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Customer: Mitsubishi Electric Corporation

Test Report



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試験結果は、当所に提出された試料についての値です。

1. Test	Examination of effects to decrease particle counts and cat allergen in air
2. Aim	To confirm the device, sterilization device for MSZ-FH , can decrease particle counts and cat allergen in house dust in air (Experiment 1) and reduce cat allergen in house dust on the ground (Experiment 2).
3. Materials & Methods	
Device	Sterilization device for MSZ-FH
Control	Out of operation of the device
Test material	House dust containing can allergen [#19908、ITEA]
Target allergen	Cat allergen (Fel d 1)
Assay for allergen	Sandwich enzyme-linked immunosorbent assay (ELISA)
1) Experiment 1	Evaluation test for the device to enable to decrease the counts of particles and cat allergen in house dust in air
Experiment system	The device was attached to an acrylic chamber (1 m^3) and the structure of one pass air flow (flow rate: 30L/min) was set up (Fig.1). House dust was scattered into the chamber in which 4 fans were put. With stirring house dust in air by the fans in the chamber, the air was vacuumed to pass through the device.
Dose of house dust	100, 300 (mg)
Particle counting	Two particle counters (P.C) (KC-01D, RION) were used in this test. Particle counts in air before (Front) and behind (Back) the device were measured by the counters (A and B).
Particle size	0.3、0.5、1、2、>5 μm

Position for air sampling	Front point: 60 mm rearward from the device Back point: 165 mm forward from the device
Vacuum rate of P.C	0.5 L/min
Vacuum pump	DAP-30 (ULVAC): 30 L/min
Allergen capture	Glass Fiber Prefilter (AP40, Millipore) for allergen capture was set on the path of air flow behind the device described in Fig. 1.
Allergen extraction	After air sampling, the filter was put into a tube containing extraction buffer and incubated at 4 degrees C for 7 hours. After centrifuge (8,000 rpm = 5,800 x g, 10 min), the supernatant was collected and then lyophilized. The lyophilized sample was dissolved with distilled water a quarter of the volume of the sample and used for quantification of cat allergen.
Data analysis	<p>1) Particle counts in air</p> <ul style="list-style-type: none"> • At first, the numbers of particles in air at Front and Back points were counted for 1 minute by P.Cs A and B, respectively. After the first counting, the connections of P.Cs to the positions of air sampling were switched and then particle counting for 1 minute was carried out again. The 2 counts were defined as "one cycle", which corresponds to particle count per 1 litter of air. Fifteen and 25 cycles were applied for tests using 100 and 300 mg of house dust, respectively. • The number of particles in the air without scattering of house dust was defined as a blank. All of the data of counting were subtracted the blank.

Allergen extraction

- The reduction of the particle counts and the ratio of the reduction were calculated using the following formula:

Particle counts at Front point= the sum of 2 counts by P.Cs

Particle counts at Back point= the sum of 2 counts by P.Cs

The reduction of the numbers of particles = B·A

The ratio of the reduction (%) = $(B \cdot A) / B \times 100$

A: the numbers of particles in the air at Back point

B: the numbers of particles in the air at Front point

2) Allergen measurement

Based on the measurements of cat allergen captured on the filters, the reduction ratio of allergen was calculated using the following formula:

Reduction ratio of allergen (%) = $(B \cdot A) / B \times 100$

A: Allergen concentration in sample collected at the device operating

B: Allergen concentration in sample collected at the device not operating

2) Experiment 2

Evaluation test for the device to enable to inactivate cat allergen in house dust

Experiment system

The device was put in a 45L chamber. House dust was scattered on the plates uniformly as much as possible. The plate was described as "ground" below. While the device was operating, the device was discharging electric to house dust on the ground. After exposure to the electric discharge, the dust sample was collected. Cat allergen was extracted from the dust and the concentration of cat allergen in the extract was measured in order to evaluate effect to reduce the allergen (Fig.3 A, B).

Dose of house dust

Approximately 30 mg

Data analysis

After the treatment by the device, the dust on the ground was collected and put into a tube containing allergen extraction buffer and then incubated for 60 min at room temperature C. After centrifuge (8,000 rpm = 5,800 x g, 10 min), the supernatant was collected and used for ELISA for cat allergen.

Based on the measurements of cat allergen in the samples treated with or without electric discharging, reduction ratio of allergen was calculated using the following formula:

$$\text{Reduction ratio of allergen (\%)} = (B-A)/B \times 100$$

A: Allergen concentration in sample treated with electric discharging

B: Allergen concentration in untreated sample

4 Protocols

Experiment 1

Preparation of the equipment (Fig.1)

1. The device, fans, and P.Cs were set as described in Fig.1.

Particle counting (Fig.2)

2. Before house dust was thrown in the chamber, the numbers of particles in air before and behind the device were counted by P.C as a blank.
3. House dust was thrown into the chamber in which air was stirred by fans.
4. One minute after the fans were stopped, vacuum pump and P.C were switched on.
5. After particle counting for 1 minute, connections P.Cs A and B to Front and Back points were exchanged each other and then particle counting was carried out again for 1 minute more, which was defined as "one cycle". Fifteen and 25 cycles were applied for using 100 and 300 mg of house dust, respectively.

Allergen measurement

6. The filter for allergen capture was collected after vacuuming.
7. Allergen was extracted from the filter and the extraction was lyophilized for condensation.
8. Allergen concentrations were measured using sandwich

ELISA as follows;

Coating wells on a micro-plate with allergen-specific antibody

↓

After washing, post coating with blocking solution

↓

After washing, samples and standard solution were applied.

↓

After washing, biotinylated detection antibody was applied.

↓

After washing, streptavidin-peroxidase was applied.

↓

After washing, substrate for peoxidase was applied.

↓

Enzymatic reaction was stopped.

↓

Absorbance was measured by microplate reader.

↓

Calculation of allergen concentration

Data analysis

9. Data analyses for particle count and cat allergen concentration were carried out as describe above.

Experiment 2

Preparation of the equipment (Fig.3)

1. The device was set in the 45L chamber described as Fig.3.

Operating the device

2. House dust was scattered on the ground.
3. The device was operating to expose the dust to electric discharge.

Allergen measurement

4. After the electric discharging, the dust sample was collected and allergen was extracted from the dust sample.
5. The concentration of cat allergen in the dust was measured by ELISA.

Data analysis

6. Based on the measurements of cat allergen in the samples treated with or without electric discharge, the reduction ratio of allergen was calculated.

