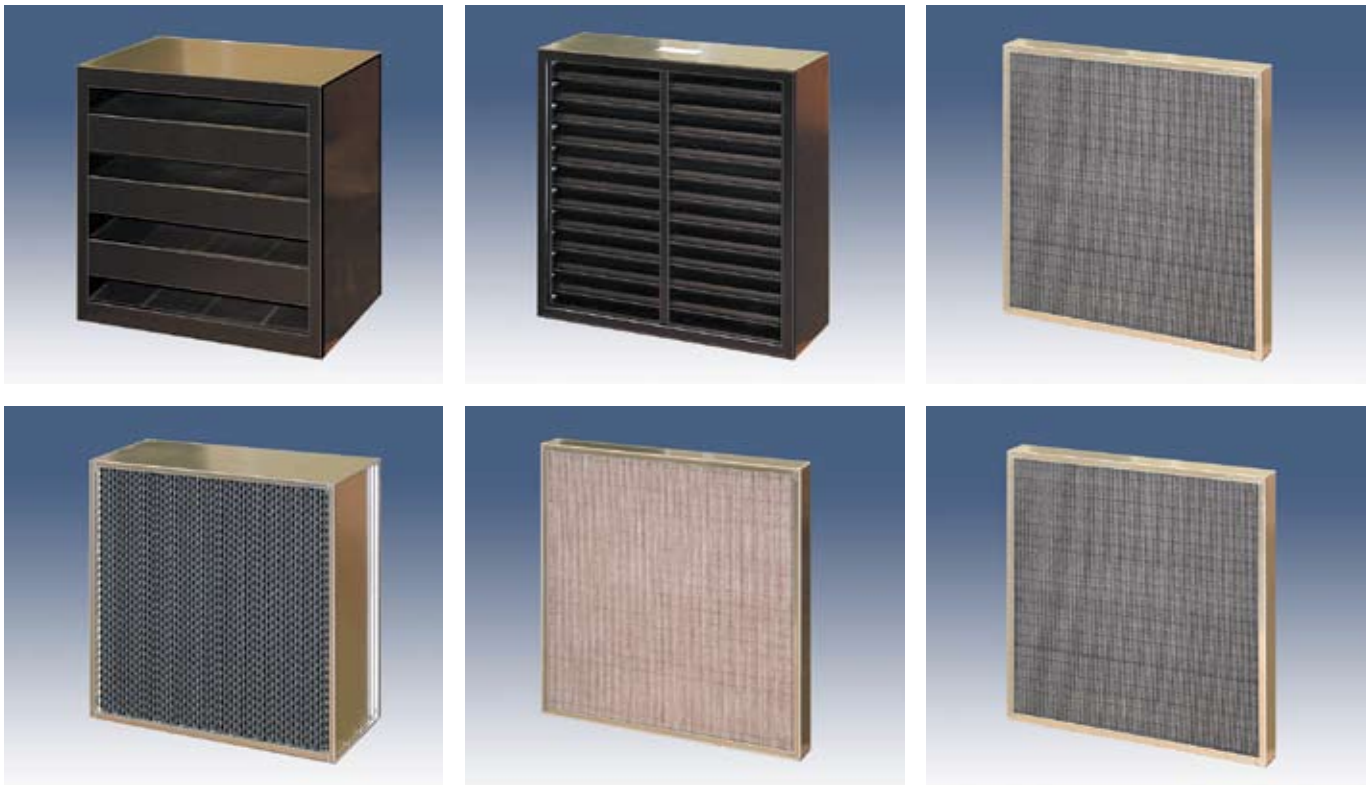
Chemical filter



Features

1.Various models

We have various type of chemical filter for AHU/MAU, RA processing and EX processing. Both of Activated carbon type (grain or fiberous) and Ion exchange resin type are available.

2.Remove many kinds of gases

Acidic gas(ex. Nox), Alkalic gas(ex. ammonia) or Organic gas(ex.ester - DOP or so) that do herm at Semiconductor or Liquid crystal factory.

