bacteria, and calculate the number of viable bacteria in the air, natural decay rate and sterilization rate under different conditions. Repeat the test for three times.

5. Ambient temperature of testing: 22.4°C-23.4°C, RH: 45%-47%.

III. Result

The testing process is as follows: When the temperature and RH of the aerosol chamber are 22 °C -24 °C and 54% respectively, turn Keenon® M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant on, open spray nozzle to spray for 6min, and act to 60min. In accordance with the testing result of three repeated tests, the rate of sterilizing staphylococcus albus in the air of the aerosol chamber is 100.00%. At this time, the natural decay rate of staphylococcus albus in the air of the control aerosol chamber is below 48.47% (see the attached table).

Attached Table: Result of Air Disinfection Field Simulation Test

Test Serial No.	Action Time (min)	Control Group		Test Group	
		The Number of Viable Bacteria (cfu/m ³)	Natural Decay Rate (%)	The Number of Viable Bacteria (cfu/m ³)	Sterilization Rate (%)
1	0	138179	/	143834	/
	30	104960	24.04	0	100.00
	60	80929	41.43	0	100.00
2	0	138533	/	145247	/
	30	101426	26.79	0	100.00
	60	71387	48.47	0	100.00
3	0	175640	/	180587	/
	30	135352	22.94	7	100.00
	60	95065	45.88	0	100.00

Note: No bacteria grow in the negative control group.

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IV. Conclusion

The testing process is as follows: Turn Keenon[®] M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant on, open spray nozzle to spray for 6min, and act to 60min. In accordance with the testing result, the rates of sterilizing staphylococcus albus in the air of the aerosol chamber in three repeated tests are all $> 99.90\%$, conforming to provisions on qualified disinfection in *Technical Standard for Disinfection* (2002).

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Name of Sample	<u>Keenon® M2 Intelligent Disinfection Robot</u>	Sample Accepted on	<u>September 08, 2020</u>
Inspection Item	<u>Air Disinfection Field Test</u>	Inspection Completed on	<u>October 02, 2020</u>

I. Equipment

1. Test strain: natural bacteria in the air.
2. Keenon® M2 Intelligent Disinfection Robot, specification/model: M2, manufacturing date/batch No.: KRM22009L20002.
3. Active composition and batch No. of disinfectant: hydrogen peroxide; 20200426.
4. On-site volume: 38m³.
5. Sampling device: impinger with Stage-six sieve pore, Quick Take 30 microbial sampler.
6. Culture medium: ordinary nutrient broth culture medium, ordinary nutrient agar culture medium, ordinary nutrient agar culture medium containing neutralizer (neutralizer: PBS containing sodium thiosulfate with a concentration of 0.09g/L and catalase with a concentration of 0.1g/L).
7. Biological safety cabinet, cultivation cabinet, vortex mixer, sterile equipment, electronic timer, etc.

II. Method

1. Inspection basis: Article 2.1.3.5 of *Technical Standard for Disinfection* (2002).
2. Testing method: Place Keenon® M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant in the room, place the sampling device in the center of the room at 1m, and connect sampling pipe well. Before the test, sample at a flow rate of 28.3L/min for 5min, which is the control group. Turn Keenon® M2 Intelligent Disinfection Robot on, open spray nozzle to spray for 6min, act to 60min, and act to the preset time. Sample as per the sampling method utilized in the control group for 5min, which is the test group. After sampling, take plates out, and place in a cultivation cabinet at 37°C to culture for 48h. Later, count the number of bacterial colonies, and calculate the total number of bacteria in the air and decay rate. Repeat the test for three times.
3. Ambient temperature of testing: 22.1°C-24.0°C; RH: 46%-47%.

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III. Result

The testing process is as follows: When the ambient temperature and RH are 22.1°C-24.0°C and 46%-47% respectively, turn Keenon® M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant on, open spray nozzle to spray for 6min, and act to 60min. In accordance with the testing result of three repeated tests, the decay rate scope of natural bacteria in the air of the room with a volume of 38m³ is 100.00% (see the attached table).

Attached Table: Result of Air Disinfection Field Test

Test Serial No.	The Number of Bacterial Colonies in the Control Group before Disinfection (cfu/m ³)	The Number of Residual Bacterial Colonies after Disinfection (cfu/m ³)	Decay Rate (%)
1	2891	0	100.00
2	2997	0	100.00
3	1838	0	100.00

IV. Conclusion

The testing process is as follows: Turn Keenon® M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant on, open spray nozzle to spray for 6min, and act to 60min. In accordance with the testing result, the decay rates of natural bacteria in the air of the room with a volume of 38m³ in three repeated tests are all >90%, conforming to provisions on qualified disinfection in *Technical Standard for Disinfection* (2002).

