The Committee for Conformity Assessment of Accreditation and Certification on Functional and Technical Textiles

Specified Requirement of Test Methods for Anti-Mite Treated Textiles

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Document Version Resume

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1.0	Newly issued		2011/12/29

1. Purpose and Scope

This criterion defines the use of Repellency test or Proliferation Inhibition test as methods to evaluate the capabilities of anti-mite textiles. It is unsuitable to use on textiles with physical anti-mite barrier.

Remarks: criteria for textiles with physical anti-mite barrier are being drafted separately.

Table 1: Test methods for different types of samples

Test method		Sample type
Repellency test	Intrusion barrier method	Sheets, beddings, blankets with thickness of less than 15cm
	Glass tube method A	Fillers (cotton, wool, synthetic fibers),etc.
	Glass tube method B	Feathers
Proliferation inhibition test	A method	Sheets, beddings, blankets with thickness of less than 15cm
	B method	Fillers, ,etc.

Annotation: **applicant must attach the original copy of the report from a certificated laboratory of skin irritability for anti-mite process agent (pH[(1)]<2) (no allergic reaction), and acute toxicity (mice>1000mg/kg, no death and abnormal occurrences) report, or a copy of test report from a third party and certification document, provided by the original manufacturer.**

Note[(1)]: primary irritation index.

2. Terminology

2.1 Repellency rate: calculates the number of surviving mites in the sample group and control group; repellency capability of sample group is expressed in percentage (%).

2.2 Proliferation inhibiting rate: calculates the number of surviving mites in the sample group and control group; proliferation inhibiting extent of sample group is expressed in percentage (%).

3. Classification

3.1 Repellency test

3.2 Proliferation inhibition test/

4. Testing Method

4.1 Test mite: *Dermatophagoides pteronyssimus*

4.2 Medicines

4.2.1 Alcohol: pharmaceutical grade

4.2.2 Pure water

4.2.3 Saturated saline: take 392g or **al least 360 g** of Sodium Chloride (NaCl, pharmaceutical grade) and 1000 mL pure water, dissolve the Sodium Chloride by heating it and mixing it thoroughly, cool at room temperature, separate the supernatant liquid and set aside for further use. Used in saturated saline floating method..

4.2.4 0.1% non-ionic surfactant solution (Tween 80, pharmaceutical grade): take 0.1 g Tween 80 and 100 mL pure water, dissolve and mix it thoroughly, then set aside for further use. Used as moisturizing solution during mite recovery..

4.2.5 Coloring solution: take 0.6 g **Colorant(2)** and 100 mL alcohol, dissolve it thoroughly, then add pure water until 1000 mL, mix thoroughly and set aside. **Used to color all materials excluding filter paper and mites**.

Note(2): both crystal violet ($C_{25}H_{30}ClN$, pharmaceutical grade) and methylene blue ($C_{10}H_{18}N_3SCl$, pharmaceutical grade) can be used as Colorants. When directly coloring filter paper, repeated use of a lighter coloring solution is recommended, because high concentration of coloring solution could kill or color the mites.

4.3 Instruments and equipment

4.3.1 Dry oven: must be able to maintain a temperature of (70±2)℃

4.3.2 Thermostat: must be able to maintain constant temperature (25±2)℃, darkroom

4.3.3 Flasks: glassware with 50 mL capacity

4.3.4 Beakers: glassware with 50 mL capacity

4.3.5 Petri dish (large): internal diameter of 90 mm, depth of 20 mm, glassware, used in intrusion barrier method.

4.3.6 Petri dish (small): outer diameter of 45 mm, depth of 15 mm, glassware, used in intrusion barrier method and proliferation inhibition test method A.

4.3.7 Glass test tubes: outer diameter of (22.0±0.6) mm, thickness of (1.2±0.2) mm, length 100 mm, glassware, used in glass tube method.

4.3.8 Vials: outer diameter of 30 mm, depth of 63 mm, capacity 30 mL, glassware, used in proliferation inhibition test method B.