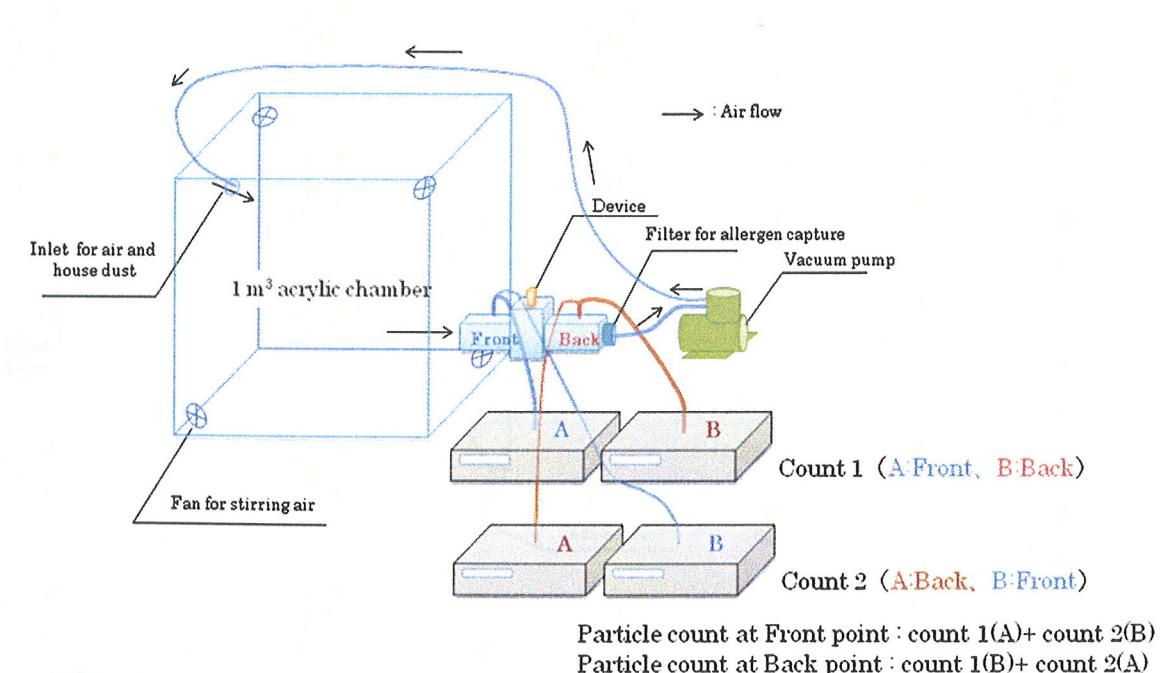


Fig.1. Equipment for Experiment 1

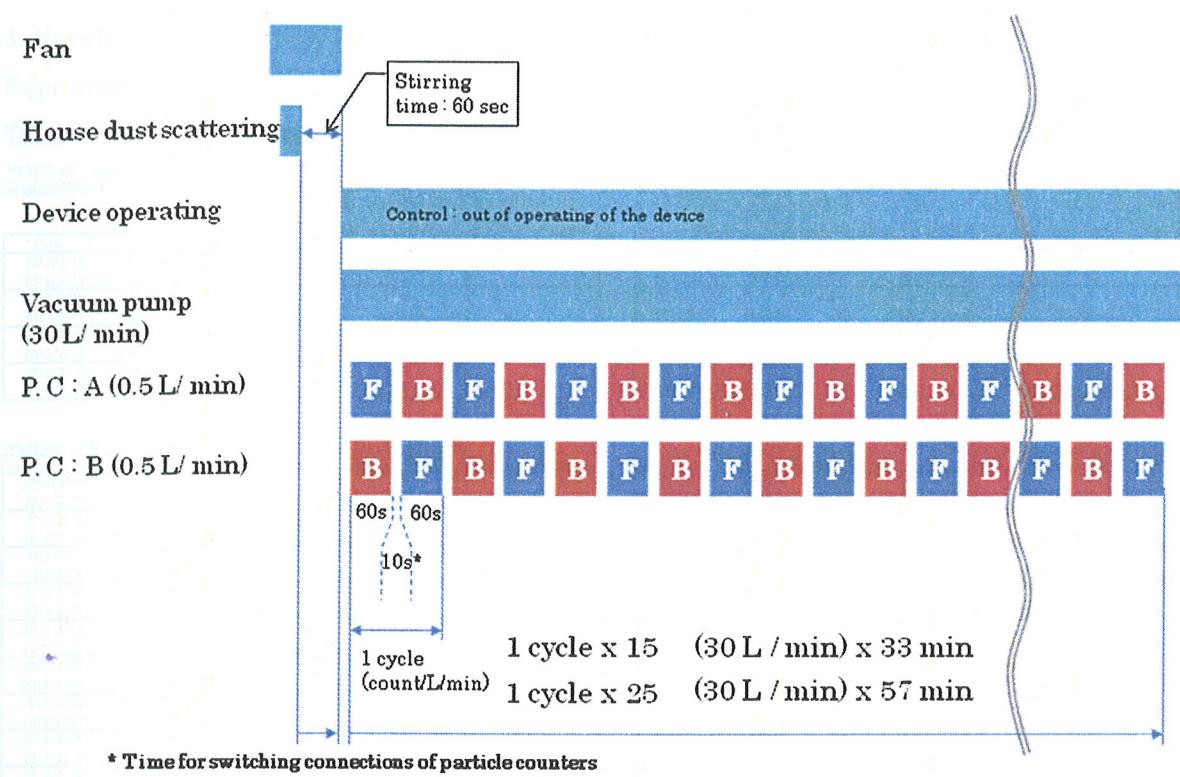


Fig. 2. Test flow of Experiment 1

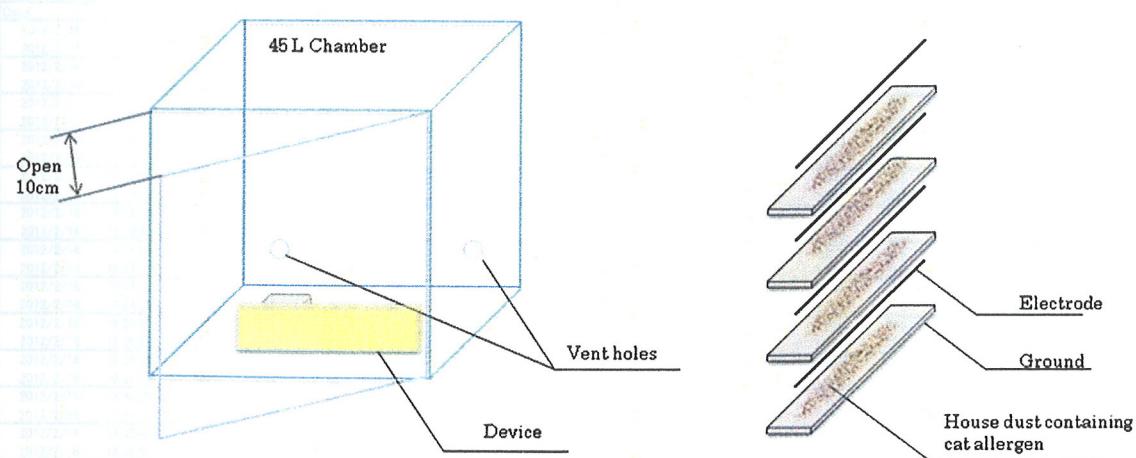


Fig. 3. Equipment for Experiment 2

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Table 3. Data of particle counting at Front and Back points (100 mg of house dust)

(Upper : 1 min/PC:A, Lower:2 min/PC:B)

BG

Date	Time	0.3um inlet outlet	0.5um inlet outlet	1um inlet outlet	2um inlet outlet	5um inlet outlet
2012/2/16	16:40:20	820	575	64	34	1
2012/2/16	16:41:30	714	667	44	61	6
2012/2/16	16:42:40	812	646	68	37	7
2012/2/16	16:43:50	715	685	38	44	4
2012/2/16	16:45:00	817	598	70	33	4
2012/2/16	16:46:10	712	723	36	57	2
2012/2/16	16:47:20	788	544	58	38	2
2012/2/16	16:48:30	772	898	58	57	7
BG		平均	768.8	667.0	54.5	45.1
(Particle cout: count / 0.5L/min)						
Vacuum 60 sec+ Connection 10 sec						

(Upper : 1 min/PC:A, Lower:2 min/PC:B)

