Product Service

Testing Report

TRF PPP:CCB 22021A:2023

TUV SUD Floor Cleaner Cleaning Efficiency and Sterilization Performance Test Report

Report reference No.:	704012300868-00
Date of issue:	2023-09-05
Project handler:	Jiajing JIN
Testing laboratory:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch Testing Center TÜV SÜD Commodity Testing (Shanghai) Co., Ltd.
Address:	Building B/C, No. 1999 Duhui Road, Shanghai
Location(s) of Testing:	Same as above
Client:	Dreame Trading (Tianjin) Co., Ltd.
Client number:	109935
Address:	1-1-2112, South District, Financial and Trade Center, No. 6975 Asia Road, Tianjin Pilot Free Trade Zone (Dongjiang Bonded Port Area)
Contact person:	Ms. Mo Wangjuan
Standard:	This test report is based on the following requirements PPP:CCB 22021A:2023
Version of TRF:	TRF PPP:CCB 22021A:2023 Rev.1
TRF originated by:	TUV SUD Product Service, Mr. Chenghong ZHU
Copyright blank test report:	This test report is based on the content of the standard (see above). The test report considered selected clauses of the a.m. standard(s) and experience gained with product testing. It was prepared by TUV SUD Product Service GmbH.
Disclaimer:	This test report is for reference only. Any use for commercial advertising purposes requires permission. The test results in this report are based on the test samples provided. The test results in this report are not suitable for other quality evaluations of regularly produced products.
Scheme:	☒TUV SUD China Mark ☐ Nothing to do with certification
Non-standard test methods:	☐ no ☐ Yes, please see the test summary for details
Country deviation:	N/A
Number of pages (Report):	33
Number of pages (Attachments):	N/A
Project handler:	Jiajing JIN *(name and signature)*
Project reviewer:	Chenghong ZHU *(name and signature)*

TÜV®

Testing sample:	Floor treatment/cleaning machines
Type of test object:	Wet and Dry Vacuum Floor Washer
Trademark:	DREAME
Model and/or type reference:	HHV4
Rating(s):	Rated voltage: 21.6 V d.c., Rated power: 300W Equipped with charger HCB3/HCB6 Rated output: 27 V d.c., 1.6A
Manufacturer:	Suzhou Suntone Technology Co., Ltd
Manufacturer number:	109935
Address:	No. 499 Fanfeng Road, Xukou Town,Wuzhong District 215000 Suzhou PEOPLE'S REPUBLIC OF CHINA
Sub-contractors/ tests (clause):	N/A
Name:	N/A
Order description:	☒ All tests included in the report
	☐ Customer-specified partial tests
	☐ Initial test
	☐ Spot check test
	☐ Other
Date of order:	2023-03-10
Date of receipt of test item:	2023-03-13
Date(s) of performance of test:	2023-03-17
Test item particulars:	

The Dreame wireless two-in-one floor cleaner contains an independent charging base, and the base has a drying air outlet to realize the function of automatic drying of the brush head of the product.

The main part has a floor floor cleaner function and a suction function, which correspond to different brush heads.

HHV4 is a single roller brush product.

Purpose of the product (Description of intended use)

Dreame wireless two-in-one floor cleaner can be used to clean dry and wet stains, sterilize, and hair on the floor. And it also has self-cleaning and self-drying function.

Characteristic data (not shown on the marking plate)

The product has self-cleaning and self-drying functions, and the brush head is removable and replaceable.

Attachments:

The product is rechargeable with a power adapter. It includes a charging base. There is a drying outlet on the base to help automatically dry the brush head. It is randomly equipped with cleaning fluid, a detachable roller brush, a storage bracket, a cleaning brush and other accessories.

General remarks:

"(see remark #)" refers to a remark appended to the report.

"(see appended table)" refers to a table appended to the report.

Throughout this report a comma is used as the decimal separator.

The test results presented in this report relate only to the object tested.

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Summary of testing:

☐ There is deviation(s) in the test results
☒ There is no deviation in the test results

Additional information on Non-standard test method(s)

Sub cl	N/A
Page	N/A
Rational	N/A

If additional information is necessary, please provide

N/A

Copy of marking plate:

Picture(s) of the product:

See Appendix 2

Factory name and address:

Suzhou Shangteng Technology Manufacturing Co., Ltd.

No. 499 , Fanfeng Road, Xukou Town, Wuzhong District, Suzhou City, Jiangsu Province

Possible test case verdicts:

- test case does not apply to the test object:	N/A (not applicable / not included in the order)
- test object does meet the requirement:	P (Pass)
- test object does not meet the requirement:	F (Fail)

Possible suffixes to the verdicts:

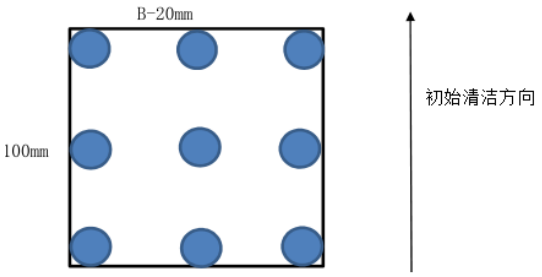
- suffix for detailed information for the client:	C (Comment)
- suffix for important information for factory inspection:	M (Manufacturing)