4.3.9 Filter paper: in accordance with CNS 5038 standard for filter paper for qualitative analysis, diameter of 70 mm.

4.3.10 Transparent adhesive tape: to be used in glass tube method.

4.3.11 High density fabric: 100% cotton, tested according to CNS 5612 standard, air permeability is 1~10 cm^3/cm^2 •s, used in glass tube method.

4.3.12 Control group (standard white cotton cloth): Cotton (Type 3) mono fiber cloth conformed to CNS 3841 standard.

4.3.13 Control group (fiber): 100% polyester fibers, count is 5~8 dtex, fiber length is 51~75 mm, laundered 1 time according to CNS 803 (placed inside laundering bag, no detergent added), after machine dry-out it was dried at room temperature and set aside for further use.

4.3.14 Airtight container: a plastic container that can be hermetically sealed.

4.3.15 Feed: powder feed for lab animals, pre sieved using metal sieves with 300 μm aperture, then mixed with dry yeasts in a 1:1 mixture; place into Petri dishes and adjust compound thickness until 10 mm, heat for 2h in a (70±2)℃ oven, then put into an airtight container filled with saturated saline (amount is 10% of internal volume), to be used within 24~48h.

4.3.16 Electronic scale: accuracy until 0.0001 g.

4.3.17 Stereoscopic microscope: with internal illumination, magnification of 20 times.

4.3.18 Metal sieves:

(1) For mite recovery: 40~50 μm and 500~700 μm aperture

(2) For feed sieving: 300 μm aperture

4.3.19 Pumping device: Buchner funnel, filter flask, three-way tube, pump

4.3.20 Timer: capable of counting from 0~9999

4.3.21 Fixture: stainless steel metal netting (1 mm mesh) cut into 20 mm diameter circles, folded circular fixtures with same diameters. Used in glass tube method B.

4.4 Sample preparation: choose the suitable specimen preparation method according to table 2.

Table 2 Sample preparation method

Test method		Sample preparation method
Repellency test	Intrusion barrier method	Cut the samples into circular sample with 40 mm diameter as 1 sample, must prepare 5 samples each for both control group ([3]) and sample group.
	Glass tube method A	Take 0.400 g as 1 sample, must prepare 5 samples each for both control group ([3]) and sample group.
	Glass tube method B	Take 0.080 g as 1 sample, must prepare 5 samples each for both control group ([3]) and sample group.
Proliferation inhibiting test	A method	Cut the samples into circular sample with 40 mm diameter as 1 sample, must prepare 9 samples each for both control group ([3]) and sample group.
	B method	Take 1.000 g as 1 sample, must prepare 9 samples each for both control group ([3]) and sample group.

Note([3]): use unprocessed samples provided by principal as control group; is samples are beddings or sheets and unprocessed samples are not possible to obtain, can be substituted with 4.3.12 control (standard cotton cloth). If samples are synthetic fiber fillings and unprocessed samples are not possible to obtain, can be substituted with 4.3.13 control (fibers).

4.5 Test conditions

4.5.1 Laboratory: temperature (25±2)℃, relative humidity (65±20)%.

4.5.2 Test environment: temperature (25±2)℃, relative humidity (65±20)%, darkroom.

4.6 Dust mites density calculation (saturated saline flotation method)

4.6.1 Fine weight 0.025 g powder with dust mites and feed, put it into a flask, and prepare a total of 8 flasks.

4.6.2 Drip several drops of 0.1% non-ionic surfactant solution and 1 mL crystal violet solution, add saturated saline until the bottleneck; let them rest for 10 min.

4.6.3 Use filter paper to filter the dust mites floating on the top of the saturated saline, count ([4]) the number using the microscope and record it.

Note([4]): dead or still dust mites should not be counted. The entire counting process must be completed within 20 minutes after flushing; if this is not possible, then move the supernatant from the flask to a 50 mL beaker, drip several drops of 0.1% non-ionic surfactant solution, and add water until 30~40 mL.