House dust : 100mg, Device:ON

Date	Time	0.3um inlet outlet	0.5um inlet outlet	1um inlet outlet	2um inlet outlet	5um inlet outlet
2012/2/16	16:56:00	2,913	80	562	14	185
2012/2/16	16:57:10	2,821	104	549	20	232
2012/2/16	16:58:20	2,911	83	605	13	205
2012/2/16	16:59:30	2,422	122	428	23	155
2012/2/16	17:00:40	2,503	86	480	8	163
2012/2/16	17:01:50	2,124	111	345	17	130
2012/2/16	17:03:00	2,152	79	400	111	124
2012/2/16	17:04:10	1,955	93	342	13	131
2012/2/16	17:05:20	1,862	101	357	13	117
2012/2/16	17:06:30	1,710	104	296	9	98
2012/2/16	17:07:40	1,702	113	303	8	111
2012/2/16	17:08:50	1,539	129	235	12	69
2012/2/16	17:10:00	1,636	106	299	111	91
2012/2/16	17:11:10	1,349	91	209	12	68
2012/2/16	17:12:20	1,414	85	248	10	84
2012/2/16	17:13:30	1,285	87	188	13	83
2012/2/16	17:14:40	1,342	91	205	11	65
2012/2/16	17:15:50	1,159	78	183	15	55
2012/2/16	17:17:00	1,194	78	209	7	73
2012/2/16	17:18:10	1,082	66	157	5	54
2012/2/16	17:19:20	1,099	82	176	4	53
2012/2/16	17:20:30	1,019	97	128	12	40
2012/2/16	17:21:40	1,030	71	151	5	55
2012/2/16	17:22:50	898	84	115	8	31
2012/2/16	17:24:00	885	50	107	3	21
2012/2/16	17:25:10	866	58	130	7	39
2012/2/16	17:26:20	818	63	126	4	30
2012/2/16	17:27:30	761	73	107	10	43
2012/2/16	17:28:40	806	51	94	2	27
2012/2/16	17:29:50	712	58	76	3	23
(Particle cout: count / 0.5L/min)						
Vacuum 60 sec+ Connection 10 sec						

(Upper : 1 min/PC:A, Lower:2 min/PC:B)

House dust : 100mg, Device:OFF

Date	Time	0.3um inlet outlet	0.5um inlet outlet	1um inlet outlet	2um inlet outlet	5um inlet outlet
2012/2/16	18:07:00	3,144	2920	862	675	331
2012/2/16	18:08:10	3,106	2848	786	688	301
2012/2/16	18:09:20	2,976	2273	744	488	281
2012/2/16	18:10:30	2,551	2324	590	572	238
2012/2/16	18:11:40	2,474	1922	624	416	214
2012/2/16	18:12:50	2,268	2025	469	470	178
2012/2/16	18:14:00	2,282	1857	544	360	192
2012/2/16	18:15:10	2,011	1853	422	411	151
2012/2/16	18:16:20	1,952	1542	443	301	181
2012/2/16	18:17:30	1,750	1667	356	355	141
2012/2/16	18:18:40	1,714	1402	352	271	117
2012/2/16	18:19:50	1,535	1493	295	315	111
2012/2/16	18:21:00	1,586	1231	324	216	97
2012/2/16	18:22:10	1,349	1303	252	259	88
2012/2/16	18:23:20	1,409	1146	280	198	94
2012/2/16	18:24:30	1,244	1202	220	230	88
2012/2/16	18:25:40	1,529	1216	259	214	75
2012/2/16	18:26:50	1,156	1066	196	216	63
2012/2/16	18:28:00	1,208	932	250	144	97
2012/2/16	18:29:10	1,030	924	187	169	56
2012/2/16	18:30:20	1,044	905	192	133	65
2012/2/16	18:31:30	931	921	146	148	44
2012/2/16	18:32:40	963	816	161	113	40
2012/2/16	18:33:50	845	889	135	124	45
2012/2/16	18:35:00	845	793	154	134	45
2012/2/16	18:36:10	802	814	118	137	39
2012/2/16	18:37:20	869	708	160	91	33
2012/2/16	18:38:30	720	781	117	127	35
2012/2/16	18:39:40	772	728	120	93	38
2012/2/16	18:40:50	697	754	109	110	32
(Particle cout: count / 0.5L/min)						
Vacuum 60 sec+ Connection 10 sec						

Table 4. Data of particle counting at Front and Back points (300 mg of house dust)