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Inspection Item	<u>Air Disinfection Field Simulation Test</u>	Inspection Completed on	<u>September 29, 2020</u>

I. Equipment

1. Test strain: staphylococcus albus (8032), 7th generation.
2. Keenon® M2 Intelligent Disinfection Robot, specification/model: M2, manufacturing date/batch No.: KRM22009L20002.
3. UV irradiation intensity: $233\mu\text{W}/\text{cm}^2$.
4. Aerosol generator: BGI Collison MRE-type atomizer.
5. Volume of aerosol chamber: 20m^3 .
6. Sampling device: impinger with Stage-six sieve pore.
7. Culture medium: ordinary nutrient broth culture medium, ordinary nutrient agar culture medium.
8. Biological safety cabinet, cultivation cabinet, vortex mixer, sterile equipment, electronic timer, etc.

II. Method

1. Testing basis: Article 2.1.3.4 of *Technical Standard for Disinfection* (2002).
2. Bacterial suspension preparation: Wash off the bacterial lawn on the slant of staphylococcus albus which has been cultured for 18h-24h with nutrient broth by utilizing the conventional method, filter with sterile gauze, then dilute to the required concentration with nutrient broth, and add to two aerosol generators evenly.
3. Testing method: Turn the computer on, start the aerosol chamber control software, start air conditioner control button for air supply and air return, adjust the temperature and RH in two aerosol chambers with a volume of 20m^3 well, and place Keenon® M2 Intelligent Disinfection Robot in right aerosol chamber. Connect aerosol generator to bacteria spraying pipe of aerosol chamber closely, close the door of aerosol chamber, and start the aerosol bacteria spraying button of aerosol chamber control software. When the pressure is 30PSI, the aerosol generator sprays bacteria to two aerosol chambers simultaneously

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for 5min. At the same time of spraying, the software automatically turns mixing fan on and is set to continue mixing for 10min after spraying comes to an end. After bacteria spraying and mixing come to an end, let stand for 5min, place the sampler fully loaded with plates in the center of aerosol chamber at 1m, and carry out pre-disinfection sampling of two aerosol chambers respectively (sampling flow rate: 28.3L/min). Turn Keenon® M2 Intelligent Disinfection Robot on, turn UV lamp on to disinfect for 20min, act to the preset time, and later, carry out post-disinfection sampling as per the above method. Take plates in the sampler out, place in a cultivation cabinet at 37°C to culture for 48h. Later, count the number of bacteria, and calculate the number of viable bacteria in the air, natural decay rate and sterilization rate under different conditions. Repeat the test for three times.

4. Ambient temperature of testing: 20.4°C-23.0°C; RH: 45%-47%.

III. Result

The testing process is as follows: When the temperature and RH of the aerosol chamber are 23°C-24°C and 52%-55% respectively, turn Keenon® M2 Intelligent Disinfection Robot on, turn UV lamp on to disinfect for 20min. In accordance with the testing result of three repeated tests, the rate of sterilizing staphylococcus albus in the air of the aerosol chamber is 100.00%. At this time, the natural decay rate of staphylococcus albus in the air of the control aerosol chamber is below 28.97% (see the attached table).

Attached Table: Result of Air Disinfection Field Simulation Test

Test Serial No.	Action Time (min)	Control Group		Test Group	
		The Number of Viable Bacteria (cfu/m ³)	Natural Decay Rate (%)	The Number of Viable Bacteria (cfu/m ³)	Sterilization Rate (%)
1	0	200024	/	183061	/
	10	176700	11.66	21	99.99
	20	157970	21.02	0	100.00
2	0	164684	/	183061	/
	10	142420	13.52	49	99.97
	20	116975	28.97	0	100.00
3	0	128284	/	141713	/
	10	114502	10.74	42	99.97
	20	97892	23.69	0	100.00

Note: No bacteria grow in the negative control group.

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IV. Conclusion

The testing process is as follows: Turn Keenon® M2 Intelligent Disinfection Robot on, turn UV lamp on to disinfect for 20min. In accordance with the testing result, the rates of sterilizing staphylococcus albus in the air of the aerosol chamber in three repeated tests are all > 99.90%, conforming to provisions on qualified disinfection in *Technical Standard for Disinfection* (2002).