Contents

Classification	Product Name	Construction	Media Material	Model	Initial removal Efficiency (%)※	Main Use	Page
RA processing	Iochemix	Mini-Pleats	Iron exchange resin	ECSL	About 90	・Semiconductor, Liquid Crystal, Electronic (FFU・Device Assembly)	5
	PureChemix G	Mini-Pleats	Granular activated carbon	ACGL	About 90		7
		Separator	Granular activated carbon	ACGM	About 90	・Semiconductor, Liquid Crystal, Electronic (Air-conditioner・Return-Duct) ・Art-Gallery,Museum	7
AHU/MAU EX processing	PureSmell	Tray (Element exchange type)	Activated carbon Zeolite	PUR	About 90	・Semi-conductor, Liquid-Crystal, Electronic MAU/AHU EX processing ・Art Gallery, Museum ・Animal breeding house ・Sewage works ・Food ・Hospital	9
	Clean Coal	Cell (Cell exchange type)	Activated carbon	CHW-13	About 90		11

＊:Initial removal efficiency changes with target gas and its concentration

Model	Target gases			Features							
	Organic	Acid	Bases	High air volume	Low concentration gas	Long life time	Low pressure drop	Media replacement	Low particle generation	Thin type	Light weight
ECSL	—	○	○	—	○	○	○	—	○	○	—
ACGL	○	○	○	—	○	—	○	—	○	○	○
ACGM	○	○	○	○	○	—	○	—	○	—	—
PUR	○	○	○	○	—	○	—	○	—	—	—
CHW-13	○	—	—	—	—	○	—	○	—	—	—

※：We can arrange suitable adsorbent to target gases.

Our own inspecting devices

GC-MS

ICP-MS

2.Main target gas and suitable filter

1.Organic Gas

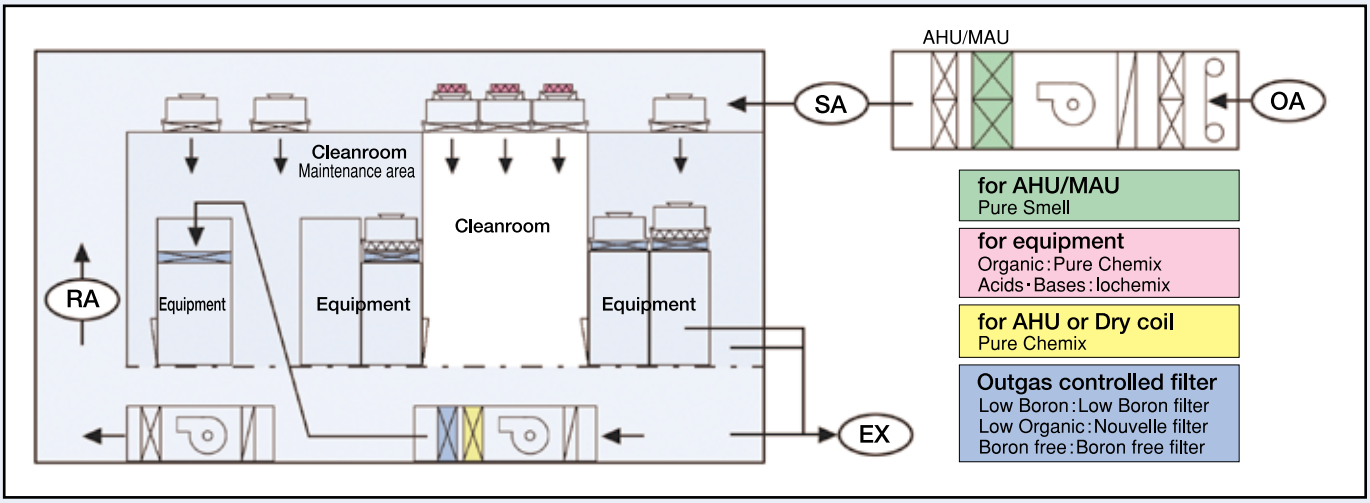
Gas type	Gas type		Gas source	Suitable Filter（Media）		Main Measurement method
	Classification	Main Gas name		AHU/MAU,EX	RA processing	
Organic Gas	Low boiling Point （Less than 150℃）	・Alcohol ・Acetone, Toluene and so on Organic Solvent ・Aromatic Compound	・Washing liquid	PUR-C CHW-13	ACGM-O ACGL-O	・THC meter ・GC/MS analysis （Absorption tube collection） ・GC analysis （Absorption tube collection）
	Middle boiling Point （around 150～300℃）	・Siloxane（D3～） ・Phosphoric acid （TEP） ・BHT	・Silicon seal material ・Noncombustible ・Symptoms of aging prevention material	PUR-C CHW-13	ACGM-O ACGL-O	
	High Boiling Point （Higher than 300℃～）	・Phosphoric acid ester type （DBP, DOP） ・Phosphate	・Plasticizer ・Noncombustible material	PUR-C CHW-13	ACGM-O,A,B ACGL-O,A,B	

