Recycling by washing the CNP filter

The following is a summary of the results of a washing and reuse test. Use the conclusions as guidelines. The technique below may not suit all types of oil mist.

Specimen and detergent used for wash and reuse tests

Specimen

CNPF-5010 (size: 610 mm × 610 mm × 10 mm)

Detergent

P3 T5000 alkaline low-foaming liquid detergent
(Manufacturer: Henkel Japan Ltd.)

* Concentration: 10 to 20% (specified in the manufacturer's brochure)
* Handling precautions (For more information, refer to the manufacturer's brochure and MSDS.)
  Use an iron or stainless steel tank. This detergent is a strong alkali. Just as when handling caustic soda, wear protective goggles, gloves, and other appropriate protection. In the case of eye contact, flush the eyes with clean running water for 15 minutes. Apply a 2% boric acid solution to the eye and consult an ophthalmologist.

Washing and reuse test method (alkali washing + pressure washing)

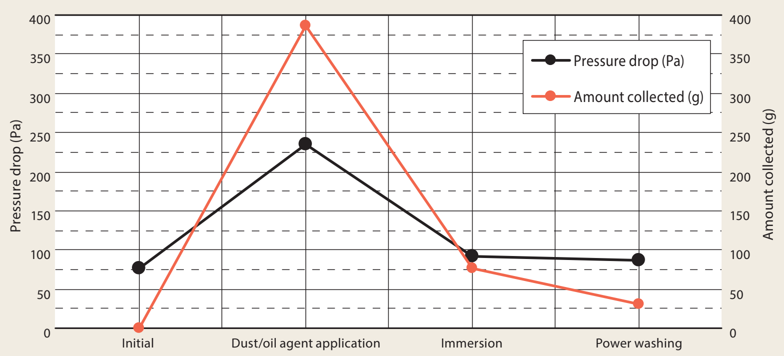
(1) Measure the initial pressure drop and the initial product weight of the CNPF-5010.
(2) Apply dummy dust to the CNPF-5010 using a dust feeder, followed by water-soluble oil agent used in a machining center in the form of mist. Apply the dust and the mist alternately until the pressure drop triples initial levels.
(3) Allow the filter to stand and dry until its weight ceases to change. Measure the pressure drop and weight.
(4) Dilute 2 L of detergent with 8 L of tap water to make 10 L of 20% detergent solution.
(5) Immerse the CNPF-5010 to which dust and oil agent were applied with its inflow side facing up in the detergent solution for 30 minutes.
(6) After 30 minutes of immersion, remove the CNPF-5010 from the detergent solution.
(7) Allow the filter to stand and dry until its weight ceases to change. Measure the pressure drop and weight.
(8) Place the tip of the gun of a pressure washer (FBN-401 made by Iris Ohyama Inc.) 1 m from the outflow surface of the CNPF-5010 and wash the filter with the pressure washer using tap water.
(9) Allow the filter to stand and dry until its weight ceases to change and measure the pressure drop and weight.

Washing and reuse test results

Before washing

After washing

Results of washing and reuse testing of the CNPF-5010



* As shown by the photographs to the left and the chart, the filter is restored to close to its original condition.

Disposal of wastewater after washing

Dispose of wastewater in accordance with applicable local ordinances and laws.

* Whether washing involves an alkali detergent solution or power washing with tap water, any wastewater used for washing of the CNP filter is industrial waste.
  Please consult your industrial waste disposal operator concerning wastewater disposal.

AQC Corporation

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ISO 9001 ISO 14001

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Contact

Specifications for all products herein are subject to change without notice. CNPC17-08 (12-08)