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Inspection Report

Sample Acceptance No.: 2020-XD-1052

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Name of Sample	Keenon® M2 Intelligent Disinfection Robot	Sample Accepted on	September 08, 2020
Inspection Item	Air Disinfection Field Test	Inspection Completed on	September 23, 2020

I. Equipment

1. Test strain: natural bacteria in the air.
2. Keenon® M2 Intelligent Disinfection Robot, specification/model: M2, manufacturing date/batch No.: KRM22009L20002.
3. UV irradiation intensity: $233\mu\text{W}/\text{cm}^2$.
4. On-site volume: 32m^3 .
5. Sampling device: impinger with Stage-six sieve pore, Quick Take 30 microbial sampler.
6. Culture medium: ordinary nutrient broth culture medium, ordinary nutrient agar culture medium, ordinary nutrient agar culture medium containing neutralizer (neutralizer: PBS containing sodium thiosulfate with a concentration of $0.09\text{g}/\text{L}$ and catalase with a concentration of $0.1\text{g}/\text{L}$).
7. Biological safety cabinet, cultivation cabinet, vortex mixer, sterile equipment, electronic timer, etc.

II. Method

1. Inspection basis: Article 2.1.3.5 of *Technical Standard for Disinfection* (2002).
2. Testing method: Place Keenon® M2 Intelligent Disinfection Robot in the room, place the sampler in the center of the room at 1m, and connect sampling pipe well. Before the test, sample at a flow rate of $28.3\text{L}/\text{min}$ for 5min, which is the control group. Turn Keenon® M2 Intelligent Disinfection Robot on, turn UV lamp on to disinfect for 20min, and act to the preset time. Sample as per the sampling method utilized in the control group for 5min, which is the test group. After sampling, take plates out, and place in a cultivation cabinet at 37°C to culture for 48h. Later, count the number of colonies, and calculate the total number of bacteria in the air and decay rate. Repeat the test for three times.
3. Ambient temperature of testing: 23.0°C - 24.1°C ; RH: 45%-47%.

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III. Result

The testing process is as follows: When the ambient temperature and RH are 23.0°C-24.1°C and 45%-47% respectively, turn Keenon® M2 Intelligent Disinfection Robot on, turn UV lamp on to disinfect for 20min. In accordance with the testing result of three repeated tests, the decay rate scope of natural bacteria in the air of the room with a volume of 32m³ is 98.31%-99.26% (see the attached table).

Attached Table: Result of Air Disinfection Field Test

Test Serial No.	The Number of Bacterial Colonies in the Control Group before Disinfection (cfu/m ³)	The Number of Residual Bacterial Colonies after Disinfection (cfu/m ³)	Decay Rate (%)
1	2855	21	99.26
2	2064	28	98.64
3	2481	42	98.31

IV. Conclusion

The testing process is as follows: Turn Keenon® M2 Intelligent Disinfection Robot on, turn UV lamp on to disinfect for 20min. In accordance with the testing result, the decay rates of natural bacteria in the air of the room with a volume of 32m³ in three repeated tests are all >90%, conforming to provisions on qualified disinfection in *Technical Standard for Disinfection* (2002).

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Name of Sample	<u>Keenon® M2 Intelligent Disinfection Robot</u>	Sample Accepted on	<u>September 08, 2020</u>
Inspection Item	<u>Air Disinfection Field Simulation Test</u>	Inspection Completed on	<u>October 02, 2020</u>

I. Equipment

1. Test strain: staphylococcus albus (8032), 7th generation.
2. Keenon® M2 Intelligent Disinfection Robot, specification/model: M2, manufacturing date/batch No.: KRM22009L20002.
3. Active composition and batch No. of disinfectant: hydrogen peroxide, 20200426; UV irradiation intensity: 233μW/cm².
4. Aerosol generator: BGI Collison MRE-type atomizer.
5. Volume of aerosol chamber: 20m³.
6. Sampling device: impinger with Stage-six sieve pore.
7. Culture medium: ordinary nutrient broth culture medium, ordinary nutrient agar culture medium.
8. Biological safety cabinet, cultivation cabinet, vortex mixer, sterile equipment, electronic timer, etc.