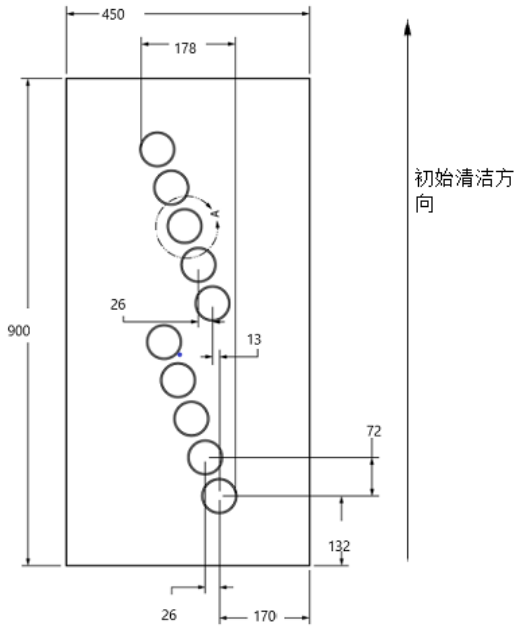
Clause	Requirement - Test	Measuring Result - Remark	Verdict
1-2	**Product definition and safety requirements based on PPP:CCB22021A:2023 Rev.1**		
1	**Product definition**		
	This document specifies the test methods and inspection rules for household and similar floor cleaners . This document is applicable to household and similar hard floor floor cleaners with vacuum suction (hereinafter referred to as floor cleaners). Floor cleaners with other principles can be implemented as a reference.		P
	This document does not apply to the following types of appliances: — Steam mop; — Mopping robots with wet cleaning function; — Electric mop.		P
2	**Safety requirements**		
	Products should meet the requirements of CCC certification, and the reports of the following standards should be provided: GB 4706.1-2005, GB 4706.7-2014 and/or GB 4706.57-2008, GB17625.1-2012, GB 4343.1-2018	CCC Certificate No.: 2023180708039179	P
3-9	**Test method for ground stain cleaning efficiency (modification based on T/CHEAA 0018-2021 Household and similar floor cleaners Chapter 5.5 & 6.5)**		
3	**General conditions for testing**		
3.1	**Power supply**		
	a) The supply voltage fluctuation should be kept within ±1% of the rated voltage; b) The supply frequency fluctuation should be kept within ±1% of the rated frequency.	Battery powered product	N/A
3.2	**Environmental conditions**		
	Temperature: (23±2) ℃ Relative humidity: (50±5)% Air pressure: 86kPa ~ 106kPa No forced convection air flow	(See Data Record Form 1)	P
4	**Ground stain cleaning efficiency limit (Cleaning efficiency (%) / cleaning cycle(s))**		
4.1	**Ground stain cleaning efficiency ≥99.5%**		
a)	Solid particles: uncooked rice grains ≥99.5%		N/A
b)	Liquid stains: ketchup ≥99.5%		N/A
c)	Liquid stains: coffee ≤ 20 drops		N/A
d)	Mixed stains: egg liquid + instant noodles ≥99.5%		N/A

Clause	Requirement - Test	Measuring Result - Remark	Verdict
	When the above four items a), b), c) and d) are all qualified at the same time, it can be judged that the cleaning efficiency of ground stains is ≥99.5%.		
4.2	**Ground stain cleaning efficiency level A+**		
a)	Solid particles: raw rice ≥ 99%		P
b)	Liquid stains: ketchup ≥ 95%		P
c)	Liquid stains: coffee ≤20 drops		P
d)	Mixed stains: egg liquid + instant noodles ≥ 98%		P
	When the above four items a), b), c) and d) are all qualified at the same time, the ground stain cleaning efficiency level can be determined to be A+.		P
4.3	**Ground stain cleaning efficiency level A**		
a)	Solid particles: raw rice ≥ 95%		N/A
b)	Liquid stains: ketchup ≥ 85%		N/A
c)	Liquid stains: coffee ≤20 drops		N/A
d)	Mixed stains: egg liquid + instant noodles ≥ 95%		N/A
	When the above four items a), b), c) and d) are all qualified at the same time, the ground stain cleaning efficiency level can be determined to be A.		N/A
4.4	**Ground stain cleaning efficiency level B**		
a)	Solid particles: raw rice ≥ 90%		N/A
b)	Liquid stains: ketchup ≥ 70%		N/A
c)	Liquid stains: coffee ≤20 drops		N/A
d)	Mixed stains: egg liquid + instant noodles ≥ 90%		N/A
	When the above four items a), b), c) and d) are all qualified at the same time, the ground stain cleaning efficiency level can be determined to be B.		N/A
5	**Preparations before the test**		
5.1	**Preparation of test material**		
	Standard test litter and stains		
	1) Raw rice grains: Wuchang rice, which meets the first-class quality requirements of GB/T 19266 standard.	(See Data Record Form 1)	P

Clause	Requirement - Test	Measuring Result - Remark	Verdict
	2) Ketchup: Ketchup meeting the requirements of SB/T 10459. 3) Instant coffee: Instant coffee meeting the requirements of GB/T 30767. (Ratio: 5 grams of instant coffee plus 95 grams of water at 50 ℃) 4) Eggs: (55±5)g/piece. 5) Instant noodles: Fried noodles meeting the requirements of GB 17400.		
5.2	**Preparation of test samples**		
	Before the first test of a new cordless floor cleaner, it should be fully charged according to the manufacturer's instructions, then operated under unrestricted air flow conditions until fully discharged, and then repeated at least 30 minutes apart. No operations are performed during the interval. For power nozzles, the disturbance device operates but does not touch the ground. During the warm-up phase of the new machine, the floor cleaner should be sprayed with solution .		P
	Before the first test of the new corded floor cleaner, the corded floor cleaner was operated for 2 h with unrestricted air flow rate. For floor cleaners with powered suction nozzles, the perturbation device was operated but did not touch the ground. During the warm-up phase, the floor cleaner should spray the solution.		
	Before the test, the wireless floor cleaner is fully charged according to the method specified in the instructions for use or the charging indicator light is full (whichever occurs first). Leave it aside for 30 minutes. Add water with a rated capacity to the clean water tank according to the instructions for use. Start the prototype at the same time. Preheat the spray solution for 30 seconds, make sure the floor brush is fully wetted, and start the test.		P
5.3	**Preparation for testing hard surface**		
5.3.1	Test hard surface: dry-pressed ceramic tiles specified in Appendix G of GB/T 4100-2015 (E≤0.5%BIa category). Single ceramic tile surface size: 600mm×600mm; Surface roughness: (Ra): 1.4μm~1.9μm (Rz): 10.0μm~13.5μm (Rt): 17.0μm~19.5μm		P
5.3.2	New tiles or used tiles for testing should be thoroughly cleaned with bleach water at a ratio		P