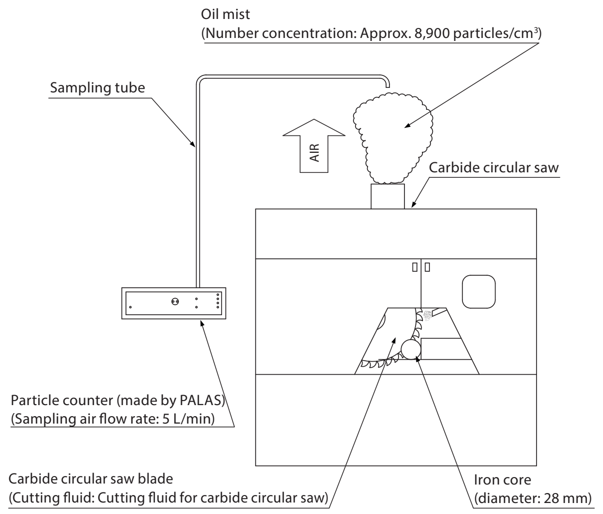
Oil mist filters

CNP filter

Long-life and low pressure drop filter to effectively collect oil mist and other particles

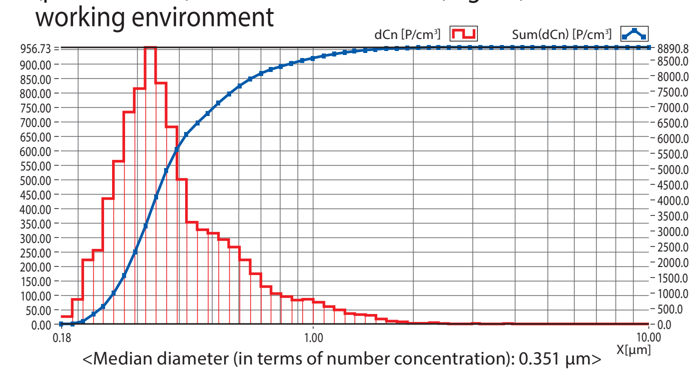
Measuring oil mist distributions in working environments

Schematic diagram of working environment measurements

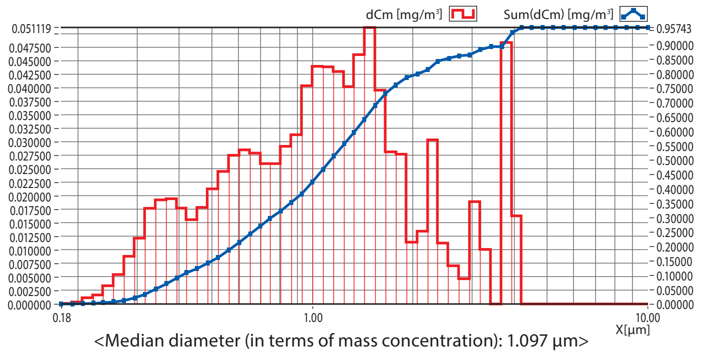


* The particle counter is portable to allow as-needed evaluations of actual working environments.

Distributions of particle sizes over number concentrations (particles/cm³) /mass concentrations (mg/m³) in an actual working environment



<Median diameter (in terms of number concentration): 0.351 µm>



<Median diameter (in terms of mass concentration): 1.097 µm>

Mass-based total collection efficiency

We use the following formula to calculate mass-based total collection efficiency:

Mass-based total collection efficiency

$$= \frac{\text{(Sum of D} - \text{sum of E)}}{\text{Sum of D}} \times 100\ (\%)$$

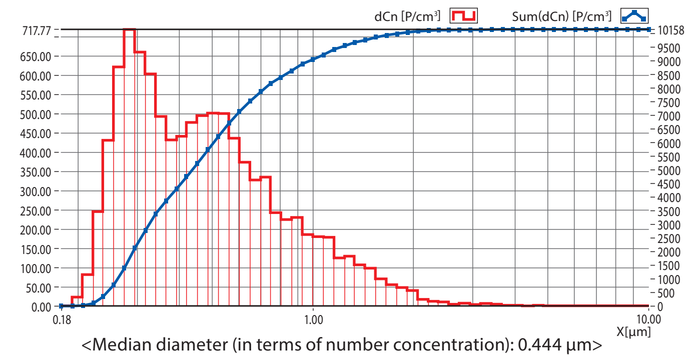
D = A × C
E = B × C
C = Volume of each particle (test particles assumed to be spherical) × specific gravity of test particle

* Total collection efficiency in this brochure refers to initial efficiency.