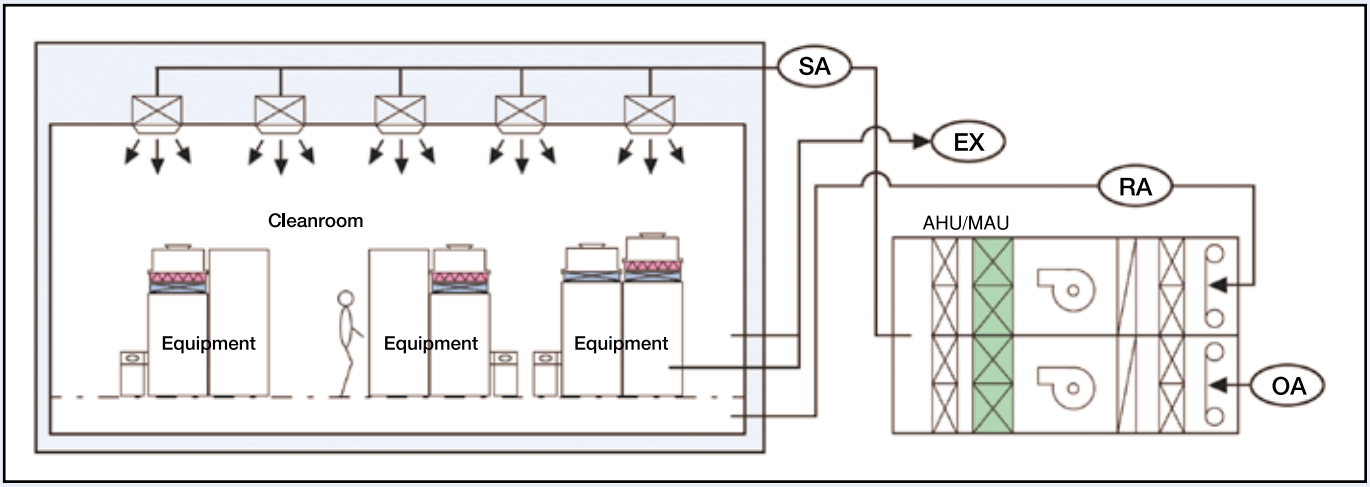
2.Acids, Bases gas

Gas type	Gas type		Main Occur Source	Suitable Filter（Media）		Main Measure method
	Gas Name	Chemical Formula		AHU/MAU,EX	RA processing	
Acids	Hydrogen fluoride, Fluoride acid Fluoride Ion	HF F^-	・Etching liquid	PUR-A2, A3H	ACGM-A ACGL-A ECSL-A	・IC analysis （Liquid collection）
	Hydrogen chloride, Chloride Chloride Ion	HCL CL^-	・Etching liquid ・Seawater			
	Nitrogen oxide	NOx	・Substance Combustion ・Boiler ・Automobile exhaust air	—	—	—
	1 nitrogen oxide	NO		PUR—E3	—	・NOx meter
	Nitrogen dioxide	NO_2		PUR-C, O2, CHW-13	ACGM-O ACGL-O	
	Nitrous acid Ion	NO_2^-		PUR-A2, A3H （PUR-E5, E5H）	ACGM-A ACGL-A ECSL-A	・IC analysis （Liquid collection）
	Nitric acid Ion	NO_3^-				
	SOx	SOx	・Burning mineral coal and earth oil containing sulfur ・Volcano,Mineral spring	—	—	—
	Sulfur dioxide	SO_2		PUR-E5, E5H, A3H	ACGM-A ACGL-A ECSL-A	・SOx meter
	Sulfuric acid Ion	SO_4^{2-}		PUR-E5, E5H, A2, A3H		・IC analysis （Liquid collection）
	Hydrogen sulfide	H_2S	・Volcano, Mineral spring ・Protein decomposition	PUR-E5, E5H, A3H	ACGM-A ACGL-A	・GC analyzer （Air Collection）
	Methyl mercaptan	CH_3SH	・Protein decomposition			
	Dimethyl sulfide	$(CH_3)_2S$	・Protein decomposition			
	2 dimethyl sulfide	$(CH_3)_2S_2$	・Protein decomposition			
Bases	Ammonia Ion	NH_3 NH_4^+	・Excrement, Human, Animal	PUR-F, F4, F4H	ACGM-B ACGL-B ECSL-B	・NH3 meter ・IC analysis （Liquid collection）
	Trimethyl-amine	$(CH_3)_3N$	・Excrement, Manure	PUR-F4, F4		・IC analysis （Liquid collection）
Others	Boron,	B	・GlassFiber	PUR-E5, E5H, A3H	ACGM-A ACGL-A ECSL-A	・Liquid Collection— ICP／MSAnalysis