Clause	Requirement - Test	Measuring Result - Remark	Verdict
	of 15mL bleach/1L water. Then rinse with clean water and dry with a clean cotton cloth. Before testing, the test floor should be dry and clean, and there should be no residue of any impurities.		
5.3.3	At least 200mm and 300mm of running length are added to the front and back of the test area for the acceleration and deceleration buffer area of the cleaning head		P
5.4	Measure and record the running speed (m/s) of the cleaner in the normal constant speed mode as the basis for subsequent tests	(See Data Record Form 1)	P
6	**Raw rice cleaning**		
6.1	**Raw rice grain distribution**		
	The raw rice grains were dried in an oven at 50 °C for 10 minutes, and 100 g of dried raw rice grains were evenly distributed on the hard surface of the test. The length of the test area was 700 mm, and the width was (cleaning head width B-20) mm .		P
6.2	**Determination of the cleaning ability of raw rice grains**		
	After the floor washer is warm-up, place it in the starting position of the test area, cleans the raw rice grains, and performs one reciprocating operation at a speed recorded at 4.4. After completing the reciprocating operation, turn off the floor cleaner, collect the raw rice grains remaining on the surface of the tiles, and dry the raw rice grains in an oven at 50 °C for 10 minutes, and record the weight of raw rice grains a_1. The cleaning efficiency of raw rice grains is calculated according to the formula: Cleaning efficiency= $a_1/100\times100\%$ In the formula: a_1 — the weight of unremoved raw rice grains on the ground, in grams (g) . The cleaning ability of raw rice grains is represented by the average value of three times of cleaning efficiency, expressed as a percentage, with two decimal places.	(See Data Record Form 2)	P
7	**Coffee stain cleaning**		
7.1	**Coffee stain distribution**		
	Use a pipette to evenly spread 9 spots of stain on the test hard floor, each spot is 0.3 mL, and the intervals are evenly distributed in a square area of (cleaning head width B-20) mm × 100		P

Clause	Requirement - Test	Measuring Result - Remark	Verdict
	mm. then dry it for 24 hours in the environment required by 6.1.2. During the process move the tip of the pipette to about 5mm directly above the spot. With the pipette perpendicular to the tile surface, slowly depress the plunger of the pipette until all of the liquid coffee stain has covered the surface.  Figure 1 Coffee stain spotting operation  Figure 2 Schematic diagram of coffee stain distribution		
7.2	**Determination of the cleaning ability of coffee stain**		

Clause	Requirement - Test	Measuring Result - Remark	Verdict
	After the cleaner is warm-up, place it at the starting position of the test area and start cleaning. During the test, the running speed is the recorded speed of 4.4, and the reciprocating operation is carried out until the stains on the floor are cleaned (the stains cannot be seen from the operator's point of view, and the stains on all tiles should be obviously removed, not just for stain soiled tiles), record the number of cleaning cycles. The cleaning ability of coffee stains is expressed as the average of 3 cleaning cycles	(See Data Record Form 3)	P
8	**Ketchup stain cleaning**		
8.1	**Ketchup stain distribution**		
	Use a needle to squeeze 1 mL of Ketchup into 10 circular areas with a diameter of 66 mm arranged on the test hard floor, spread it evenly by hand, and dry for 2 hours in the environment specified in 2.2. The dirt distribution of the stain is shown in Figure 3.  Figure 3 Schematic diagram of Ketchup stain distribution (unit mm)		P
8.2	**Determination of the cleaning ability of ketchup stain**		
	After warm-up, place the floor cleaner at the front of the test area and clean the test area at	(See Data Record Form 4)	P

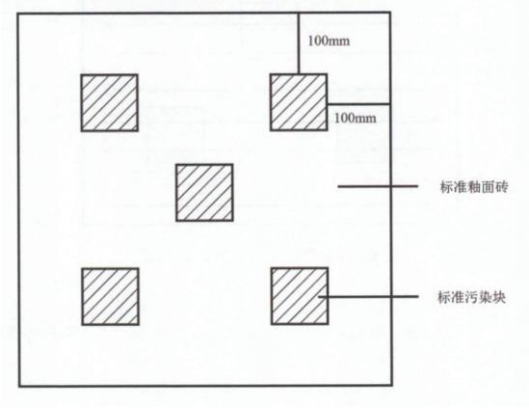
Clause	Requirement - Test	Measuring Result - Remark	Verdict
	a running speed of 4.4. Perform 3 reciprocating runs over the test area. Before staining the test area, use a colorimeter to measure the chromaticity values of 10 points (*L_{1i}, *a_{1i}, *b_{1i}, i = 1~10) After the test area is stained, measure the chromaticity value of 10 points (*L_{2i}, *a_{2i}, *b_{2i}, i = 1~10) After cleaning, measure 10 point chromaticity values (*L_{3i}, *a_{3i}, *b_{3i}, i = 1~10) When calculating the color change, the average color change before and after 10 stained area is taken as the overall color change before and after. The cleaning efficiency of ketchup stains is calculated according to formula (2): Cleaning efficiency = [1-(ΔE_1/ΔE_2)]×100% In the formula: ΔE_1 is the color change of the test hard floor before and after cleaning $$\Delta E_1 = \frac{1}{10}\sum_{i=1}^{10} \Delta E_{1i}$$ Where: ΔE_{1i} For each point of cloth color change before and after cleaning: $$\Delta E_{1i} = \sqrt{\Delta L_{1i}^2 + \Delta a_{1i}^2 + \Delta b_{1i}^2}$$ In the formula: ΔL_{1i} = *L_{1i} - *L_{3i} Δa_{2i} = *a_{1i} - *a_{3i} Δb_{3i} = *b_{1i} - *b_{3i} ΔE_2 is the color change of the test hard floor before and after staining. $$\Delta E_2 = \frac{1}{10}\sum_{i=1}^{10} \Delta E_{2i}$$ In the formula: ΔE_{2i} is the color change of each point before and after staining: $$\Delta E_{2i} = \sqrt{\Delta L_{2i}^2 + \Delta a_{2i}^2 + \Delta b_{2i}^2}$$ In the formula: ΔL_{2i} = *L_{1i} - *L_{2i} Δa_{2i} = *a_{1i} - *a_{2i} Δb_{2i} = *b_{1i} - *b_{2i} The cleaning ability of ketchup stains is expressed as the average of three cleaning efficiency measurements, expressed as a percentage, with two decimal places.		