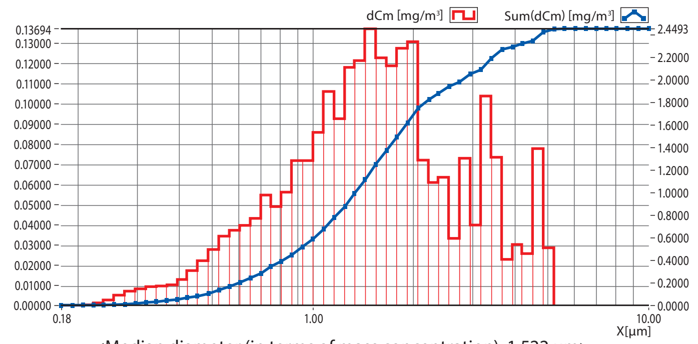
A: Number of particles per unit volume for each particle size on the filter's upstream side
B: Number of particles per unit volume for each particle size on the filter's downstream side
C: Mass of particle for each particle size
D: Mass of particles per unit volume for each particle size on the filter's upstream side
E: Mass of particles per unit volume for each particle size on the filter's downstream side

Reproducing the working environment in the laboratory

Monodisperse particles generated with a condensed aerosol generator make it possible to reproduce particle size distributions in the working environment and evaluate filtration performance. Measurable particle sizes range from 0.3 to 5 µm.



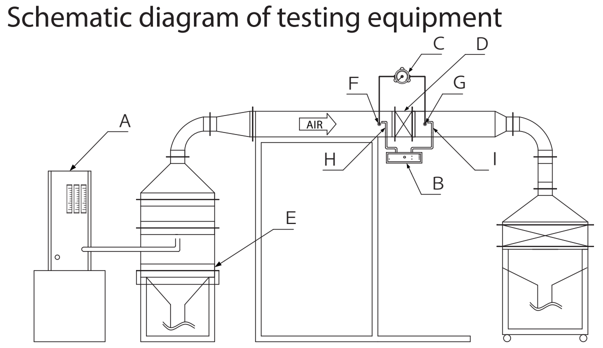
<Median diameter (in terms of number concentration): 0.444 µm>



<Median diameter (in terms of mass concentration): 1.522 µm>

Oil mist test method

Schematic diagram of testing equipment



* Air flow rate is measured at the orifice (Range of test air velocities: 0.5 to 3.0 m/sec).

A: Condensed monodisperse particle generator <made by TSI>
*Test particle: DOS particle with NaCl nucleus
(DOS: Dioctyl sebacate)
B: Particle counter <made by PALAS>
*Sampling air flow rate: 5 L/min
C: Differential pressure gauge
D: Test specimen (210 mm × 210 mm)
E: HEPA filter
F: Upstream side static pressure port
G: Downstream side static pressure port
H: Upstream side sampling tube
I: Downstream side sampling tube

Photograph of testing equipment

CNP filter

○ Micro demister

The Micro demister® is made of fibers tens of micrometers in length, cut by a special cutting method from stainless steel foil, needle-punched, and compressed with a roller.

○ Resistance to ultra high temperature, chemicals and corrosion

The all stainless steel filter resists ultra high temperatures (upper temperature limit: 480°C), chemicals, and corrosion.

○ High efficiency and high oil retention

Optimal fiber diameters and porosity achieve high efficiency and high oil retention.

○ Preventing fiber fall-off

Minimizes fiber fall-off during use or cleaning.

○ Three types of media

Three types of media are available: Standard with fiber diameter of 25 µm, density gradient (standard) with a combination of fiber diameters of 50 µm and 25 µm, and density gradient (high performance) with a combination of fiber diameters of 50 µm and 10 µm.