		(Particle count: count / 0.5L/min) Vacuum 60 sec+ Connection 10 sec					
		(Upper : 1 min/PC:A, Lower : 2 min/PC:B)					
BG	Date	Time	0.3um inlet outlet	0.5um inlet outlet	1um inlet outlet	2um inlet outlet	5um inlet outlet
	2012/2/17	2:05:00	361	238	35	30	4
	2012/2/17	2:06:10	389	230	45	15	5
	2012/2/17	2:07:20	355	214	27	16	5
	2012/2/17	2:08:30	367	201	32	17	3
	2012/2/17	2:09:40	366	208	25	23	2
	2012/2/17	2:10:50	329	200	41	19	1
	2012/2/17	2:12:00	329	244	30	19	1
	2012/2/17	2:13:10	332	163	35	12	6
	2012/2/17	2:14:20	349	152	28	18	7
	2012/2/17	2:15:30	347	160	32	9	5
			3,580.0				
		(Particle count: count / 0.5L/min) Vacuum 60 sec+ Connection 10 sec					
		(Upper : 1 min/PC:A, Lower : 2 min/PC:B)					
House dust : 300mg, Device: ON	Date	Time	0.3um inlet outlet	0.5um inlet outlet	1um inlet outlet	2um inlet outlet	5um inlet outlet
	2012/2/17	2:25:00	6,375	93	3,439	43	1,589
	2012/2/17	2:26:10	6,681	178	3,404	78	1,612
	2012/2/17	2:27:20	5,628	174	2,896	63	1,345
	2012/2/17	2:28:30	5,410	235	2,687	113	1,281
	2012/2/17	2:29:40	5,115	227	2,616	67	1,205
	2012/2/17	2:30:50	4,662	102	2,326	39	1,059
	2012/2/17	2:32:00	4,269	240	2,114	79	948
	2012/2/17	2:33:10	3,774	211	1,820	78	833
	2012/2/17	2:34:20	3,704	173	1,933	50	830
	2012/2/17	2:35:30	3,443	244	1,639	83	756
	2012/2/17	2:36:40	3,020	199	1,454	70	615
	2012/2/17	2:37:50	2,903	207	1,345	65	583
	2012/2/17	2:39:00	2,582	184	1,250	49	533
	2012/2/17	2:40:10	2,425	209	1,114	54	497
	2012/2/17	2:41:20	2,587	191	1,222	58	541
	2012/2/17	2:42:30	2,334	194	1,039	68	458
	2012/2/17	2:43:40	2,184	166	969	39	408
	2012/2/17	2:44:50	1,819	166	765	44	319
	2012/2/17	2:46:00	1,797	166	814	34	337
	2012/2/17	2:47:10	1,600	172	899	52	319
	2012/2/17	2:48:20	1,619	130	841	27	285
	2012/2/17	2:49:30	1,436	151	868	41	200
	2012/2/17	2:50:40	1,471	129	803	33	243
	2012/2/17	2:51:50	1,361	164	532	36	229
	2012/2/17	2:53:00	1,388	97	585	16	234
	2012/2/17	2:54:10	1,106	136	429	30	178
	2012/2/17	2:55:20	1,130	112	430	11	157
	2012/2/17	2:56:30	1,052	119	361	19	145
	2012/2/17	2:57:40	1,149	136	432	19	191
	2012/2/17	3:00:00	1,004	104	390	21	138
	2012/2/17	3:01:10	879	100	324	15	130
	2012/2/17	3:02:20	821	109	296	12	108
	2012/2/17	3:03:30	788	93	269	19	107
	2012/2/17	3:04:40	865	113	288	11	114
	2012/2/17	3:05:50	762	102	256	17	98
	2012/2/17	3:07:00	791	95	247	15	118
	2012/2/17	3:08:10	692	114	207	16	89
	2012/2/17	3:09:20	729	99	236	8	73
	2012/2/17	3:10:30	700	69	211	6	70
	2012/2/17	3:11:40	711	86	233	13	77
	2012/2/17	3:12:50	574	112	188	9	78
	2012/2/17	3:14:00	611	81	190	10	68
	2012/2/17	3:15:10	575	103	141	10	56
	2012/2/17	3:16:20	574	77	159	5	53
	2012/2/17	3:17:30	517	94	125	9	47
	2012/2/17	3:18:40	582	84	148	12	44
	2012/2/17	3:19:50	513	82	139	8	45
	2012/2/17	3:21:00	508	85	132	11	46
	2012/2/17	3:22:10	498	92	119	17	45
		(Particle count: count / 0.5L/min) Vacuum 60 sec+ Connection 10 sec					
		(Upper : 1 min/PC:A, Lower : 2 min/PC:B)					
House dust : 300mg, Device: OFF	Date	Time	0.3um inlet outlet	0.5um inlet outlet	1um inlet outlet	2um inlet outlet	5um inlet outlet
	2012/2/17	3:43:00	6,655	5655	3,739	2862	1,749
	2012/2/17	3:44:10	5,362	5602	2,839	3113	1,367
	2012/2/17	3:45:20	5,295	4887	2,925	2540	1,362
	2012/2/17	3:46:30	4,366	4578	2,233	2504	1,070
	2012/2/17	3:47:40	4,151	3693	2,238	1860	1,063
	2012/2/17	3:48:50	3,880	3659	1,960	2009	929
	2012/2/17	3:50:00	3,960	3381	2,130	1755	948
	2012/2/17	3:51:10	3,438	3157	1,717	1654	755
	2012/2/17	3:52:20	3,408	2993	1,827	1461	825
	2012/2/17	3:53:30	3,109	2864	1,504	1463	705
	2012/2/17	3:54:40	2,938	2553	1,554	1,208	690
	2012/2/17	3:55:50	2,470	4590	1,026	539	554
	2012/2/17	3:57:00	2,595	2,177	1,328	1,016	550
	2012/2/17	3:58:10	2,227	2,183	1,037	1,128	467
	2012/2/17	3:59:20	2,218	1927	1,116	945	473
	2012/2/17	4:00:30	1,897	1817	886	872	397
	2012/2/17	4:01:40	1,973	1649	952	734	416
	2012/2/17	4:02:50	1,657	1642	773	722	344
	2012/2/17	4:04:00	1,624	1492	755	652	330
	2012/2/17	4:05:10	1,471	654	755	281	115
	2012/2/17	4:06:20	1,605	1385	735	599	314
	2012/2/17	4:07:30	1,339	1385	563	628	239
	2012/2/17	4:08:40	1,300	1254	567	474	221
	2012/2/17	4:09:50	1,164	1309	483	559	185
	2012/2/17	4:11:00	1,145	1068	480	408	203
	2012/2/17	4:12:10	1,048	1072	411	483	159
	2012/2/17	4:13:20	1,111	1038	464	405	194
	2012/2/17	4:14:30	958	123	307	40	144
	2012/2/17	4:15:40	998	866	410	312	169
	2012/2/17	4:16:50	885	920	322	387	112
	2012/2/17	4:18:00	879	843	369	303	157
	2012/2/17	4:19:10	797	855	293	340	122
	2012/2/17	4:20:20	818	795	294	272	105
	2012/2/17	4:21:30	752	759	239	295	95
	2012/2/17	4:22:40	750	739	291	240	114
	2012/2/17	4:23:50	675	760	233	288	92
	2012/2/17	4:25:00	689	707	264	220	103
	2012/2/17	4:26:10	642	686	220	232	89
	2012/2/17	4:27:20	633	581	193	198	81
	2012/2/17	4:28:30	614	650	190	194	86
	2012/2/17	4:29:40	584	544	1188	160	67
	2012/2/17	4:30:50	570	577	142	189	57
	2012/2/17	4:32:00	566	568	192	165	77
	2012/2/17	4:33:10	464	596	123	176	42
	2012/2/17	4:34:20	552	465	173	133	66
	2012/2/17	4:35:30	453	514	134	151	48
	2012/2/17	4:36:40	500	474	159	124	54
	2012/2/17	4:37:50	466	482	131	118	44
	2012/2/17	4:39:00	494	450	149	128	56
	2012/2/17	4:40:10	483	521	118	137	34

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試験結果は、当所に提出された試料についての値です。

Table 5. Data of particle counting at Front and Back points (the sum of counts by two P.Cs , 100 mg of house dust)

(L/2 min (Sum of PC: A and B)

BG

(Particle count: count / L/ 2 min)

1 cycle: Vacuum 60 sec+ Connection 10 sec + Vacuum 60 sec+ Connection 10 sec

Date	Time	0.3um inlet	outlet	Reduction	0.5um inlet	outlet	Reduction	1um inlet	outlet	Reduction	2um inlet	outlet	Reduction	5um inlet	outlet	Reduction
2012/2/16	16:40:20	1,534	1,242	19.0%	108	95	12.0%	13	8	38.5%	1	3	-200.0%	0	0	#DIV/0!
2012/2/16	16:42:40	1,527	1,331	12.8%	106	81	23.6%	7	10	-42.9%	1	1	0.0%	0	0	#DIV/0!
2012/2/16	16:45:00	1,529	1,321	13.6%	106	90	15.1%	6	10	-66.7%	1	0	100.0%	0	0	#DIV/0!
2012/2/16	16:47:20	1,560	1,442	7.6%	116	95	18.1%	9	5	44.4%	3	0	100.0%	0	0	#DIV/0!
BG	Mean	1,537.5	1,334.0	13.2%	109.0	90.3	17.2%	8.8	8.3	5.7%	1.5	1.0	33.3%	0.0	0.0	#DIV/0!

(Upper : 1 min/PC:A, Lower: 2 min/PC:B)

House dust : 100mg, Device: ON

(Particle count: count / L/ 2 min)

1 cycle: Vacuum 60 sec+ Connection 10 sec + Vacuum 60 sec+ Connection 10 sec

Date	Time	0.3um inlet	outlet	Reduction	0.5um inlet	outlet	Reduction	1um inlet	outlet	Reduction	2um inlet	outlet	Reduction	5um inlet	outlet	Reduction
	16:56:00	5,734	164	97.1%	1,111	34	96.9%	417	10	97.6%	148	2	98.6%	4	0	100.0%
	16:58:20	5,333	205	96.2%	1,033	36	96.5%	360	16	95.6%	131	6	95.4%	5	0	100.0%
	17:00:40	4,627	197	95.7%	825	25	97.0%	293	4	98.6%	97	3	96.9%	6	0	100.0%
	17:03:00	4,107	172	95.8%	742	24	96.8%	255	4	98.4%	83	0	100.0%	4	0	100.0%
	17:05:20	3,572	205	94.3%	653	22	96.6%	215	7	96.7%	75	3	96.0%	1	0	100.0%
	17:07:40	3,241	242	92.5%	538	20	96.3%	180	2	98.9%	54	2	96.3%	3	0	100.0%
	17:10:00	2,985	197	93.4%	508	23	95.5%	159	6	96.2%	46	0	100.0%	0	0	#DIV/0!
	17:12:20	2,699	172	93.6%	436	23	94.7%	147	11	92.5%	53	3	94.3%	2	0	100.0%
	17:14:40	2,501	169	93.2%	388	26	93.3%	120	6	95.0%	37	2	94.6%	0	0	#DIV/0!
	17:17:00	2,276	144	93.7%	366	12	96.7%	127	3	97.6%	39	0	100.0%	0	0	#DIV/0!
	17:19:20	2,118	179	91.5%	304	16	94.7%	93	5	94.6%	26	1	96.2%	0	0	#DIV/0!
	17:21:40	1,928	155	92.0%	266	13	95.1%	86	0	100.0%	28	0	100.0%	3	0	100.0%
	17:24:00	1,751	108	93.8%	237	10	95.8%	60	2	96.7%	18	1	94.4%	0	0	#DIV/0!
	17:26:20	1,579	136	91.4%	233	14	94.0%	73	0	100.0%	20	0	100.0%	0	0	#DIV/0!
	17:28:40	1,518	109	92.8%	170	5	97.1%	50	1	98.0%	15	0	100.0%	0	0	#DIV/0!
Total count of particle		45,969	2,554	94.4%	7,810	303	96.1%	2,635	77	97.1%	870	23	97.4%	28	0	100.0%