Clause	Requirement - Test	Measuring Result - Remark	Verdict
9	**Mix egg liquid and instant noodles stains cleaning**		
9.1	**Instant noodle test preparation**		
	Take a whole 90g~100g instant noodle cake and submerge it in 500mL of boiling water, cover and soak for 5 minutes, remove the soaked noodles and drain for 1 minute to be tested. Mixed stain distribution: Pour the egg liquid from the whole egg into a bowl, weigh the bowl m_1; pour it lightly onto the test hard ground at the center within a range of 150mm × 150mm without stirring, and let it flow naturally for 1 minute. Weigh the bowl after pouring out the egg liquid in m_2. Take 30g of the prepared instant noodles and spread them evenly on the hard floor area (cleaning head width B-20) mm × 300mm centered on the egg liquid area (there must be no blank space in every 50mm × 50mm area).	(See Data Record Form 5)	P
9.2	**Determination of the cleaning ability of mix egg liquid and instant noodles stain**		
	After warm-up, place the floor cleaner at the front of test area, clean the mixed stains, and perform a reciprocating operation at a speed of 4.4 records . After the reciprocating operation, after the cleaning is completed, the floor cleaner stands still for 5 seconds and then shuts down. Immediately collect the residual noodles on the hard ground and weigh m_3. Take a piece of absorbent paper large enough to weigh the initial weight m_4, use Weigh m_5 after collecting the remaining liquid stains with absorbent paper; remove the floor cleaner after standing still for 1 minute, then take a piece of absorbent paper large enough to weigh the initial weight m_6, use absorbent paper to collect the original dirt of the floor cleaner immediately. Let the refluxed egg liquid stains sit on a hard floor and weigh m_7. The cleaning efficiency of mixed stains is calculated according to formula (3) : Cleaning efficiency=$[(30+m_1-m_2) - (m_3+m_5-m_4+m_7-m_6)]/ (30+m_1-m_2) \times 100\%$ In the formula: m_1 -The weight of the bowl containing the egg liquid, in grams (g); m_2 -The weight of the bowl into which the egg liquid has been poured, in grams (g); m_3 - the weight of noodles remaining on the floor after cleaning, in grams (g);	(See Data Record Form 5)	P

Clause	Requirement - Test	Measuring Result - Remark	Verdict
	m_4 -The initial weight of the absorbent paper used to collect residual liquid stains on the floor after cleaning, in grams (g); m_5 - the weight of the absorbent paper after absorbing the residual liquid stains on the floor after cleaning, in grams (g); m_6 - the initial weight, in grams (g), of the absorbent paper used to collect the backflow liquid stain ; m_7 - the weight, in grams (g), of the absorbent paper after absorbing the return liquid stain ; The cleaning ability of the mixed stains of egg liquid and instant noodles is represented by the average value of three times of cleaning efficiency, expressed as a percentage, with two decimal places.		
10	**Gap dust cleaning efficiency (modification based on GB/T 20291.1-2014 Household Vacuum Cleaner Part 1: Dry vacuum cleaners Performance test method chapter 5.2)**		
10.1	Gap dust cleaning efficiency ≥ 99.9%		P
10.2	The test equipment complies with the description of GB/T 20291.1-2014 7.3.12		P
10.3	The test surface and test gap comply with GB/T 20291.1-2014. The description of 7.3.2 consists of a wooden laboratory floor with a movable gap panel, the gap is at an angle of 45 degrees to the running direction , and the test gap is movable with (3±0.05mm) wide, (10± 0.05mm) deep smooth groove . The groove length is equal to the cleaning head width/ cos45° .		P
10.4	**Distribution of test dust**		
	Weigh the inlay and fill the gaps with the dust required in GB/T 20291.1-2014 7.2.2.1. Use a rubber scraper to fill in the dust. Weigh the inlay again and install it carefully on the experimental floor to avoid shaking.	(See Data Record Form 6)	P
10.5	**Determination of gap dust removal ability**		
	During the testing period, the floor cleaner reciprocates in a parallel manner through the gap at a speed of (0.50±0.02) m/s, and the cleaning head of the floor cleaner is kept aligned with the center of the laboratory floor. After 5 round-trip operations, determine The amount of dust removed is determined by the mass change of the strip. The length of the cloth is equal to the length of the groove. The dust removal ability is calculated as a percentage, and the amount of dust removed	(See Data Record Form 6)	P