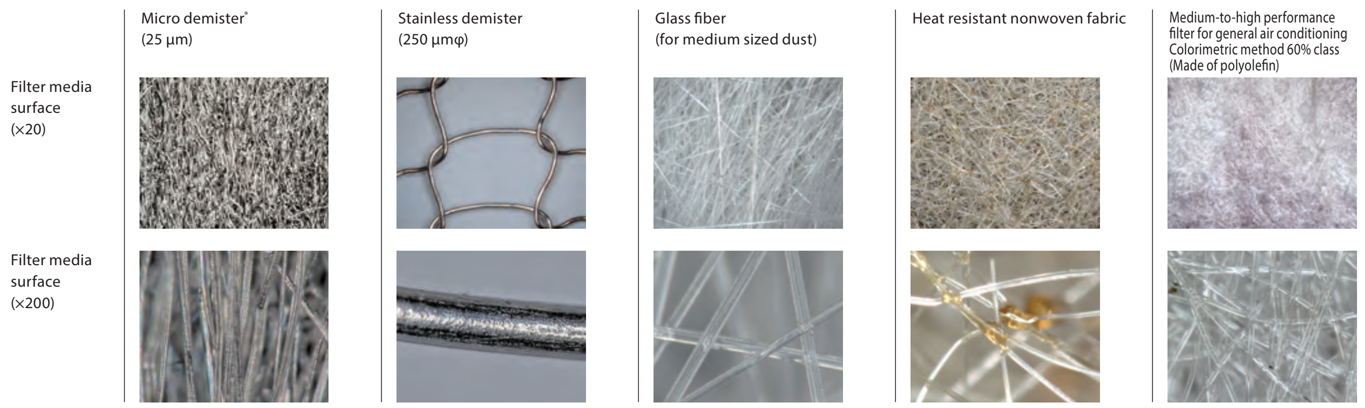
○ Structure for ease of use

Fiber directions are standardized to vertical. To facilitate fall of collected oil mist, the density gradient types feature spacers between media. The lifter is installed inside the frame to make it easy to drain oil mist or cleaning fluid through the drain hole in the frame.

○ Selecting a suitable filter

Measures collection efficiency for each particle size at three different air velocities to determine the most suitable CNP filters.

Comparison of Micro demister® and other filter media



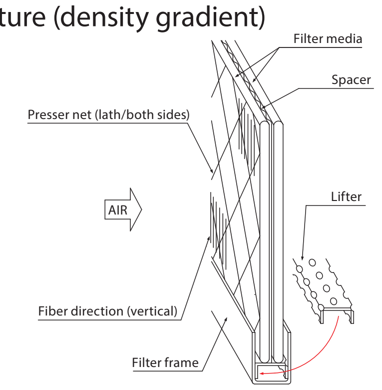
* Micro demister® is a registered trademark of AQC Corporation.

Applications

- Oil mist removal in vehicle parts and appliance parts factories
- Air conditioning requiring heat resistance (e.g., paint drying ovens, automobile factories, waste incineration plants)
- General air conditioning (e.g., food factories, chemical factories, hospitals)
- Building air conditioning (e.g., office buildings, hotels, various facilities)

CNPF
Flat type

Structure (density gradient)



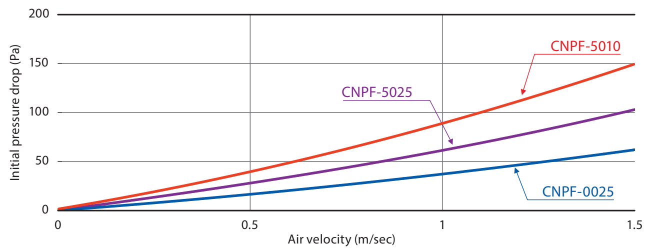
Features

- Ultra-thin filter with frame thickness of 10 mm
- Space-saving; easy to install and remove

Specifications

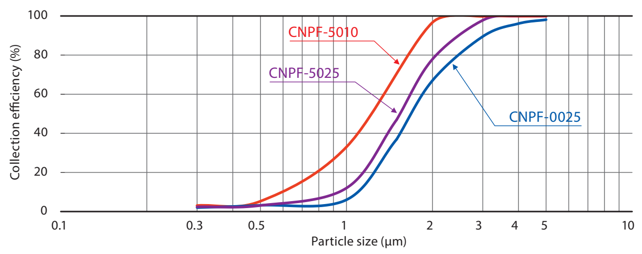
Type	Product no.	Standard size (mm)	Air velocity (m/sec)	Initial pressure drop (Pa)	Mass-based total collection efficiency (%) (0.3 to 5.0 µm)	Weight (kg)
Standard	CNPF - 0025	500×500×10 (610×610×10)	0.5	17	25	1.6 (2.1)
			1.0	37	45	
			1.5	62	55	
Density gradient (standard)	CNPF - 5025	500×500×10 (610×610×10)	0.5	29	35	1.9 (2.6)
			1.0	60	55	
			1.5	104	65	
Density gradient (high performance)	CNPF - 5010	500×500×10 (610×610×10)	0.5	41	45	1.9 (2.6)
			1.0	90	65	
			1.5	150	75	