(Upper : 1 min/PC:A, Lower: 2 min/PC:B)

House dust : 100mg, Device: OFF

(Particle count: count / L/ 2 min)

1 cycle: Vacuum 60 sec+ Connection 10 sec + Vacuum 60 sec+ Connection 10 sec

Date	Time	0.3um inlet	outlet	Reduction	0.5um inlet	outlet	Reduction	1um inlet	outlet	Reduction	2um inlet	outlet	Reduction	5um inlet	outlet	Reduction
	18:07:00	6,250	5,768	7.7%	1,648	1,363	17.3%	632	509	19.5%	208	185	11.1%	10	11	-10.0%
	18:09:20	5,527	4,597	16.8%	1,334	1,060	20.5%	519	424	18.3%	176	150	14.8%	4	6	-50.0%
	18:11:40	4,742	3,947	16.8%	1,093	886	18.9%	392	314	19.9%	121	98	19.0%	6	3	50.0%
	18:14:00	4,293	3,710	13.6%	966	771	20.2%	343	263	23.3%	100	84	16.0%	7	5	28.6%
	18:16:20	3,702	3,209	13.3%	799	656	17.9%	322	229	28.9%	112	61	45.5%	4	3	25.0%
	18:18:40	3,249	2,895	10.9%	647	566	9.4%	228	203	11.0%	67	72	-7.5%	3	2	33.3%
	18:21:00	2,935	2,534	13.7%	576	475	17.5%	185	173	6.5%	55	62	-12.7%	2	1	50.0%
	18:23:20	2,653	2,348	11.5%	500	428	14.4%	182	135	25.8%	64	44	31.3%	1	0	100.0%
	18:25:40	2,685	2,282	15.0%	455	430	5.5%	138	129	6.5%	40	41	-2.5%	1	1	0.0%
	18:28:00	2,238	1,856	17.1%	437	313	28.4%	153	95	37.9%	48	23	52.1%	2	0	100.0%
	18:30:20	1,975	1,826	7.5%	338	281	16.9%	109	81	25.7%	33	24	27.3%	0	0	#DIV/0!
	18:32:40	1,808	1,705	5.7%	296	237	19.9%	85	71	16.5%	30	26	13.3%	0	0	#DIV/0!
	18:35:00	1,647	1,607	2.4%	272	271	0.4%	84	83	1.2%	22	26	-18.2%	2	0	100.0%
	18:37:20	1,589	1,489	6.3%	277	218	21.3%	68	65	4.4%	14	12	14.3%	1	0	100.0%
	18:39:40	1,469	1,482	-0.9%	229	203	11.4%	70	64	8.6%	12	17	-41.7%	0	2	#DIV/0!
Total count of particle		46,762	41,255	11.8%	9,867	8,178	17.1%	3,510	2,838	19.1%	1,102	925	16.1%	43	34	20.9%

Table 6. Data of particle counting at Front and Back points (the sum of counts by two PCAs, 300 mg of house dust)

1L/2 min (Sum of PC: A and B)											
(Particle count, count / L/ 2 min)											
1 cycle: Vacuum 60 sec+ Connection 10 sec + Vacuum 60 sec+ Connection 10 sec											
BG	Date	Time	0.3um inlet	outlet	induction ra	0.5um inlet	outlet	induction ra	1um inlet	outlet	induction ra
	2012/2/17	2:05:00	750	468	37.6%	80	45	43.8%	9	7	22.2%
	2012/2/17	2:07:20	722	415	42.6%	59	33	44.1%	8	4	50.0%
	2012/2/17	2:08:30									
	2012/2/17	2:09:40	751	416	44.6%	66	42	36.4%	3	3	0.0%
	2012/2/17	2:10:50	661	407	38.4%	65	31	52.3%			
	2012/2/17	2:12:10									
	2012/2/17	2:14:20	696	312	55.2%	60	29	58.3%	12	2	83.3%
	2012/2/17	2:15:30									
BG	Mean		716.0	403.6		66.0	35.2		7.8	4.0	
1 cycle : 1L/ 2 min (Sum of PC: A and B)											
(Particle count, count / L/ 2 min)											
House dust : 300mg Device: ON											
Date	Time	0.3um inlet	outlet	induction ra	0.5um inlet	outlet	induction ra	1um inlet	outlet	induction ra	
2012/2/17	2:25:00	13,056	272	97.9%	6,843	121	98.2%	3,201	52	98.4%	
	2:27:20	11,038	409	96.3%	5,583	176	96.8%	2,626	72	97.3%	
	2:29:40	9,777	420	99.7%	4,912	136	97.2%	2,231	56	97.5%	
	2:32:00	8,043	451	94.4%	3,944	157	96.0%	1,781	62	96.6%	
	2:34:20	7,147	417	94.2%	3,372	133	98.3%	1,586	52	96.7%	
	2:36:40	5,923	406	93.1%	2,799	135	95.2%	1,198	53	95.6%	
	2:39:00	5,007	393	92.2%	2,364	103	95.6%	1,030	37	96.4%	
	2:41:20	4,921	385	92.2%	2,261	126	94.4%	999	51	94.9%	
	2:43:40	4,003	332	91.7%	1,734	83	95.2%	727	32	95.6%	
	2:46:00	3,487	338	90.3%	1,513	86	94.3%	656	38	94.2%	
	2:48:20	3,055	284	90.7%	1,279	68	94.7%	545	18	96.7%	
	2:50:40	2,832	282	89.7%	1,138	69	93.9%	472	24	94.9%	
	2:53:00	2,494	233	90.7%	1,014	46	95.5%	412	10	97.6%	
	2:55:20	2,182	231	89.4%	791	30	96.2%	302	10	96.7%	
	2:57:40	2,145	256	88.1%	781	37	95.3%	318	9	97.2%	
	3:00:00	1,883	204	89.2%	714	36	98.0%	268	8	97.0%	
	3:02:20	1,809	202	87.4%	565	31	94.5%	215	5	97.7%	
	3:04:40	1,607	215	88.6%	544	28	94.9%	212	5	97.6%	
	3:07:00	1,483	209	85.9%	494	30	93.9%	207	6	97.1%	
	3:09:20	1,429	168	88.2%	447	14	96.9%	143	2	98.0%	
	3:11:40	1,285	198	84.6%	421	22	94.8%	155	4	97.4%	
	3:14:00	1,186	184	84.5%	331	20	94.0%	124	5	96.0%	
	3:16:20	1,091	171	84.3%	284	14	95.1%	100	2	98.0%	
	3:18:40	1,095	166	84.8%	287	20	93.0%	89	4	95.5%	
	3:21:00	1,006	177	82.4%	251	28	88.8%	91	4	95.6%	
Total count of particle		85,110	5,119	94.0%	40,525	1,506	96.3%	18,084	576	96.8%	
1 cycle : 1L/ 2 min (Sum of PC: A and B)											
(Particle count, count / L/ 2 min)											
House dust : 300mg Device: OFF											
Date	Time	0.3um inlet	outlet	induction ra	0.5um inlet	outlet	induction ra	1um inlet	outlet	induction ra	
2012/2/17	3:43:00	12,017	11,257	6.3%	6,578	5,975	9.2%	3,116	2,839	8.9%	
	3:45:20	9,661	9,465	2.0%	5,158	5,044	2.2%	2,432	2,446	-0.6%	
	3:47:40	8,031	7,352	8.5%	4,198	3,869	7.8%	1,992	1,786	10.3%	
	3:50:00	7,398	6,538	11.6%	3,847	3,409	11.4%	1,703	1,628	4.4%	
	3:52:20	6,517	5,857	10.1%	3,331	2,924	12.2%	1,530	1,336	12.7%	
	3:54:40	5,388	5,012	7.0%	2,700	2,502	7.3%	1,229	1,096	10.8%	
	3:57:00	4,822	4,340	10.0%	2,363	2,142	9.4%	1,047	954	9.9%	
	3:59:20	4,115	3,744	9.0%	2,002	1,817	9.2%	870	819	5.9%	
	4:01:40	3,630	3,291	9.3%	1,725	1,506	12.7%	760	640	15.8%	
	4:04:00	3,095	3,136	-1.3%	1,409	1,407	0.1%	611	607	0.7%	
	4:06:20	2,944	2,770	5.9%	1,298	1,227	5.9%	553	564	-2.0%	
	4:08:40	2,464	2,363	-4.0%	1,050	1,033	1.6%	406	429	-5.7%	
	4:11:00	2,191	2,145	2.1%	891	869	2.5%	362	342	5.5%	
	4:13:20	2,069	2,011	2.6%	871	809	7.1%	338	346	-2.4%	
	4:15:40	1,871	1,786	4.6%	742	699	5.8%	281	258	8.2%	
	4:18:00	1,676	1,698	-1.3%	662	643	2.9%	279	245	12.2%	
	4:20:20	1,570	1,554	1.0%	533	567	-6.4%	200	241	-20.5%	
	4:22:40	1,425	1,499	-5.2%	524	528	-0.8%	206	191	7.3%	
	4:25:00	1,331	1,393	-4.7%	484	452	6.6%	192	172	10.4%	
	4:27:20	1,247	1,231	1.3%	383	392	-2.3%	167	126	24.6%	
	4:29:40	1,164	1,121	3.7%	350	349	0.3%	124	149	-20.2%	
	4:32:00	1,030	1,163	-12.9%	315	341	-8.3%	119	113	5.0%	
	4:34:20	1,005	979	2.6%	307	284	7.5%	114	102	10.5%	
	4:36:40	966	956	1.0%	290	242	16.6%	98	87	11.2%	
	4:39:00	977	971	0.6%	265	265	0.0%	90	94	-4.4%	
Total count of particle		76,213	71,267	6.5%	38,165	35,232	7.7%	17,230	16,090	6.6%	