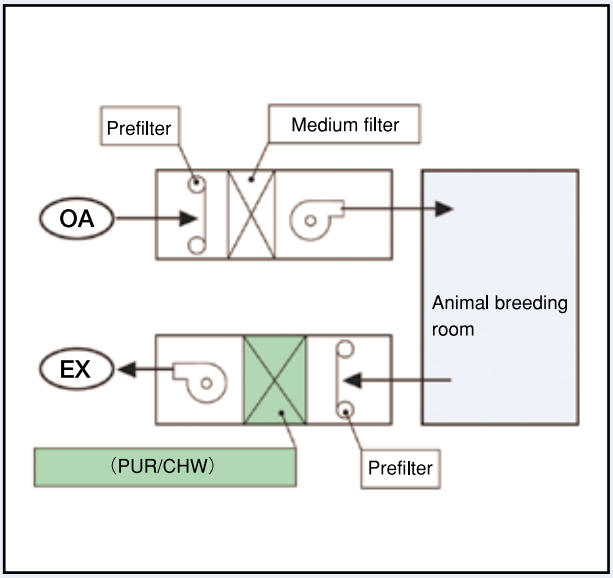
※Abbreviation：THC meter ····· Total Hydrocarbon meter
GC ····· Gas Chromatograph
GC／MS ····· Gas Chromatograph Mass Spectrometer
IC ····· Ion Chromatograph
CP／MS ····· Inductively Coupled Plasma Mass Spectrometer

Semiconductor, Liquid crystal factory

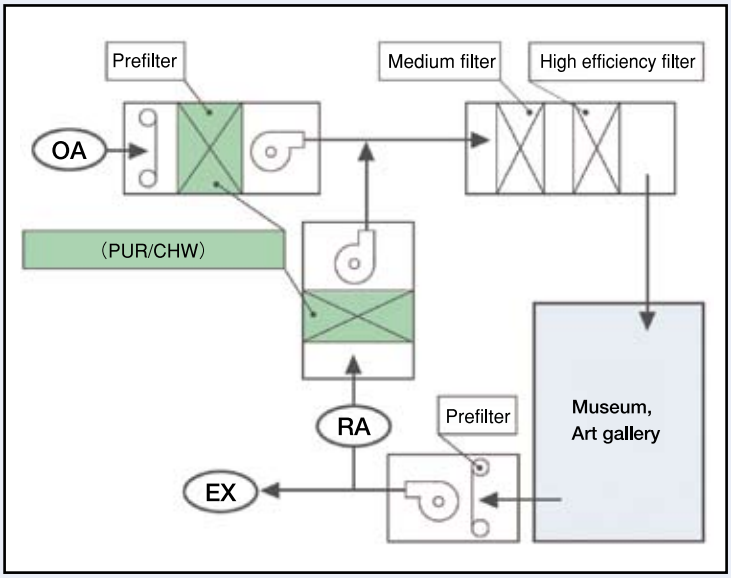




Animal breeding

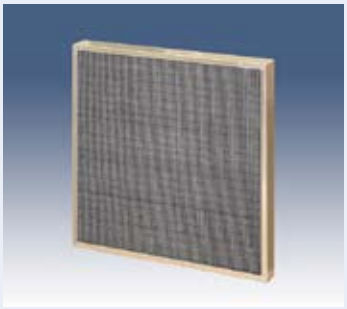


Museum, Art gallery



Iochemix (for RA processing / Ion exchange resin media type)

For acids removal



For bases removal

Model

ECSL —□— □ — □ — □□

- Add "Z"for special model
- Media(※) A:For Acids / B:For Bases
- Frame E :Aluminum / E＊＊:Aluminum / K :Polyester lominated plywood
- Shows frame depth R :75mm / RS:65mm / S :50mm
- Shows dimension:See Standard spec.("Z"stands for special spec.)