Initial pressure drop data



Collection efficiency for each particle size at air velocity of 1.0 m/sec

Product no.	Collection efficiency for each particle size (%)						
	0.3 µm	0.5 µm	1 µm	2 µm	3 µm	4 µm	5 µm
CNPF - 0025	2.0	3.2	6.0	67.0	89.5	96.1	98.1
CNPF - 5025	2.4	3.1	12.0	77.9	97.8	≥ 99.9	≥ 99.9
CNPF - 5010	3.0	5.2	33.0	96.8	≥ 99.9	≥ 99.9	≥ 99.9



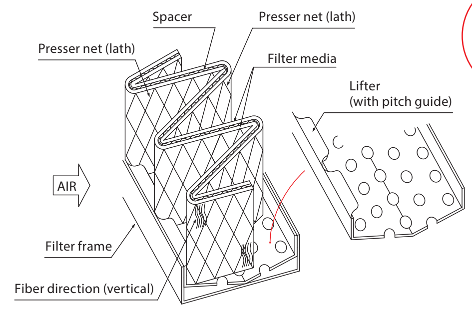
Model No. coding

C N P F — [ ] [ ]

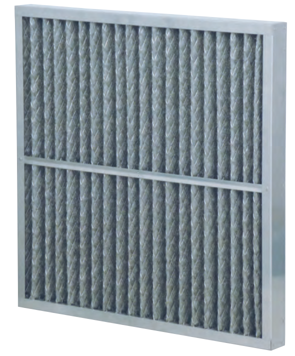
F: Flat type filter
00: Single layer 50: The fiber diameter of the first filter layer media is 50 µm.
10: The fiber diameter of the second layer filter media is 10 µm.
25: The fiber diameter of the second layer filter media is 25 µm.

CNPP
Pleated type

Structure (density gradient)



Patent pending



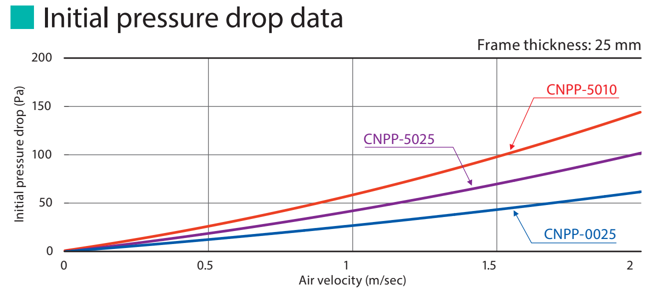
Features

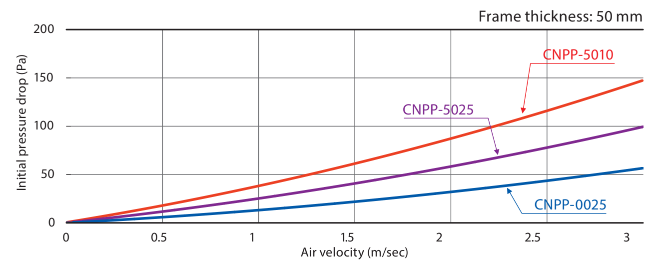
- Pleating achieves reduced pressure drop and long life.
- Incorporates lifter with pitch guide.