社印もしくは測定実施者印のないも、コピーされたものは正式な報告書としてみとめられません。本報告書を他に転載・引用される場合は、弊社の承諾を受けてください。

試験結果は、当所に提出された試料についての値です。

Table 7. Data of particle counting at Front and Back points after subtraction of blank data (100 mg of house dust)

(Particle count: count / L / 2 min) 1 cycle: Vacuum 60 sec+ Connection 10 sec + Vacuum 60 sec+ Connection 10 sec																
BG	Mean	1,537.5	1,334.0	13.2%	109.0	90.3	17.2%	8.8	8.3	5.7%	1.5	1.0	33.3%	0.0	0.0	#DIV/0!
-BG 1 cycle: 1L/2 min (Sum of PC: A and B) House dust : 100mg, Device: ON																
(Particle count: count / L / 2 min) 1 cycle: Vacuum 60 sec+ Connection 10 sec + Vacuum 60 sec+ Connection 10 sec																
Date	Time	0.3μm inlet	outlet	Reduction r	0.5μm inlet	outlet	Reduction r	1μm inlet	outlet	Reduction r	2μm inlet	outlet	Reduction r	Sum inlet	outlet	Reduction r
2012/2/16	16:56:00	4,197	0	100.0%	1,002	0	100.0%	408	2	99.6%	147	1	99.3%	4	0	100.0%
	16:58:20	3,796	0	100.0%	924	0	100.0%	351	8	97.8%	130	5	96.1%	5	0	100.0%
	17:00:40	3,090	0	100.0%	716	0	100.0%	284	0	100.0%	96	2	97.8%	6	0	100.0%
	17:03:00	2,570	0	100.0%	633	0	100.0%	246	0	100.0%	82	0	100.0%	4	0	100.0%
	17:05:20	2,035	0	100.0%	544	0	100.0%	206	0	100.0%	74	2	97.3%	1	0	100.0%
	17:07:40	1,704	0	100.0%	429	0	100.0%	171	0	100.0%	53	1	98.1%	3	0	100.0%
	17:10:00	1,448	0	100.0%	398	0	100.0%	150	0	100.0%	45	0	100.0%	0	0	#DIV/0!
	17:12:20	1,162	0	100.0%	327	0	100.0%	138	3	98.0%	52	2	96.1%	2	0	100.0%
	17:14:40	964	0	100.0%	279	0	100.0%	111	0	100.0%	36	1	97.2%	0	0	#DIV/0!
	17:17:00	739	0	100.0%	257	0	100.0%	118	0	100.0%	38	0	100.0%	0	0	#DIV/0!
	17:19:20	581	0	100.0%	195	0	100.0%	84	0	100.0%	25	0	100.0%	0	0	#DIV/0!
	17:21:40	391	0	100.0%	157	0	100.0%	77	0	100.0%	27	0	100.0%	3	0	100.0%
	17:24:00	214	0	100.0%	128	0	100.0%	51	0	100.0%	17	0	100.0%	0	0	#DIV/0!
	17:26:20	42	0	100.0%	124	0	100.0%	64	0	100.0%	19	0	100.0%	0	0	#DIV/0!
	17:28:40	0	0	#DIV/0!	61	0	100.0%	41	0	100.0%	14	0	100.0%	0	0	#DIV/0!
Total count of particle		22,926	0	100.0%	6,175	0	100.0%	2,504	12	99.5%	848	14	98.3%	28	0	100.0%
-BG 1 cycle: 1L/2 min (Sum of PC: A and B) House dust : 100mg, Device: OFF																
(Particle count: count / L / 2 min) 1 cycle: Vacuum 60 sec+ Connection 10 sec + Vacuum 60 sec+ Connection 10 sec																
Date	Time	0.3μm inlet	outlet	Reduction r	0.5μm inlet	outlet	Reduction r	1μm inlet	outlet	Reduction r	2μm inlet	outlet	Reduction r	Sum inlet	outlet	Reduction r
2012/2/16	18:07:00	4,713	4,434	5.9%	1,539	1,273	17.3%	623	501	19.7%	207	184	10.9%	10	11	-10.0%
	18:09:20	3,990	3,263	18.2%	1,225	970	20.8%	510	416	18.5%	175	149	14.6%	4	6	-50.0%
	18:11:40	3,205	2,613	18.5%	984	796	19.1%	383	306	20.2%	120	97	18.8%	6	3	50.0%
	18:14:00	2,756	2,376	13.8%	857	681	20.8%	334	255	23.8%	99	83	15.7%	7	5	28.6%
	18:16:20	2,165	1,875	13.4%	690	566	18.0%	313	221	29.5%	111	60	45.7%	4	3	25.0%
	18:18:40	1,712	1,561	8.8%	538	496	7.9%	219	195	11.2%	66	71	-8.4%	3	2	33.3%
	18:21:00	1,398	1,200	14.1%	467	385	17.0%	176	165	6.5%	54	61	-14.0%	2	1	50.0%
	18:23:20	1,116	1,014	9.1%	391	338	13.6%	173	127	26.8%	63	43	31.2%	1	0	100.0%
	18:25:40	1,148	948	17.4%	346	340	1.8%	129	121	6.6%	39	40	-3.9%	1	1	0.0%
	18:28:00	701	522	25.5%	328	223	32.1%	144	87	39.9%	47	22	52.7%	2	0	100.0%
	18:30:20	438	492	-12.5%	229	191	16.7%	100	73	27.4%	32	23	27.0%	0	0	#DIV/0!
	18:32:40	271	371	-37.2%	187	147	21.5%	76	63	17.7%	29	25	12.3%	0	0	#DIV/0!
	18:35:00	110	273	-149.3%	163	181	-10.9%	75	75	0.7%	21	25	-22.0%	2	0	100.0%
	18:37:20	52	155	-201.0%	168	128	24.0%	59	57	4.2%	13	11	12.0%	1	0	100.0%
	18:39:40	0	148	#DIV/0!	120	113	6.0%	61	56	9.0%	11	16	-52.4%	0	2	#DIV/0!
Total count of particle		23,769	21,245	10.8%	8,232	6,924	17.1%	3,379	2,714	19.7%	1,080	910	15.7%	43	34	20.9%