4.6.4 Dust mites density must be larger than 30000 unit/g, variation ratio between all 8 groups must be less than 10%, for the test to continue, otherwise the solution must be re-adjusted or mixed thoroughly again. Use formula **(1)** to calculate dust mites density.

In the formula, Nm: dust mites density (unit/g)

X_1, X_2 …… X_n: number of dust mites included in 0.025 g

n = test number, n = 8

4.7 Intrusion barrier test procedure

4.7.1 Sample pre-treatment: place the prepared circular specimen samples (diameter about 40 mm) into the small Petri dishes, then put them into the (70±2)℃ oven to heat pre-treatment for 10 min, then place them into an airtight container and let them rest in room temperature for more than 8h ([5]).

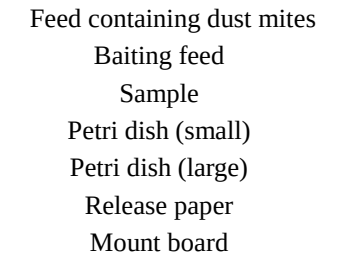
Note([5]): different samples need to be heat pre-treated separately, then stored into separate airtight containers.

4.7.2 Place 0.050 g of baiting feed at about 10 mm at the center of the specimens.

4.7.3 Take feed containing 10000 units of dust mites, and spread it evenly into a large Petri dish.

4.7.4 Place a small Petri dish at the center, as shown in picture 1. Put all in an airtight container, and add a small amount of saturated saline, to prevent the dust mites from escaping.

4.7.5 Culture in a darkroom set at temperature (25±2)℃ and relative humidity (65±20)% for 24h.



unit: mm

Picture 1 Test equipment for intrusion barrier method

4.7.6 Observation method: remove the small Petri dish, calculate the dust mites quantity using saturated saline floating method for the baiting feed, then place the sample on the metal sieve, flush down the dust mites with water, and must also flush gently the dust mites remaining in the small Petri dish, and collect the washing fluids; use a beaker to slowly pour it on a filter paper, then proceed to counting using the microscope, calculating the total surviving number of dust mites and record it.

4.8 Glass tube test procedure

4.8.1 Sample pre-treatment: place the prepared samples into an airtight container, and proceed with heat pre-treatment with the (70±2)℃ oven for 10 min.

4.8.2 Proceed with sample assembly as shown in the Picture 2 (Method A) and Picture 3 (Method B) setup.

(1) Seal one end of the glass tube with adhesive tape, and place 0.010 g of bait feed in the other end.

(2) Place 0.025 g of count fiber, adjust width to (5±1) mm.

(3) Place the pre-heated samples inside the glass tube, adjust width to (20±2) mm; method B requires placing the two sides o the sample on the fixture.

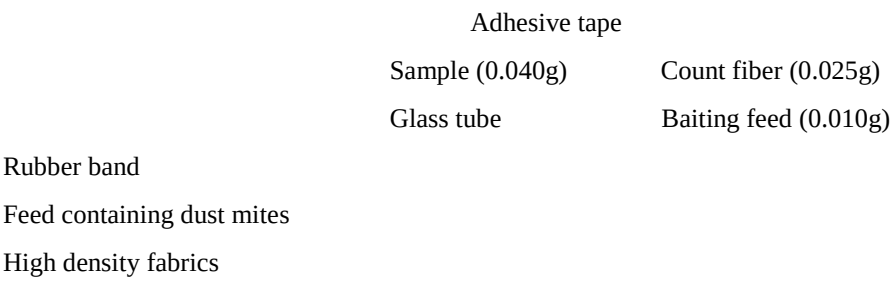
(4) After setting up the samples put in an airtight container and let it rest at room temperature for more than 8 hours.

4.8.3 Take feed containing 10000 units of dust mites, and spread it evenly at the other end of the glass tube, between widths of about 40 mm.