Specifications

Type	Product no.	Standard size (mm)	Increase in surface area (times)	Air velocity (m/sec)	Initial pressure drop (Pa)	Mass-based total collection efficiency (%) (0.3 to 5.0 µm)	Weight (kg)
Standard	CNPP - 0025	500×500×25 (610×610×25)	2	1.0	27	35	2.6 (3.4)
				1.5	43	50	
				2.0	62	55	
		500×500×50 (610×610×50)	3	2.0	32	40	3.7 (4.9)
				2.5	44	55	
				3.0	57	60	
Density gradient (standard)	CNPP - 5025	500×500×25 (610×610×25)	2	1.0	42	40	3.3 (4.4)
				1.5	70	55	
				2.0	102	60	
		500×500×50 (610×610×50)	3	2.0	58	45	4.6 (6.4)
				2.5	78	60	
				3.0	101	65	
Density gradient (high performance)	CNPP - 5010	500×500×25 (610×610×25)	2	1.0	60	50	3.3 (4.4)
				1.5	98	65	
				2.0	142	75	
		500×500×50 (610×610×50)	3	2.0	87	65	4.6 (6.4)
				2.5	117	70	
				3.0	148	75	

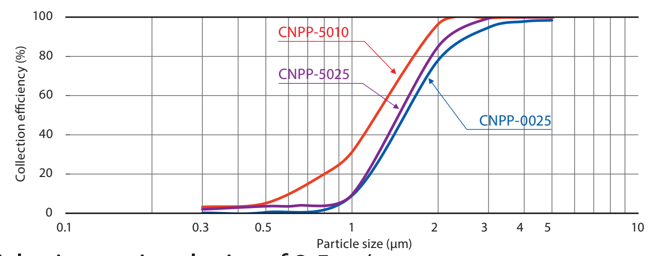
Initial pressure drop data





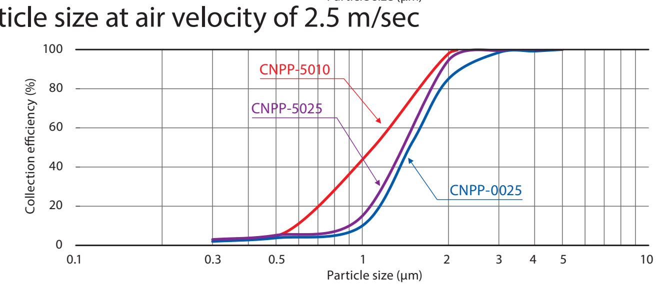
Collection efficiency of 25 mm frame filter for each particle size at air velocity of 1.5 m/sec

Product no.	Collection efficiency for each particle size (%)						
	0.3 µm	0.5 µm	1 µm	2 µm	3 µm	4 µm	5 µm
CNPP - 0025	—	—	9.0	78.0	94.7	97.8	98.4
CNPP - 5025	2.0	3.6	9.5	85.0	99.4	≥ 99.9	≥ 99.9
CNPP - 5010	3.0	5.0	31.5	97.0	99.7	≥ 99.9	≥ 99.9



Collection efficiency of 50 mm frame filter for each particle size at air velocity of 2.5 m/sec

Product no.	Collection efficiency for each particle size (%)						
	0.3 µm	0.5 µm	1 µm	2 µm	3 µm	4 µm	5 µm
CNPP - 0025	2.0	3.8	10.0	85.0	98.5	99.2	≥ 99.9
CNPP - 5025	3.0	5.2	15.0	94.5	99.5	≥ 99.9	≥ 99.9
CNPP - 5010	3.0	5.0	43.0	97.6	99.8	≥ 99.9	≥ 99.9



Model No. coding

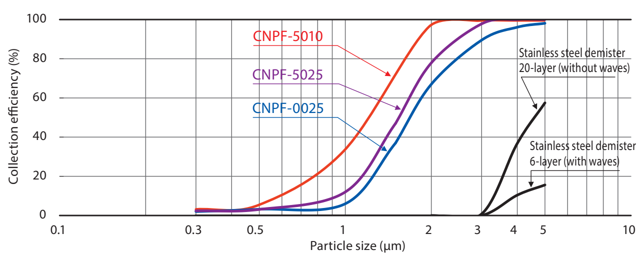
C N P P — [ ] [ ]

P: Pleated type filter
00: Single layer 50: The fiber diameter of the first filter layer media is 50 µm.
10: The fiber diameter of the second layer filter media is 10 µm.
25: The fiber diameter of the second layer filter media is 25 µm.