Clause	Requirement - Test	Measuring Result - Remark	Verdict
	from the gap is calculated according to the following formula. $K_{cr} = (m_L - m_r)/ m_L *100\%$ K_{cr} ---- Dust removal ability, expressed in percentage (%) m_L ---- the amount of dust in the gap before the test, in grams (g) m_r ---- the amount of dust in the gap after the test, in grams (g) The average value of 3 measurements is the crevice cleaning efficiency , and the unit is expressed in percentage (%).		
11	**Test method for sterilization performance (modification based on Chapter 5.9 & 6.10 & Annex C of Q B/T 5426-2019 Household and Similar Steam Mop)**		
11.1	**Bacterial elimination rate**		
	For floor cleaners that expressly have the function of sterilization, the sterilization rate of specific microorganisms is ≥ 99.9 %.		N/A
	For floor cleaners that expressly have the function of sterilization, the sterilization rate of specific microorganisms is ≥ 9 9.99%.		P
11.2	**Test substrate**		
	Dry-pressed ceramic tiles (E≤0.5% B Ia category) specified in Appendix G of GB/T 4100-2015 , size specification (length X width): 800 mm x 800 mm.		P
11.3	**Preparation of bacterials and suspensions**		
11.3.1	Test bacterials: The following three types of bacteria are preferred: a) *Staphylococcus aureus* CGMCC 1.2910, equivalent to ATCC 6538P ; b) Escherichia coli *Escherichia coli* CGMCC 1.2463, equivalent to ATCC 8739; c) *Aspergillus terreus* CGMCC 3.3934;	(See Data Record Form 6) Selected test strains: a) *Staphylococcus aureus* CGMCC 1.2910, equivalent to ATCC 6538P ; b) Escherichia *coli* CGMCC 1.2463, equivalent to ATCC 8739;	P
	According to the usage requirements, other strains or strains can also be used as test bacteria, but all strains or strains should be provided by the corresponding national strain collection and management center and the name and classification number of the test strains should be indicated in the report. Laboratories should safely use test microorganisms in accordance with relevant national regulations, and try to choose non-pathogenic or low-pathogenic microorganisms.		P

Clause	Requirement - Test	Measuring Result - Remark	Verdict
	The various medium components used for cultivating strains shall meet the requirements of the strain preservation and management center.		
	All instruments and materials involved in microbial operations should be sterilized in advance, and moist heat sterilization (121°C, 20 min) is preferred.		P
11.3.2	**Activation of bacterials and preparation of bacterial solution**		
11.3.2.1	Activation of Staphylococcus aureus and Escherichia coli and preparation of bacteria solution Inoculate the standard strain on the slant solid medium, culture it at (37±1)°C for 24 hours, and then preserve it at 5°C-10°C (should not exceed 1 month) as slant-preserved bacteria. The slant-preserved bacteria were transferred to the plate solid medium, cultured at (37 ± 1) °C for (24 ± 1) h, transferred once a day, no more than 2 weeks. During the test, fresh bacterial cultures of 3-5 generations and transferred within 24 hours should be used. Use an inoculation loop to scrape 1 to 2 rings of fresh bacteria from the fresh culture, place them in 0.9% physiological saline, and make 10-fold gradient dilutions in sequence. Select the bacterial concentration from 10 9 CFU/mL to 10 ^{10} CFU / ^{mL}. The diluted solution is used as the bacterial solution for the test, and it is operated according to the method of GB 4789.2.		P
11.3.2.2	Activation of Aspergillus terreus species and preparation of bacterial solution The standard strains were inoculated on solid slopes, cultured at 28 °C ~ 30 °C for 7 days ~ 14 days, and then stored at 5 °C ~ 10 °C (should not exceed 4 months) as preserved bacteria. The preserved bacteria were inoculated in the slant medium test tube, and cultured for 7d ~ 14d to generate a large number of spores. The cotton plug should not be removed before the spore suspension is prepared. Each opened tube is only used for one suspension preparation, and freshly cultivated mold spores should be used for each preparation of spore suspension. Add a small amount of sterile distilled water to the above slant medium, use a sterile inoculation loop to gently pick up the fresh mold spores on the surface, place the spore suspension in a 250 mL Erlenmeyer flask, and		N/A

Clause	Requirement - Test	Measuring Result - Remark	Verdict
	then inject a small amount of eluent. Add 10 to 15 glass beads with a diameter of 5 mm to the Erlenmeyer flask and mix them with the spores. Place the stopper in a water bath oscillator to continuously shake the spores to disperse the clustered spores, and then filter with a single layer of cotton gauze to remove the hyphae. Put it into a sterilized centrifuge tube, separate the precipitated tungsten with a centrifuge, and remove the supernatant. Then add 40 mL of eluent, and repeat the centrifugation operation 3 times. Dilute the spore suspension with the eluent, count it with a hemocytometer, and make a mold spore suspension with a concentration of 10^{9} CFU/mL to 10^{10} CFU/mL. The final spore concentration shall be operated according to the method of GB 4789.15.		
11.4	**Test method**		
11.4.1	Preprocessing Before the test, wipe the substrate surface twice with 75% alcohol, then wipe it twice with sterile water, and let it dry naturally.		P
11.4.2	Test pollutant coating method Mix the test bacterial solution in 10.3 and the sterilized 2.0% xanthan gum solution in a ratio of 1 : 1 evenly to form a test pollutant. Select 5 coating locations according to Figure 4, which are located in the center of the substrate and at the four corners 100 mm from the edge. The size of the standard contamination block is 100 mm x 100 mm . Evenly apply 1 mL of test contaminant on each standard contamination block.  Figure 4: Schematic diagram of the coating location of the contaminated block		P