Table 8. Data of particle counting at Front and Back points after subtraction of blank data
(300 mg of house dust)

(Particle count : count / L / 2 min) 1 cycle: Vacuum 60 sec+ Connection 10 sec + Vacuum 60 sec+ Connection 10 sec													
BG	Mean	716.0	403.6	66.0	35.2	7.8	4.0	1.4	0.2	0.4	0.0		
-BG 1 cycle: 1L/2 min (Sum of PC: A and B) House dust : 300mg, Device: ON													
(Particle count : count / L / 2 min) 1 cycle: Vacuum 60 sec+ Connection 10 sec + Vacuum 60 sec+ Connection 10 sec													
Date	Time	0.3um inlet	outlet	Reduction	0.5um inlet	outlet	Reduction	1um inlet	outlet	Reduction	2um inlet	outlet	Reduction
2012/2/17	2:25:00	12,340	0	100.0%	6,777	86	98.7%	3,193	48	98.5%	1,120	18	98.4%
	2:27:20	10,322	5	99.9%	5,517	141	97.4%	2,618	68	97.4%	943	25	97.4%
	2:29:40	9,061	16	99.8%	4,846	101	97.9%	2,223	52	97.7%	749	25	96.7%
	2:32:00	7,327	47	99.4%	3,878	122	96.9%	1,773	58	96.7%	624	22	96.5%
	2:34:20	6,431	13	99.8%	3,506	98	97.2%	1,578	48	97.0%	525	19	96.4%
	2:36:40	5,207	2	100.0%	2,733	100	96.3%	1,190	49	95.9%	374	20	94.7%
	2:39:00	4,291	0	100.0%	2,298	68	97.0%	1,022	33	96.8%	352	9	97.5%
	2:41:20	4,205	0	100.0%	2,195	91	95.9%	991	47	95.3%	326	14	95.8%
	2:43:40	3,287	0	100.0%	1,668	48	97.1%	719	28	96.1%	228	7	97.0%
	2:46:00	2,771	0	100.0%	1,447	51	96.5%	648	34	94.8%	211	10	95.3%
	2:48:20	2,339	0	100.0%	1,213	33	97.3%	537	14	97.4%	172	8	95.5%
	2:50:40	2,116	0	100.0%	1,069	34	96.8%	464	20	95.7%	150	10	93.4%
	2:53:00	1,778	0	100.0%	948	11	98.9%	404	6	98.5%	111	4	96.6%
	2:55:20	1,466	0	100.0%	725	0	100.0%	294	6	98.0%	86	1	99.1%
	2:57:40	1,429	0	100.0%	715	2	99.7%	310	5	98.4%	92	2	98.0%
	3:00:00	1,167	0	100.0%	648	1	99.9%	260	4	98.5%	79	3	96.4%
	3:02:20	893	0	100.0%	499	0	100.0%	207	1	99.5%	55	1	98.5%
	3:04:40	891	0	100.0%	478	0	100.0%	204	1	99.5%	52	1	98.4%
	3:07:00	767	0	100.0%	428	0	100.0%	199	2	99.0%	53	0	100.4%
	3:09:20	713	0	100.0%	381	0	100.0%	135	0	100.0%	42	1	98.1%
	3:11:40	569	0	100.0%	355	0	100.0%	147	0	100.0%	40	3	92.9%
	3:14:00	470	0	100.0%	265	0	100.0%	116	1	99.1%	25	3	88.6%
	3:16:20	375	0	100.0%	218	0	100.0%	92	0	100.0%	24	0	100.8%
	3:18:40	379	0	100.0%	221	0	100.0%	81	0	100.0%	19	0	101.1%
	3:21:00	290	0	100.0%	185	0	100.0%	83	0	100.0%	19	1	95.7%
Total count of particle		80,884	85	99.9%	43,213	984	97.7%	19,493	525	97.3%	6,461	202	96.9%
-BG 1 cycle: 1L/2 min (Sum of PC: A and B) House dust : 100mg, Device: OFF													
(Particle count : count / L / 2 min) 1 cycle: Vacuum 60 sec+ Connection 10 sec + Vacuum 60 sec+ Connection 10 sec													
Date	Time	0.3um inlet	outlet	Reduction	0.5um inlet	outlet	Reduction	1um inlet	outlet	Reduction	2um inlet	outlet	Reduction
2012/2/17	3:43:00	11,301	10,853	4.0%	6,512	5,940	8.8%	3,108	2,835	8.8%	1,148	1,024	10.8%
	3:45:20	8,945	9,061	-1.3%	5,092	5,009	1.6%	2,424	2,442	-0.7%	828	871	-5.2%
	3:47:40	7,315	6,948	5.0%	4,132	3,834	7.2%	1,984	1,782	10.2%	703	612	12.9%
	3:50:00	6,682	6,134	8.2%	3,781	3,374	10.8%	1,695	1,624	4.2%	584	562	3.7%
	3:52:20	5,801	5,453	6.0%	3,265	2,889	11.5%	1,522	1,332	12.5%	516	443	14.1%
	3:54:40	4,672	4,608	1.4%	2,634	2,467	6.3%	1,221	1,092	10.6%	388	356	8.2%
	3:57:00	4,106	3,936	4.1%	2,299	2,107	8.4%	1,039	950	8.6%	348	312	10.3%
	3:59:20	3,399	3,340	1.7%	1,936	1,762	8.0%	862	815	5.5%	273	266	2.5%
	4:01:40	2,914	2,887	0.9%	1,659	1,471	11.3%	752	636	15.4%	235	214	8.9%
	4:04:00	2,379	2,732	-14.9%	1,343	1,372	-2.1%	603	603	0.0%	197	186	5.5%
	4:06:20	2,228	2,366	-6.2%	1,232	1,192	3.3%	545	560	-2.7%	182	177	2.6%
	4:08:40	1,748	2,159	-23.5%	984	998	-1.4%	398	425	-6.7%	116	138	-19.2%
	4:11:00	1,475	1,741	-18.1%	825	834	-1.1%	354	338	4.6%	117	105	10.1%
	4:13:20	1,353	1,607	-18.8%	805	774	3.9%	330	342	-3.6%	99	117	-18.5%
	4:15:40	1,155	1,382	-19.7%	676	664	1.8%	273	254	7.0%	85	62	27.0%
	4:18:00	960	1,294	-34.8%	596	608	-2.0%	271	241	11.1%	96	77	19.7%
	4:20:20	854	1,150	-34.7%	467	532	-13.9%	192	237	-23.3%	62	66	-6.8%
	4:22:40	709	1,095	-54.5%	458	493	-7.6%	198	187	5.7%	52	35	32.6%
	4:25:00	615	989	-60.9%	418	417	0.3%	184	168	8.8%	51	62	-22.1%
	4:27:20	531	827	-55.8%	317	357	-12.6%	159	122	23.4%	58	42	27.4%
	4:29:40	448	717	-60.1%	284	314	-10.5%	116	145	-24.6%	36	41	-14.6%
	4:32:00	314	759	-141.8%	249	306	-22.8%	111	109	2.0%	30	28	6.1%
	4:34:20	289	575	-99.1%	241	249	-3.2%	106	98	7.7%	31	35	-13.7%
	4:36:40	250	552	-121.0%	224	207	7.7%	90	83	8.0%	24	27	-13.6%
	4:39:00	261	567	-117.4%	199	230	-15.5%	82	90	-9.5%	17	23	-37.3%
Total count of particle		70,704	73,742	-4.3%	40,628	38,415	5.4%	18,624	17,510	6.0%	6,266	5,876	6.2%