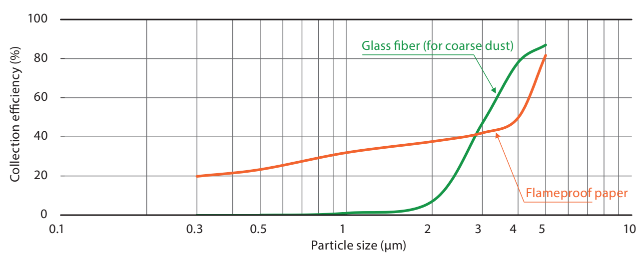
Performance comparison of CNPF filter (flat type) and other filters

Category	Description	Product no.	Initial pressure drop (Pa) at air velocity (m/sec)			Collection efficiency (%) for each particle size at air velocity of 1.0 m/sec							
			0.5	1.0	1.5	0.3 µm	0.5 µm	1 µm	2 µm	3 µm	4 µm	5 µm	Mass-based total collection efficiency (%) (0.3 to 5.0 µm)
Paint mist filter Heat resistant filter for drying oven	Micro demister®	CNPF -0025	17	37	62	2.0	3.2	6.0	67.0	89.5	96.1	98.1	45
		CNPF -5025	29	60	104	2.4	3.1	12.0	77.9	97.8	≥ 99.9	≥ 99.9	55
		CNPF -5010	41	90	150	3.0	5.2	33.0	96.8	≥ 99.9	≥ 99.9	≥ 99.9	65
	Stainless steel demister 6-layer (with waves)	—	1	3	5	—	—	—	—	—	10.4	15.6	1
	Stainless steel demister 20-layer (without waves)	—	3	8	15	—	—	—	—	—	36.8	57.5	4
Paint mist filter	Glass fiber (for coarse dust)	—	5	11	19	—	—	—	6.6	46.9	78.0	86.5	15
	Flameproof paper	—	4	13	27	19.8	23.3	31.9	37.6	42.0	49.7	81.7	37
Heat resistant filter for drying oven	Glass fiber (for fine dust)	—	50	148	260	9.5	10.2	17.2	42.3	99.3	≥ 99.9	≥ 99.9	43
	Glass fiber (for middle dust)	—	25	72	131	—	—	8.5	29.0	91.4	≥ 99.9	≥ 99.9	27
	Heat resistant nonwoven fabric	—	18	45	75	—	—	5.2	33.9	81.4	96.1	99.3	31
Kitchen extraction filter	Baffresh filter	—	20	90	200	—	—	—	11.1	58.0	88.0	99.7	18
	Aluminum grease filter	—	3	6	10	—	—	—	—	—	8.8	31.3	1
	Ceramic	—	12	54	108	—	—	3.0	18.6	52.1	81.9	92.1	21

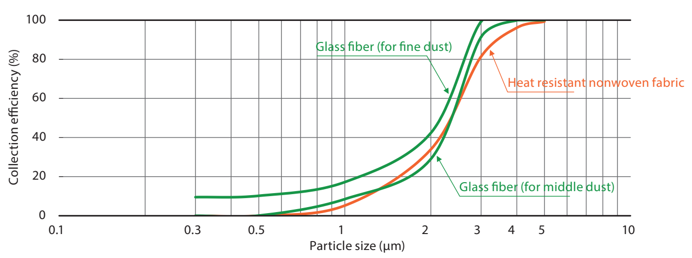
Paint mist filter and heat resistant filter for drying oven