Clause	Requirement - Test	Measuring Result - Remark	Verdict
11.4.3	Placement time After the contaminant coating is completed, let it stand for 10 minutes at the ambient temperature of the sterile test room .		P
11.4.4	**Cleaning operation**		
11.4.4.1	Test group Follow the steps below to test, a) Under the test conditions, the floor cleaner is in ultra mode working condition, powered by rated voltage, and the cleaning head is placed horizontally on the smooth standard glazed tile, and the floor cleaner is cleaned according to the method specified in the product instruction manual . cleaning operations; b) As shown in the figure, the floor floor cleaner is in ultra mode working condition, and the ground is cleaned at (0.2 ± 0.002) m/s Scanning cleaning in a back and forth manner . Clean a full piece of substrate as 1 cycle , run 10 cycles . c) After the floor cleaner is cleaned, wipe each test position with a sterile cotton swab dipped in sterile physiological saline, place it in 10 mL of 0.9% physiological saline, fully shake and elute on a turbine oscillator, and gradient the eluent After dilution, inoculate into nutrient agar medium (NA), incubate at (37±1) °C for 24 h to 48 h, then count viable bacteria, and determine the number of viable bacteria in the eluate according to GB 4789.2 d) The recovery method of the mold is the same as above, after culturing at 28 °C to 30 °C for 3 days to 5 days, measure the number of mold tungsten in the eluate according to the method of GB 4789.15. e) Take the arithmetic mean of the remaining viable bacteria in the 5 test positions as the number of residual viable bacteria after the test.		P
11.4.4.2	**Positive control** After applying the contaminants, let it stand for 10 minutes, directly recover it with a sterile cotton swab dipped in water, and measure the number of viable bacteria. The number of viable bacteria recovered from the positive control should not be less than 10^6 CFU/block.	(See Data Record Form 7)	P
11.5	**Calculation of sterilization effect** Calculate according to the following formula	(See Data Record Form 7)	P

Clause	Requirement - Test	Measuring Result - Remark	Verdict
	$$R_1 = \frac{B - A}{B} \times 100\%$$ In the formula, R_1 ---- sterilization rate, expressed as a percentage; B ---- The number of viable bacteria recovered from the positive control group, the unit is CFU/block; A ---- The number of viable bacteria recovered in the test group, the unit is CFU/block. At least one floor cleaner of the same specification should be tested under the same conditions, and each machine should be tested three times. After each test, the residual viable bacteria should be determined. Calculate the sterilization rate numerically, and take the arithmetic mean of the 3 sterilization rates to be the sterilization rate value of the mop.		

Data Record Form 1 – Basic Information			
Model name:	HHV4		
Rated voltage (V):	21.6VDC	Rated power (W)	300W
Rated frequency (Hz):	-	Air pressure (kPa)	99.8
Ambient temperature (23±2)(°C)	23.5	Relative humidity(%)	48.5
Running speed (m/s)	0.2 m/s		
Test materials	Brand, model, parameters		
Rice	Wuchang Rice Qiaofu Courtyard 5Kg		
Ketchup	Heinz Ketchup 330 g		
Instant coffee	Nestle premium instant coffee 86.4g (48 packs* 1.8g)		
Egg	Prefer antibiotic-free fresh eggs 1.59kg (30 pieces)		
Instant noodles	Master Kong Braised Beef Noodles 82.5g *24 bags		

Data Record Form 2 – Raw Rice Cleaning Test			
Model name:	HHV4		
Rated voltage (V):	21.6VDC	Rated power (W)	300W
Rated frequency (Hz):	-	Air pressure (kPa)	101.1
Ambient temperature (23±2)(°C)	22.4	Relative humidity(%)	45.9
Measurement 1	Raw rice grains before testing (g)		100
	Weight of raw rice grains remaining after the test a_1 (g)		0
	Cleaning efficiency=a_1 /100×100%		100 %
Measurement 2	Raw rice grains before testing (g)		100
	Weight of uncooked rice grains remaining after testing a_1 (g)		0
	Cleaning efficiency=a_1 /100×100%		100 %
Measurement 3	Uncooked rice grains before testing (g)		100
	Weight of uncooked rice grains remaining after testing a_1 (g)		0
	Cleaning efficiency=a_1 /100×100%		100 %
The average value of the cleaning efficiency of the three tests (% , keep two decimal places)			100 %

Data Record Form 3 – Coffee Stain Cleaning Test			
Model name:	HHV4		
Rated voltage (V):	21.6 DC	Rated power (W)	300W
Rated frequency (Hz):	-	Air pressure (kPa)	98.2
Ambient temperature (23±2)(°C)	23.9	Relative humidity(%)	46.5
Measurement 1	Number of cleaning cycles		12
Measurement 2	Number of cleaning cycles		15
Measurement 3	Number of cleaning cycles		13
Average number of cleaning cycles for three tests			13.3

Data Record Form 4 – Ketchup Stain Cleaning Test												
Model name:			HHV4									
Rated voltage (V):			21.6 VDC			Rated power (W)		300W				
Rated frequency (Hz):			-			Air pressure (kPa)		101.2				
Ambient temperature (23±2)(°C)			24.5			Relative humidity(%)		54.2				
Measurement 1	Color before staining		1	2	3	4	5	6	7	8	9	10
		L	47.1	47.56	47.39	46.7	46.3	47.31	47.16	46.86	46.71	46.14
		a	-1.27	-1.23	-1.15	-1.3	-1.16	-1.29	-1.27	-1.26	-1.28	-1.45
		b	2.86	2.82	2.81	2.81	2.64	2.83	2.75	2.71	2.71	1.9
	Color after staining		1	2	3	4	5	6	7	8	9	10
		L	32.86	25.98	29.35	25.49	20.3	25.2	39.31	34.41	25.65	27.41
		a	12.09	21.58	17.24	25.03	25.97	22.87	13.65	10.16	18.86	20.9
		b	22.41	33.23	27.98	30.1	22.63	25.58	19.62	18.84	29.71	27.18
	Color after cleaning		1	2	3	4	5	6	7	8	9	10
		L	44.14	45.07	45.93	46.86	42.75	46.47	46.47	46.92	46.07	45.78
		a	-1.77	-1.21	-1.1	-1.23	-0.52	-1.22	-1.1	-1.04	-1.12	-0.92
		b	0.72	2.68	2.71	2.3	-1.76	2.77	2.88	2.81	2.78	3.03
	ΔE_1	1.7653										
	ΔE_2	35.8776										
	Cleaning efficiency (%)					95.08						