II. Method

1. Testing basis: Article 2.1.3.4 of *Technical Standard for Disinfection* (2002).
2. Bacterial suspension preparation: Wash off the bacterial lawn on the slant of staphylococcus albus which has been cultured for 18h-24h with nutrient broth by utilizing the conventional method, filter with sterile gauze, then dilute to the required concentration with nutrient broth, and add to two aerosol generators evenly.
3. Testing method: Turn the computer on, start the aerosol chamber control software, start air conditioner control button for air supply and air return, adjust the temperature and RH in two aerosol chambers with a volume of 20m³ well, and place Keenon® M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant in right aerosol chamber. Connect aerosol generator to bacteria spraying pipe of aerosol chamber closely, close the door of aerosol chamber, and start the aerosol bacteria spraying button of aerosol chamber control software. When the pressure is 30PSI, the aerosol generator sprays bacteria to two aerosol chambers simultaneously for 5min. At the same time of spraying, the software automatically turns mixing fan on and is set to continue mixing for 10min after

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spraying comes to an end. After bacteria spraying and mixing come to an end, let stand for 5min, place the sampler fully loaded with plates in the center of aerosol chamber at 1m, and carry out pre-disinfection sampling of two aerosol chambers respectively (sampling flow rate: 28.3L/min). Turn Keenon® M2 Intelligent Disinfection Robot on, open spray nozzle and turn UV lamp on simultaneously (spray for 6min, act to 30min, and carry out UV disinfection for 10min at the same time), act to the preset time, and later, carry out post-disinfection sampling as per the above method. Take plates in the sampler out, place in a cultivation cabinet at 37°C to culture for 48h. Later, count the number of bacteria, and calculate the number of viable bacteria in the air, natural decay rate and sterilization rate under different conditions. Repeat the test for three times.

5. Ambient temperature of testing: 22.5°C-24.6°C; RH: 46%-47%.

III. Result

The testing process is as follows: When the temperature and RH of the aerosol chamber are 22°C-23°C and 53%-55% respectively, turn Keenon® M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant on, open spray nozzle and turn UV lamp on simultaneously (spray for 6min, act to 30min, and carry out UV disinfection for 10min at the same time). In accordance with the testing result of three repeated tests, the rate of sterilizing staphylococcus albus in the air of the aerosol chamber is 100.00%. At this time, the natural decay rate of staphylococcus albus in the air of the control aerosol chamber is below 35.26% (see the attached table).

Attached Table: Result of Air Disinfection Field Simulation Test

Test Serial No.	Action Time (min)	Control Group		Test Group	
		The Number of Viable Bacteria (cfu/m ³)	Natural Decay Rate (%)	The Number of Viable Bacteria (cfu/m ³)	Sterilization Rate (%)
1	0	189422	/	195784	/
	15	154082	18.66	0	100.00
	30	122630	35.26	0	100.00
2	0	161504	/	177407	/
	15	128638	20.35	0	100.00
	30	108140	33.04	0	100.00
3	0	148781	/	153729	/
	15	114855	22.80	0	100.00
	30	97538	34.44	0	100.00

Note: No bacteria grow in the negative control group.

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IV. Conclusion

The testing process is as follows: Turn Keenon[®] M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant on, open spray nozzle and turn UV lamp on simultaneously (spray for 6min, act to 30min, and carry out UV disinfection for 10min at the same time). In accordance with the testing result, the rates of sterilizing staphylococcus albus in the air of the aerosol chamber in three repeated tests are all $> 99.90\%$, conforming to provisions on qualified disinfection in *Technical Standard for Disinfection* (2002).

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Sample Acceptance No.: 2020-XD-1052

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Name of Sample	<u>Keenon® M2 Intelligent Disinfection Robot</u>	Sample Accepted on	<u>September 08, 2020</u>
Inspection Item	<u>Air Disinfection Field Test</u>	Inspection Completed on	<u>October 10, 2020</u>

I. Equipment

1. Test strain: natural bacteria in the air.
2. Keenon® M2 Intelligent Disinfection Robot, specification/model: M2, manufacturing date/batch No.: KRM22009L20002.
3. Active composition and batch No. of disinfectant: hydrogen peroxide, 20200426; UV irradiation intensity: $233\mu\text{W}/\text{cm}^2$.
4. On-site volume: 40m^3 .
5. Sampling device: impinger with Stage-six sieve pore, Quick Take 30 microbial sampler.
6. Culture medium: ordinary nutrient broth culture medium, ordinary nutrient agar culture medium, ordinary nutrient agar culture medium containing neutralizer (neutralizer: PBS containing sodium thiosulfate with a concentration of $0.09\text{g}/\text{L}$ and catalase with a concentration of $0.1\text{g}/\text{L}$).
7. Biological safety cabinet, cultivation cabinet, vortex mixer, sterile equipment, electronic timer, etc.