4.8.4 Use high density fabrics and rubber bands to seal the opening, then place it into an airtight container.

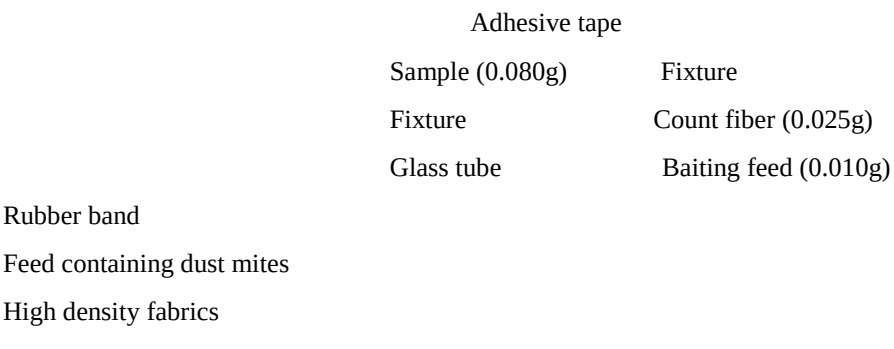
4.8.5 Culture in a darkroom set at temperature (25±2)℃ and relative humidity (65±20)% for 48h.

Method A unit: mm



Picture 2 Set up picture of Glass tube test method A

Method B unit: mm



Picture 3 Set up picture of Glass tube test method b

4.8.6 Observation method: remove the glass tube, carefully tear off the adhesive tape, place it with the baiting feed and count fiber on the metal sieve, flush down the dust mites with water, and collect the washing fluids; use a beaker to slowly pour it on a filter paper, then proceed to counting using the microscope, calculating and recording the number.

4.9 Proliferation inhibition test procedure

4.9.1 Set up the as shown in the Picture 4.

(1) Method A: put the prepared 40 mm circular specimen sample into a small Petri dish.

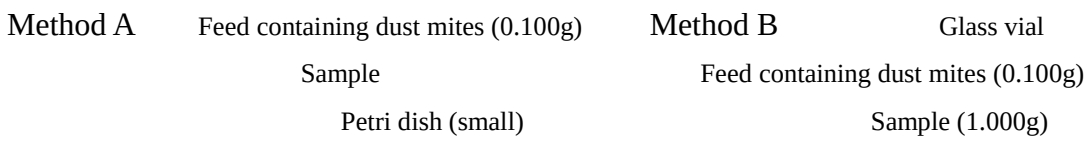
(2) Method B: place the prepared 1.000g samples into the glass vial.

4.9.2 Place all into an airtight container and let it rest at room temperature for more than 8h.

4.9.3 According to the dust mites density obtained in 4.6, using the feed according to the required quantity, adjust dust mites density to 500~800 units/g; place all into flasks and mix thoroughly, then fine weight 0.100g and put into flasks; prepare 3 groups. Calculate the initial dust mites density, average should be 50-80 units/0.100g.

4.9.4 Take 0.100g feed containing dust mites (about 50~80 units) and spread it evenly on the sample.

4.9.5 Culture in a **darkroom** set at **temperature (25±2)℃** and relative **humidity (65±20)%** for respectively 4 and 6 weeks, if needed 8 weeks.



Picture 4 Set up picture of Proliferation inhibition test

4.9.6 Observation method: remove the small Petri dish or glass vial after 4, 6 or 8 weeks culture, calculate the dust mites quantity using saturated saline floating method for the baiting feed, then place the sample on the metal sieve, flush down the dust mites with water, and must also flush gently the dust mites remaining in the small Petri dish, and collect the washing fluids; use a beaker to slowly pour it on a filter paper, then proceed to counting using the microscope, calculating the total surviving number of dust mites and record it.