Measurement 2	Color before staining		1	2	3	4	5	6	7	8	9	10
		L	46.46	46.95	46.82	45.95	47.48	46.59	46.32	46.01	46.01	45.91
		a	-1.32	-1.33	-1.2	-1.35	-1.31	-1.33	-1.31	-1.29	-1.32	-1.26
		b	2.82	2.79	2.82	2.89	2.85	2.83	2.79	2.71	2.73	2.36
	Color after staining		1	2	3	4	5	6	7	8	9	10
		L	twenty three	24.18	24.27	22.89	26.72	26.01	27.3	25.65	24.4	23.23
		a	24.98	23.58	23.83	25.11	20.93	21.46	19.78	21.69	23.02	24.8
		b	34.18	34.5	31.91	33.99	34.36	34.44	32.66	34.39	33.98	34.29
	Chroma after cleaning		1	2	3	4	5	6	7	8	9	10
		L	45.52	45	45.57	46.18	46.24	46.82	46.05	45.79	45.5	46.4
		a	-1.14	-1.18	-1.11	-1.07	-1.23	-1.15	-0.94	-1.22	-1.12	-1.12
		b	3.18	3.06	3.09	3.52	3.15	3.31	3.29	2.74	2.8	3.02
	ΔE1	0.9142										
	ΔE2	45.0257										
	Cleaning efficiency (%)					97.97						
Measurement 3	Color before staining		1	2	3	4	5	6	7	8	9	10
		L	46.91	47.11	46.67	46.12	47.39	47.16	47	46.57	46.6	46.9
		a	-1.18	-1.13	-1.07	-1.23	-1.21	-1.15	-1.14	-1.11	-1.17	-1.13
		b	2.77	2.73	2.65	2.79	2.73	2.82	2.72	2.63	2.66	2.59
	Color after staining		1	2	3	4	5	6	7	8	9	10
		L	31.95	22.64	33.7	32.23	40.3	34.92	36.6	30.72	31.28	33.07
		a	12.61	21.53	8.63	10.8	6.42	11.07	8.39	14.76	13.73	12.57
		b	22.06	25.81	17.51	18.69	15.16	20.68	17.39	20.55	24.27	17.94
	Chroma after cleaning		1	2	3	4	5	6	7	8	9	10
		L	45.9	46.98	45.59	45.98	45.36	46.8	46.59	45.89	45.98	45.35
		a	-1.39	-1.47	-1.34	-1.42	-1.41	0.28	0.98	-0.85	-1.34	-1.43
		b	2.81	2.32	2.07	2.98	2.98	4.11	4.15	2.9	2.8	2.37
	ΔE_1	1.2772										
	ΔE_2	26.0198										
	Cleaning efficiency (%)					95.09						
Average cleaning efficiency of three tests (%, rounded to two decimal places)						96.05						

Data Record Form 5 – Egg liquid and instant noodles mixed stain cleaning test			
Model name:	HHV4		
Rated voltage (V):	21.6VDC	Rated power (W)	300W
Rated frequency (Hz):	-	Air pressure (kPa)	96.6
Ambient temperature (23±2)(°C)	23.7	Relative humidity(%)	49.5

Measurement 1	Instant noodles weight (g)	95.2
	The weight of the bowl containing the egg liquid is m_1 (g)	238.6
	The weight of the bowl into which the egg liquid has been poured m_2 (g)	194.1
	Arranged instant noodles (g)	30.00
	The weight of noodles remaining on the floor after cleaning is m_3 (g)	0.00
	Initial weight of absorbent paper 1 m_4 (g)	2.190
	Absorbent paper 1 after absorbing liquid stains m_5 (g)	2.194
	Initial weight of absorbent paper 2 m_6 (g)	2.191
	Absorbent paper 2 after absorbing backflow liquid stains m_7 (g)	2.350
	Cleaning efficiency=[(30+m_1 -m_2) - (m_3 +m_5 -m_4 +m_7 -m_6)]/ (30+m_1 -m_2) ×100%	99.78
Measurement 2	Instant noodles weight (g)	93.6
	The weight of the bowl containing the egg liquid is m_1 (g)	239.0
	The weight of the bowl into which the egg liquid has been poured m_2 (g)	194.8
	Arranged instant noodles (g)	30.00
	The weight of noodles remaining on the floor after cleaning is m_3 (g)	0.00
	Initial weight of absorbent paper 1 m_4 (g)	2.193
	Absorbent paper 1 after absorbing liquid stains m_5 (g)	2.198
	Initial weight of absorbent paper 2 m_6 (g)	2.193
	The absorbent paper 2 after absorbing the reflux liquid stain m_7 (g)	2.328
	Cleaning efficiency=[(30+m_1 -m_2) - (m_3 +m_5 -m_4 +m_7 -m_6)]/ (30+m_1 -m_2) ×100%	99.81

Measurement 3	Instant noodles weight (g)	98.50
	The weight of the bowl containing egg liquid m_1 (g)	238.5
	The weight of the bowl into which the egg liquid has been poured m_2 (g)	194.0
	Arranged instant noodles (g)	30.00
	The weight of noodles remaining on the floor after cleaning is m_3 (g)	0.00
	Initial weight of absorbent paper 1 m_4 (g)	2.192
	Absorbent paper 1 after absorbing liquid stains m_5 (g)	2.193
	Initial weight of absorbent paper 2 m_6 (g)	2.191
	Absorbent paper 2 after absorbing backflow liquid stains m_7 (g)	2.400
	Cleaning efficiency=[(30+m_1 -m_2) - (m_3 +m_5 -m_4 +m_7 -m_6)]/ (30+m_1 -m_2) ×100%	99.76
	Average cleaning efficiency of three tests (%)	99.60