II. Method

1. Inspection basis: Article 2.1.3.5 of *Technical Standard for Disinfection* (2002).
2. Testing method: Place Keenon® M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant in the room, place the sampling device in the center of the room at 1m, and connect sampling pipe well. Before the test, sample at a flow rate of $28.3\text{L}/\text{min}$ for 5min, which is the control group. Turn Keenon® M2 Intelligent Disinfection Robot on, open spray nozzle and turn UV lamp on simultaneously (spray for 6min, act to 30min, and carry out UV disinfection for 10min at the same time), and act to the preset time. Sample as per the sampling method utilized in the control group for 5min, which is the test group. After sampling, take plates out, and place in a cultivation cabinet at 37°C to culture for 48h. Later, count the number of bacterial colonies, and calculate the total number of bacteria in the air and decay rate. Repeat the test for three times.
3. Ambient temperature of testing: 21.7°C - 23.4°C ; RH: 45%-47%.

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III. Result

The testing process is as follows: When the ambient temperature and RH are 21.7°C-23.4°C and 45%-47% respectively, turn Keenon® M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant on, open spray nozzle and turn UV lamp on simultaneously (spray for 6min, act to 30min, and carry out UV disinfection for 10min at the same time). In accordance with the testing result of three repeated tests, the decay rate scope of natural bacteria in the air of the room with a volume of 40m³ is 100.00% (see the attached table).

Attached Table: Result of Air Disinfection Field Test

Test Serial No.	The Number of Bacterial Colonies in the Control Group before Disinfection (cfu/m ³)	The Number of Residual Bacterial Colonies after Disinfection (cfu/m ³)	Decay Rate (%)
1	2537	0	100.00
2	2587	0	100.00
3	2544	0	100.00

IV. Conclusion

The testing process is as follows: Turn Keenon® M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant on, open spray nozzle and turn UV lamp on simultaneously (spray for 6min, act to 30min, and carry out UV disinfection for 10min at the same time). In accordance with the testing result, the decay rates of natural bacteria in the air of the room with a volume of 40m³ in three repeated tests are all >90%, conforming to provisions on qualified disinfection in *Technical Standard for Disinfection* (2002).

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Sample Acceptance No.: 2020-XD-1052

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Name of Sample	<u>Keenon® M2 Intelligent Disinfection Robot</u>	Sample Accepted on	<u>September 08, 2020</u>
Inspection Item	<u>Neutralizer Identification Test</u>	Inspection Completed on	<u>September 21, 2020</u>

I. Equipment

1. Test strain: black spore variants of bacillus subtilis (ATCC 9372).
2. Keenon® M2 Intelligent Disinfection Robot, specification/model: M2, manufacturing date/batch No.: KRM22009L20002.
3. Active composition and batch No. of disinfectant: hydrogen peroxide, 20200426.
4. Composition and concentration of neutralizer: PBS solution containing sodium thiosulfate with a concentration of 5g/L and catalase with a concentration of 0.1g/L.
5. Diluent: tryptone physiology solution (TPS).
6. Culture medium: tryptic soy agar (TSA), tryptic soy broth (TSB).
7. Test carrier: sterile round stainless steel sheet (diameter: 12mm, thickness: 0.5mm).
8. Biological safety cabinet, cultivation cabinet, thermostat, vortex mixer, sterile equipment, electronic timer, etc.

II. Method

1. Testing basis: Article 2.2.1.2.4 and Article 2.1.1.5.6 of *Technical Standard for Disinfection* (2002).
2. Preparation of bacterial carrier: Dilute black spore variants of bacillus subtilis (ATCC 9372) suspension with TSB, pipette 10 μ L of spore suspension, add to the steel sheet, and dry at 37°C for 15min as a standby. Prepare immediately before use.
3. Neutralizer identification test:
Before disinfection, tape the bacterial carrier to the enclosed room with a volume of 20m³, turn Keenon® M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant on, and act for 20min. Repeat the test for three times.
4. Ambient temperature of testing: 22.6°C-23.0°C, RH: 45%-46%.