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試験結果は、当所に提出された試料についての値です。

Experiment 1

Table 9. Effect of the device to reduce cat allergen in air (House dust : 100mg)

	Not operating	Operating
Concentration (ng/ml) (Ratio)	1.83	0.11 (94.2%)

Table 10. Effect of the device to reduce cat allergen in air (House dust : 300mg)

	Not operating	Operating
Concentration (ng/ml) (Ratio)	37.67	1.09 (97.1%)

Experiment 2

Table 11. Effect to reduce cat allergen by electric discharging from the device

	Pre	6 hrs	12 hrs	24 hrs
Concentration ($\mu\text{g/g}$) (Ratio)	122.85	37.46 (69.5%)	78.23 (36.3%)	78.11 (36.4%)

6. Summary

- 1) Exp 1: Evaluation test for the device to enable to decrease the levels of particles and cat allergen in air
- Function of the device for MSZ-FH to reduce the counts of particles in air and cat allergen in house dust was investigated in this test.
 - An acrylic chamber ($1m^3$) with one pass structure was used in this test. House dust was scattered into the chamber in which 4 fans were put. With stirring house dust in air in the chamber, the air was vacuumed to pass through the device.
 - Particle counts in air at Front and Back point from the device were measured by two particle counters. The concentration of cat allergen (Fel d 1) of the extracts from the filter, on which house dust in air through the device was trapped, was measured by sandwich ELISA.
 - Using 100 mg of house dust, at operating the device, particle counts at Back point were dramatically decreased compared with those at Front point in all sizes of particle (0.3 mm: Front; 22,926, Back; 0 counts/L, 0.5 mm: Front; 6,175, Back; 0 counts/L, 1.0 mm: Front; 2,504, Back; 12 counts/L, 2.0 mm: Front; 848, Back; 14 counts/L, >5 mm: Front; 28, Back; 0 counts/L). On the other hand, at not operating it, the effect was not observed (0.3 mm: Front; 23,768, Back; 21,245 counts/L, 0.5 mm: Front; 8,232, Back; 6,824 counts/L, 1.0 mm: Front; 3,379, Back; 2,714 counts/L, 2.0 mm: Front; 1,080, Back; 910 counts/L, >5 mm: Front; 43, Back; 34 counts/L).
 - Using 300 mg of house dust, at operating the device, particle counts at Back point were also dramatically decreased compared with those at Front point in all sizes of particle (0.3 mm: Front; 80,884, Back; 85 counts/L, 0.5 mm: Front; 43,213, Back; 984 counts/L, 1.0 mm: Front; 19,493, Back; 525 counts/L, 2.0 mm: Front; 6,461, Back; 202 counts/L, >5 mm: Front; 235, Back; 9 counts/L). At not operating it, the effect was not observed; 0.3 mm: Front; 70,704, Back; 73,742 counts/L, 0.5 mm: Front; 40,628, Back;

38,415 counts/L, 1.0 mm: Front; 18,624, Back; 17,510 counts/L, 2.0 mm: Front; 6,266, Back; 5,876 counts/L, >5 mm : Front; 218, Back; 236 counts/L.

- At the device operating, the reduction ratios of particle counts were 100 % (0.3 mm), 100 % (0.5 mm), 99.5 % (1.0 mm), 98.3 % (2.0 mm), and 100 % (>5 mm) at a dosage of 100 mg of house dust. In contrast, without the device operating, the reduction ratios of particle counts were dramatically found to be lower; 0 % (0.3 mm), 5.4 % (0.5 mm), 6.0 % (1.0 mm), 6.2 % (2.0 mm), and 0 % (>5 mm).
- The reduction effect of the device against cat allergen in house dust was. The concentrations of cat allergen were 0.11 and 1.09 ng/ml at doses of 100 and 300 mg of house dusts, respectively at the device operating. At the device not operating, those were 1.83 and 37.67 ng/ml at doses of 100 and 300 mg of house dusts, respectively. Based on the data, the reduction ratios against cat allergen were 94.2 and 97.1 % at doses of 100 and 300 mg of house dusts, respectively. In every condition, the concentrations of cat allergen were found to be lower at the device operating.
- These findings indicate that the device has function to decrease particles and cat allergen in house dust in air.

2) Exp 2: The effect of the device to enable to inactivate cat allergen in house dust

- On this experiment, it was investigated whether the electric discharging from the device could inactivate cat allergen in house dust on the ground in 45L chamber.
- After electric discharging to house dust scattered on the ground, the house dust was collected. The concentration of cat allergen in extract solution from the house dust was measured by sandwich ELISA.
- The concentrations of cat allergens in house dusts exposed to the electric discharging for 0, 6, 12, and 24 hours were 122.85, 37.46, 78.23, and 78.11 ($\mu\text{g}/\text{ml}$), respectively.

The reduction ratios were 69.5 (6 hrs), 30.7 (12 hrs), 36.4 % (24 hrs).

- It was unexpected that the allergen concentration was lower at 6 hour-exposure compared with those at 12 and 24 hour-exposure. There are two possibilities to attribute to the result. One is that the amounts of cat allergen were not equable among house dust samples. But it was unlikely based on past experiment results of us. Another is due to the difference of the surface area of house dust exposed to the electric discharging on the ground. It is speculated that monolayer of the house dust may be efficiently affected by the electric discharging compared with multiple layer of it. It was possible that the layers of house dusts on the ground at 12 and 24 hours might be piled much more than that at 6 hours, so that effect of electric discharging to house dust was diminished. Therefore, reduction effect at 12 or 24 hour discharging similar to that at 6 hours could be observed on condition that on each sample is exposed equally to the electric discharging.
- Compared with non exposed sample, all the samples exposed to electric discharging showed reduction of the concentrations of cat allergen, indicating that the device has function to decrease cat allergen in house dust.

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