Data Record Form 6 – Gap Cleaning Efficiency Test				
Model name:	HHV4			
Rated voltage (V):	21.6V		Rated power (W)	300W
Rated frequency (Hz):	-		Air pressure (kPa)	100.5
Ambient temperature (23±2)(°C)	23.6		Relative humidity(%)	50.3
Measurement 1	The amount of dust in the gap before the test m_L (g)			13.29
	The amount of dust in the gap after the test m_r (g)			0.01
	Length of cloth ash L (m)			0.400
	The cleaning head of the floor cleaner B (m)			0.260
	Dust removal capacity Kcr (%)			99.92
Measurement 2	The amount of dust in the gap before the test m_L (g)			13.30
	The amount of dust in the gap after the test m_r (g)			0.01
	Length of cloth ash L (m)			0.400
	The cleaning head of the floor cleaner B (m)			0.260
	Dust removal capacity Kcr (%)			99.92
Measurement 3	The amount of dust in the gap before the test m_L (g)			13.29
	The amount of dust in the gap after the test m_r (g)			0.01
	Length of cloth ash L (m)			0.400
	The cleaning head of the floor cleaner B (m)			0.260
	Dust removal capacity Kcr (%)			99.92
Average dust removal capacity of three tests (%, rounded to two decimal places)				99.92

Data Record Form 7 – Sterilization Performance Test		
	Test bacterial a	Staphylococcus *aureus* CGMCC 1.2910, equivalent to ATCC *6538P*
Measurement 1 Bacterial liquid concentration 9.2×10^9 (CFU/mL)	The number of viable bacteria recovered from the positive control group (CFU/block)	$6.8X10^8$
	The number of viable bacteria recovered in the test group (CFU/block)	$1.3X10^3$
	Bacteria removal rate (%)	>99.99%
Measurement 2 Bacterial liquid concentration 8.6×10^9 (CFU/mL)	The number of viable bacteria recovered from the positive control group (CFU/block)	$6.2X10^8$
	The number of viable bacteria recovered in the test group (CFU/block)	$< 1.0 X10^3$
	Bacteria removal rate (%)	>99.99%
Measurement 3 Bacteria concentration 9.2×10^9 (CFU/mL)	The number of viable bacteria recovered from the positive control group (CFU/block)	$4.6 X10^8$
	The number of viable bacteria recovered in the test group (CFU/block)	$< 4.8 X10^2$
	Bacteria removal rate (%)	>99.99%
Average sterilization rate of three tests (%)		>99.99%

	Test bacterial b	Escherichia coli *Escherichia coli* CGMCC 1.2463, equivalent to ATCC 8739
Measurement 1 6.1×10^9 (CFU/mL)	The number of viable bacteria recovered from the positive control group (CFU/block)	$4.0\ X10^8$
	The number of viable bacteria recovered from the test group (CFU/block)	$<9.2X10^2$
	Bacteria removal rate (%)	>99.99%
Measurement 2 5.9×10^9 (CFU/mL)	The number of viable bacteria recovered from the positive control group (CFU/block)	$4.3\ X10^8$
	The number of viable bacteria recovered in the test group (CFU/block)	$<4.7\ X10^2$
	Bacteria removal rate (%)	>99.99%
Measurement 3 5.7×10^9 (CFU/mL)	The number of viable bacteria recovered from the positive control group (CFU/block)	$3.7X10^8$
	The number of viable bacteria recovered from the test group (CFU/block)	$<4.3\ X10^2$
	Bacteria removal rate (%)	>99.99%
Average sterilization rate of three tests (%)		>99.99%

	Test bacterial c	N/A
Measurement 1	The number of viable bacteria recovered from the positive control group (CFU/block)	N/A
	The number of viable bacteria recovered from the test group (CFU/block)	N/A
	Bacteria removal rate (%)	N/A
Measurement 2	The number of viable bacteria recovered from the positive control group (CFU/block)	N/A
	The number of viable bacteria recovered in the test group (CFU/block)	N/A
	Bacteria removal rate (%)	N/A
Measurement 3	The number of viable bacteria recovered from the positive control group (CFU/block)	N/A
	The number of viable bacteria recovered in the test group (CFU/block)	N/A
	Bacteria removal rate (%)	N/A
Average sterilization rate of three tests (%)		N/A

Appendix 1: Equipments List

Equipment	Serial number	Type	Brand / Manufacturer	Calibration date	Next calibration date
Stopwatch	S0611277-YQ	HS-70W	Casio	6/6/2022	6/5/2023
Vacuum cleaner energy efficiency comprehensive test device	S1402836a-YQ	-	Dongch	6/3/2022	6/2/2023
Precision balance	S1402836b-YQ	XP4002S	Mettler-Toledo	8/4/2022	8/3/2023
Vernier caliper	S0712341-YQ	500mm	Guilin Guanglu Company	5/18/2021	5/17/2023
Environmental temperature and humidity recorder	S1508953-YQ	7210-00	SATO (Sato)	6/7/2022	6/6/2023
Tape measure	S0611278-YQ	30-628	STANLEY	5/18/2021	5/17/2024
Precision balance	S1509964-YQ	MS1003S/01	Mettler-Toledo	8/4/2022	8/3/2023
Electronic scale	S1206677-YQ	DS-425P	DIGI (Shanghai)	6/3/2022	6/2/2023
Vernier caliper	S19021245-YQ	530-119	Mitutoyo (Japan)	6/6/2022	6/5/2023
Spectrophotometer	S18091174-YQ	PSC -20	Distance	6/2/2022	6/1/2023

Appendix 2: Picture(s) of the product

Details of: Products and related accessories, brush head, base, host

Details of: Control display, rear side of product, brush head, single brush head

End