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III. Result

The identification result of 3 repeated tests on aerosol neutralizer generated from spraying hydrogen peroxide disinfectant contained in Keenon® M2 Intelligent Disinfection Robot is as follows: The average number of bacterial colonies growing in the 1st group is 82cfu/piece, and the average number of bacterial colonies growing in the 2nd group is 1.37×10^3 cfu/piece. The average numbers of bacterial colonies growing in the 3rd, 4th and 5th groups are 8.78×10^5 cfu/piece, 8.52×10^5 cfu/piece and 9.57×10^5 cfu/piece respectively, and the difference rate among these three groups is 5.46%, and the 6th group is negative control group (see the attached table).

Attached Table: Result of Neutralizer Identification Test

Group No.	The Number of Bacterial Colonies Growing in Each Group in Three Tests (cfu/Piece)			Average Value (cfu/Piece)	Difference Rate among Group 3, Group 4 and Group 5 (%)
	1	2	3		
1	75	60	1.10×10^2	82	
2	1.07×10^3	8.00×10^2	2.25×10^3	1.37×10^3	
3	7.20×10^5	5.65×10^5	1.35×10^6	8.78×10^5	5.46
4	7.65×10^5	5.70×10^5	1.22×10^6	8.52×10^5	
5	8.50×10^5	6.40×10^5	1.38×10^6	9.57×10^5	
6	0	0	0	0	

IV. Conclusion

In accordance with the testing result, PBS neutralizer solution containing sodium thiosulfate with a concentration of 5g/L and catalase with a concentration of 0.1g/L used can effectively neutralize the residual effect of aerosol generated from spraying hydrogen peroxide disinfectant contained in Keenon® M2 Intelligent Disinfection Robot on black spore variants of bacillus subtilis (ATCC 9372), and the neutralizer solution and the neutralization product solution have no adverse effect on the culture medium and have no effect on the growth of black spore variants of bacillus subtilis (ATCC 9372) basically.

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Inspection Report

Sample Acceptance No.: 2020-XD-1052

Name of Sample	<u>Keenon® M2 Intelligent Disinfection Robot</u>	Sample Accepted on	<u>September 08, 2020</u>
Inspection Item	<u>Object Surface Disinfection Field Simulation Test</u>	Inspection Completed on	<u>September 26, 2020</u>

I. Equipment

1. Test strain: black spore variants of bacillus subtilis (ATCC 9372).
2. Keenon® M2 Intelligent Disinfection Robot, specification/model: M2, manufacturing date/batch No.: KRM22009L20002.
3. Active composition and batch No. of disinfectant: hydrogen peroxide, 20200426.
4. Volume of the enclosed room: 20m³.
5. Composition and concentration of neutralizer: PBS solution containing sodium thiosulfate with a concentration of 5g/L and catalase with a concentration of 0.1g/L.
6. Diluent: phosphate buffer containing 0.1% of Tween-80 (PBS, 0.03M, pH 7.2).
7. Culture medium: tryptic soy agar (TSA), tryptic soy broth (TSB).
8. Test carrier: sterile round stainless steel sheet (diameter: 12mm, thickness: 0.5mm).
9. Biological safety cabinet, cultivation cabinet, thermostat, vortex mixer, sterile equipment, electronic timer, etc.

II. Method

1. Testing basis: refer to Article 2.1.1.7.5(1) and Article 2.1.2.9 of *Technical Standard for Disinfection* (2002).
2. Testing method: Take 10µl of TSB suspension of black spore variants of bacillus subtilis (ATCC 9372), drop on the steel sheet evenly, place in a cultivation cabinet at 37°C to dry (about 15min), and prepare bacterial carriers (hereinafter referred to as bacterial carrier) as standbys. Before test, arrange testing points on representative surfaces of different positions in the enclosed chamber, and fix bacterial carriers at corresponding

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positions with tape. Select 30 representative positions in total to hang bacterial carriers. Pour hydrogen peroxide disinfectant into Keenon® M2 Intelligent Disinfection Robot, turn Keenon® M2 Intelligent Disinfection Robot on, open spray nozzle to spray for 30min, and act to 90min. After disinfection comes to an end, take bacterial carriers at each sampling point down, transfer to the test tube containing 5mL of neutralizer, knock for 80 times, and act for 10min. Later, pipette 1.0 ml respectively, and inoculate the plate in duplicate, which is the test group. Take 3 pieces of unsterilized bacterial carriers of the same batch, transfer to the test tube containing 5mL of neutralizer respectively, knock for 80 times, then carry out 10-fold serial dilution with diluent, and take sample solution for viable bacteria count culture, which is the control group of the number of bacteria. Take the same batch of neutralizer PBS culture medium for inoculation test which hasn't been inoculated, and culture as per the same method utilized in the test group, which is the negative control group. After inoculating plates in each group, pour TSA agar. After condensation, place in a cultivation cabinet at 37°C to culture for 72h, and count the number of viable bacteria.