4.10 Results and record

4.10.1 Calculate the respective surviving dust mites' numbers for the control and sample group.

4.10.2 Result of repellency test

(1) Necessary test condition:

(a) Dust mites density variation ratio between all 8 groups must be less than 10%

(b) Mean of control group dust mites' number must be larger than 1000 units.

(2) Use formula **(2)** to calculate repellency rate to the nearest 0.1.

$Ev = (B - A)/B \times 100$……(2)

In the formula, Ev: repellency rate (%)

A: surviving dust mites' number, sample group

B: surviving dust mites' number, control group

4.10.3 Result of proliferation inhibition test

(1) Necessary test condition:

(a) Dust mites density variation ratio between all 8 groups must be less than 10%

(b) Mean of initial dust mites' density is 50~80 units/0.100g

(c) After 4 weeks culture, mean of control group dust mites' number should be 3 times the initial dust mites' density.

(2) Use formula **(3)** to calculate repellency rate to the nearest 0.1.

$R = (B - A)/B \times 100$……(3)

In the formula, R: proliferation inhibition rate (%)

A: surviving dust mites' number, sample group

B: surviving dust mites' number, control group

5. Reference Standard

5.1 JIS L 1920:2007　　纖維製品の防ダニ性能試験方法

5.2 The “インテリアファブリックス性能自主基準” drafted in 2003 by the Japanese “インテリアファブリックス性能評価協議会”

6. Supplement

This standard has been reviewed by the convener of the Normative Validation Implementation Group, presented to the chairman of the Committee for approval then issuing, to be implemented from announcement day.

Reference 1

Table 1 Recording sample of test results (Repellency test)

Test method									
Sample type									
Sample name									
Testing mite									
Control									
Test date	Start date	YYYY/MM/DD							
	Observation date	YYYY/MM/DD							
Dust mites' density	Surviving no.	1	2	3	4	5	6	7	8
	(/0.025g)								
	Variation rate(%)								
Test results (surviving mites no.)		1	2	3	4	5	Total	Repellency (%)	
	Control group								
	Sample group								
Tester:									

Table 2 Recording sample of test results (Proliferation inhibition test)

Test method									
Sample type									
Sample name									
Testing mite									
Control									
Test date	Start date	YYYY/MM/DD							
	Observation date (4 weeks)	YYYY/MM/DD							
	Observation date (6 weeks)	YYYY/MM/DD							
	Observation date (8 weeks)	YYYY/MM/DD							
Dust mites' density	Surviving no.	1	2	3	4	5	6	7	8
	(/0.025g)								
	Variation rate(%)								
Initial mites' density	Surviving no. (/0.100g)				Mean				
Test results (surviving mites no.)				1	2	3	Total	Proliferation inhibition (%)	
	4 weeks	Control group							
		Sample group							
	6 weeks	Control group							
		Sample group							
	8 weeks	Control group							
		Sample group							
Tester:									

Reference 2

Quality: after undergoing durability test with heat treatment (using a setting of 3 years of use), the repellency rate or proliferation inhibition rate of the **common anti-mite processed textiles** should reach more than 50%. Temperature and time for heat treatment condition are based on reference to the outdoor mean temperature for the last 3 years, and calculate using the "Polymer material **performance decrement rule**" (**shelf life cut by half for 7℃ increase**).

Reference 2 Table 1 Temperature and time for heat treatment condition

Japan	Mean temp./3 years time	Heating temperature/Time									
Temp. (℃)	17	24	31	38	45	52	59	66	73	80	81
Time (h)	26280	13140	6570	3285	1643	821	411	205	103	51	48

Taiwan	Mean temp./3 years time	Heating temperature/Time									
Temp. (℃)	22	29	36	43	50	57	64	71	78	85	86
Time (h)	26280	13140	6570	3285	1643	821	411	205	103	51	48

Taiwan	Mean temp./3 years time	Heating temperature/Time									
Temp. (℃)	25	32	39	46	53	60	67	74	81	88	89
Time (h)	26280	13140	6570	3285	1643	821	411	205	103	51	48