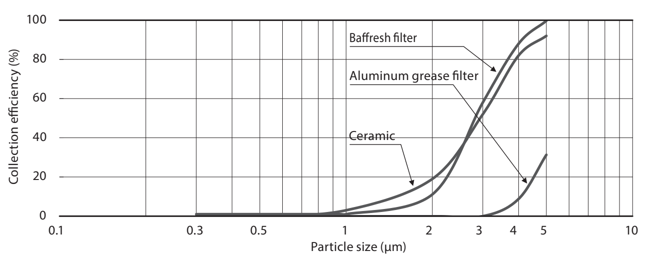
Paint mist filter



Heat resistant filter for drying oven



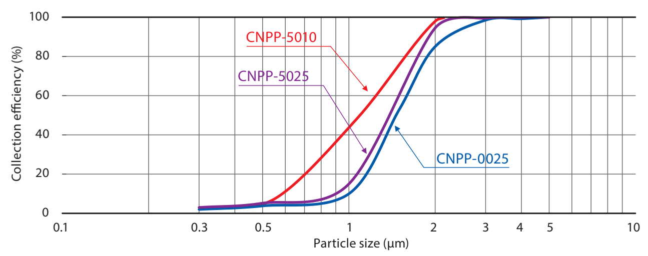
Kitchen extraction filter



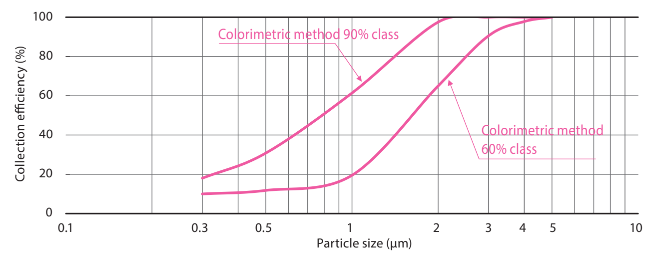
Performance comparison of CNPP filter (pleated type) and medium-performance filters

Category	Description	Product no.	Initial pressure drop (Pa) at air velocity (m/sec)			Collection efficiency (%) for each particle size at air velocity of 1.0 m/sec							
			2.0	2.5	3.0	0.3 µm	0.5 µm	1 µm	2 µm	3 µm	4 µm	5 µm	Mass-based total collection efficiency (%) (0.3 to 5.0 µm)
Paint mist filter Heat resistant filter for drying oven	Micro demister® (Frame thickness: 50 mm)	CNPP -0025	32	44	57	2.0	3.8	10.0	85.0	98.5	99.2	≥ 99.9	55
		CNPP -5025	58	78	101	3.0	5.2	15.0	94.5	99.5	≥ 99.9	≥ 99.9	60
		CNPP -5010	87	117	148	3.0	5.0	43.0	97.6	99.8	≥ 99.9	≥ 99.9	70
Medium-to-high performance filter for general air conditioning	Colorimetric method 60% class	—	39	58	79	10.0	11.8	19.5	65.0	90.5	97.8	≥ 99.9	49
	Colorimetric method 90% class	—	82	112	146	18.0	30.8	61.4	97.5	≥ 99.9	≥ 99.9	≥ 99.9	77

Paint mist filter and heat resistant filter for drying oven



Medium-to-high performance filter for general air conditioning



Physical properties of test particles

- Specific gravity: 0.91 g/cm³
- Kinetic viscosity: 11.6 mm²/sec·40°C
- Solubility: Water-insoluble

Basic theory about oil retention

(1) Comparison of standard and density gradient types
The standard type traps various particle sizes in a single sheet of media; the density gradient type traps particles in a dual structure. The upstream side filter media collects relatively large particles, while the downstream side filter media collects small particles. Since each filter media collects particles, the density gradient type has greater oil retention.

(2) Comparison of standard and high-performance density gradient types
The downstream side filter media of the high-performance type saturates faster than the standard type because it traps finer particles. That is why the high-performance type is associated with smaller oil retention.

* Actual oil retention may differ depending on particle size, concentration, kinetic viscosity, and other attributes of the oil mist.

*This brochure is based on laboratory measurement data. Please note that the data may differ from data for actual working environments.
*In the table, a dash (–) means the collection efficiency could not be obtained because there was no difference in numbers of particles between the upstream and downstream sides during the performance evaluation.
*In the case of liquid particles, unlike solid particles, higher air velocities result in greater collection efficiency. We have measurement data at other air velocities besides the rated velocities. Please contact us to obtain this data.
*Tailored filters with various sizes are available.
*Neutral and alkaline detergents can be used on the product for washing. Depending on service conditions, please note that it may not be possible to reuse filters by washing.