3. Ambient temperature of testing: 23.1°C, relative humidity (RH): 46%.

III. Result

The testing process is as follows: When the ambient temperature and RH are 23.1°C and 46% respectively, turn Keenon® M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant on, open spray nozzle to spray for 30min, and act to 90min. In accordance with the testing result, the logarithm values of sterilizing black spore variants of bacillus subtilis (ATCC 9372) on 30 steel sheets at different positions in the enclosed room with a volume of 20m³ are all >3.00 (see the attached table).

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Attached Table: Keenon® M2 Intelligent Disinfection Robot Disinfection Field Simulation Test

Point Arrangement Position	The Average Number of Bacteria in the Test Group (cfu/Piece)	The Average Number and Scope of Bacteria in the Control Group (cfu/Piece)	Sterilization Logarithm Value	
Left Side of the Room	Top Left Corner	0	5.90	
	Bottom Left Corner	0	5.90	
	Top Right Corner	0	5.90	
	Bottom Right Corner	0	5.90	
	Center	0	5.90	
	Top Center	0	5.90	
	Bottom Center	0	5.90	
	Top Left Corner	0	5.90	
	Bottom Left Corner	0	5.90	
	Top Right Corner	0	5.90	
Right Side of the Room	Bottom Right Corner	0	5.90	
	Center	0	5.90	
	Top Center	0	5.90	
	Bottom Center	0	5.90	
	Top Left Corner	0	5.90	
	Bottom Left Corner	0	5.90	
	Top Right Corner	0	5.90	
	Bottom Right Corner	0	5.90	
	Center	0	5.90	
	Top Center	0	5.90	
Front Side of the Room	Bottom Center	0	5.90	
	Top Left Corner	0	5.90	
	Bottom Left Corner	0	7.93×10 ⁵ (7.55×10 ⁵ -8.50×10 ⁵)	5.90
	Top Right Corner	0	5.90	
	Bottom Right Corner	0	5.90	
	Center	0	5.90	
	Top Center	0	5.90	
	Bottom Center	0	5.90	
	Top Left Corner	0	5.90	
	Bottom Left Corner	0	5.90	
Back Side of the Room	Top Right Corner	0	5.90	
	Bottom Right Corner	0	5.90	
	Center	0	5.90	
	Top Center	0	5.90	
	Bottom Center	0	5.90	
	Center of Floor	0	5.90	
	On the Machine	0	5.90	

Note: No bacteria grow in the negative control group.

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IV. Conclusion

The testing process is as follows: Turn Keenon® M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant on, open spray nozzle to spray for 30min, and act to 90min. In accordance with the testing result, the logarithm values of sterilizing black spore variants of bacillus subtilis (ATCC 9372) on 30 steel sheets at different positions in the enclosed room with a volume of 20m³ are all > 3.00, conforming to provisions on qualified disinfection in *Technical Standard for Disinfection* (2002).

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Name of Sample	Keenon® M2 Intelligent Disinfection Robot	Sample Accepted on	September 08, 2020
Inspection Item	Object Surface Disinfection Field Simulation Test	Inspection Completed on	September 24, 2020

I. Equipment

1. Test strain: black spore variants of bacillus subtilis (ATCC 9372).
2. Keenon® M2 Intelligent Disinfection Robot, specification/model: M2, manufacturing date/batch No.: KRM22009L20002.
3. Active composition and batch No. of disinfectant: hydrogen peroxide, 20200426.
4. UV irradiance of the lamp of the machine: 233 μ W/cm².
5. Volume of the enclosed room: 20m³.
6. Composition and concentration of neutralizer: PBS solution containing sodium thiosulfate with a concentration of 5g/L and catalase with a concentration of 0.1g/L.
7. Diluent: phosphate buffer containing 0.1% of Tween-80 (PBS, 0.03M, pH 7.2).
8. Culture medium: tryptic soy agar (TSA), tryptic soy broth (TSB).
9. Test carrier: sterile round stainless steel sheet (diameter: 12mm, thickness: 0.5mm).
10. Biological safety cabinet, cultivation cabinet, thermostat, vortex mixer, sterile equipment, electronic timer, etc.

II. Method

1. Testing basis: refer to Article 2.1.1.7.5(1) and Article 2.1.2.9 of *Technical Standard for Disinfection* (2002).
2. Testing method: Take 10 μ l of TSB suspension of black spore variants of bacillus subtilis (ATCC 9372), drop on the steel sheet evenly, place in a cultivation cabinet at 37°C to dry (about 15min), and prepare bacterial carriers (hereinafter referred to as bacterial carrier) as standbys. Before test, arrange testing points on representative surfaces of different positions in the enclosed chamber, and fix bacterial carriers at corresponding positions with tape. Select 30 representative positions in total to hang

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bacterial carriers. Pour hydrogen peroxide disinfectant into Keenon® M2 Intelligent Disinfection Robot, turn Keenon® M2 Intelligent Disinfection Robot on, and turn UV lamp on and open spray nozzle simultaneously (spray for 30min, act to 90min, and carry out UV disinfection for 90min at the same time). After disinfection comes to an end, take bacterial carriers at each sampling point down, transfer to the test tube containing 5mL of neutralizer, knock for 80 times, and act for 10min. Later, pipette 1.0 ml respectively, and inoculate the plate in duplicate, which is the test group. Take 3 pieces of unsterilized bacterial carriers of the same batch, transfer to the test tube containing 5mL of neutralizer respectively, knock for 80 times, then carry out 10-fold serial dilution with diluent, and take sample solution for viable bacteria count culture, which is the control group of the number of bacteria. Take the same batch of neutralizer PBS culture medium for inoculation test which hasn't been inoculated, and culture as per the same method utilized in the test group, which is the negative control group. After inoculating plates in each group, pour TSA agar. After condensation, place in a cultivation cabinet at 37°C to culture for 72h, and count the number of viable bacteria.

3. Ambient temperature of testing: 23.4°C, relative humidity (RH): 47%.

III. Result

The testing process is as follows: When the ambient temperature and RH are 23.4°C and 47% respectively, turn Keenon® M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant on, and turn UV lamp on and open spray nozzle simultaneously (spray for 30min, act to 90min, and carry out UV disinfection for 90min at the same time). In accordance with the testing result, the logarithm values of sterilizing black spore variants of bacillus subtilis (ATCC 9372) on 30 steel sheets at different positions in the enclosed room with a volume of 20m³ are all >3.00 (see the attached table).

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Attached Table: Keenon® M2 Intelligent Disinfection Robot Disinfection Field Simulation Test

Point Arrangement Position	The Average Number of Bacteria in the Test Group	The Average Number and Scope of Bacteria in the Control Group (cfu/Piece)	Sterilization Logarithm Value
Left Side of the Room	Top Left Corner	0	6.00
	Bottom Left Corner	0	6.00
	Top Right Corner	0	6.00
	Bottom Right Corner	0	6.00
	Center	0	6.00
	Top Center	0	6.00
	Bottom Center	0	6.00
Right Side of the Room	Top Left Corner	0	6.00
	Bottom Left Corner	0	6.00
	Top Right Corner	0	6.00
	Bottom Right Corner	0	6.00
	Center	0	6.00
	Top Center	0	6.00
	Bottom Center	0	6.00
Front Side of the Room	Top Left Corner	0	6.00
	Bottom Left Corner	0	6.00
	Top Right Corner	0	6.00
	Bottom Right Corner	0	6.00
	Center	0	6.00
	Top Center	0	6.00
	Bottom Center	0	6.00
Back Side of the Room	Top Left Corner	0	6.00
	Bottom Left Corner	0	6.00
	Top Right Corner	0	6.00
	Bottom Right Corner	0	6.00
	Center	0	6.00
	Top Center	0	6.00
	Bottom Center	0	6.00
Center of Floor On the Machine	0	1.01×10 ⁶ (9.75×10 ⁵ -1.08×10 ⁶)	6.00

Note: No bacteria grow in the negative control group.

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IV. Conclusion

The testing process is as follows: Turn Keenon® M2 Intelligent Disinfection Robot containing hydrogen peroxide disinfectant on, and turn UV lamp on and open spray nozzle simultaneously (spray for 30min, act to 90min, and carry out UV disinfection for 90min at the same time). In accordance with the testing result, the logarithm values of sterilizing black spore variants of bacillus subtilis (ATCC 9372) on 30 steel sheets at different positions in the enclosed room with a volume of 20m³ are all > 3.00, conforming to provisions on qualified disinfection in *Technical Standard for Disinfection* (2002).

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Authorized Signatory _____

张子福

Finally Checked on: _____

10-26, 2020

Special Seal for Inspection and Testing