Standard specification

Model	Dimension(mm) H×W×D	Rated air volume (m³/min)	Rated face velocity(m/s)	Pressure drop (Pa)	Gas removal efficiency(%)	Weight (kg)
ECSL-10-R -E-※	610×610×75	10	0.5	35	90	6.0
ECSL-10-RS-E-※	610×610×65			20		5.0
ECSL- 7-S -E-※	610×610×50	7	0.35	12		4.5

Materials and Temperature / Humidity

Materials				Temp. & Hum. (Recommend)	
Frame	Media	Ribbon	Sealant	Temperature(℃)	Humidity(%/RH)
Aluminum	Ion exchange resin	Hot melt	Polyurethane resin	0～40	30～90

Dimension available

D	H	W
50,65,75	150～1,220(Note 1)	1,500

(Note 1) It will be 2pcs connected specificatior when height over 760mm

Media type and target gases

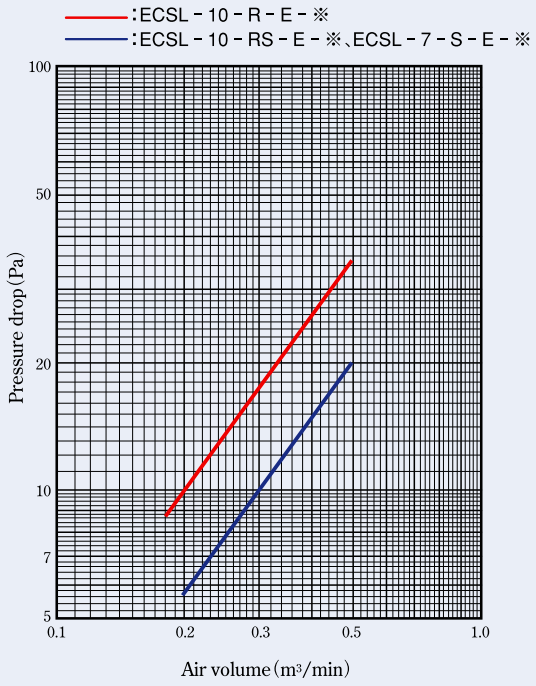
Media Type	Media		Target gases	
	Base material	Ion exchange group	Type	Example
A	Polystyrene resin	Quaternary ammonium group	For acids	Sulfar oxide (Sox), Hydrochloric acid, Hydrofluoric acid,
B	Polystyrene resin	Sulfone acid group	For bases removal	Ammonia, Amine

Specification

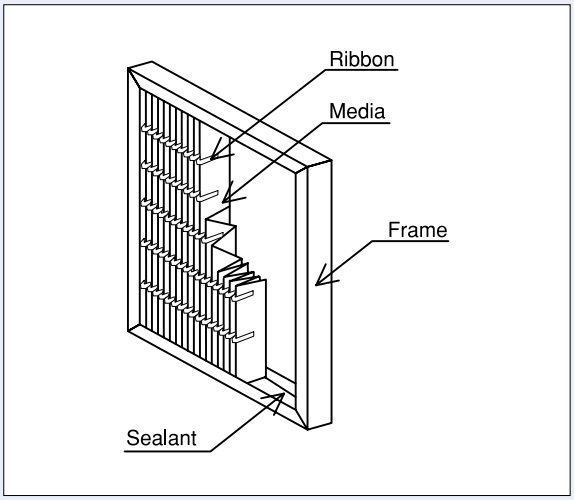
Gas removal efficiency (Sample)

Type		Element		Concentration ($\mu g/m^3$)		Efficiency (%)	Measaring method
		Name	Chemical formula	Up Stream	Down Stream		
A	For acids removing	Chloride Ion	CL^-	3.7	0.3	92	IC
		Nitrite Ion	NO_2^-	4.8	0.8	83	
		Nitrate Ion	NO_3^-	1.2	0.3	75	
		Salfate Ion	SO_4^{2-}	3.3	0.2	94	
		Boron	B	0.6	0.03	95	ICP-MS
B	For bases removing	Ammonium Ion	NH_4^+	4.5	0.15	97	IC

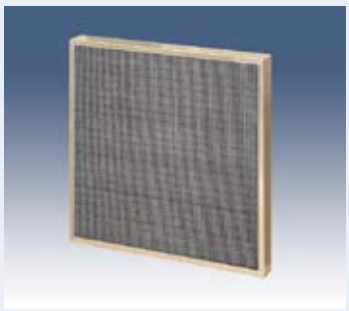
Face Velocity vs. Pressure Drop

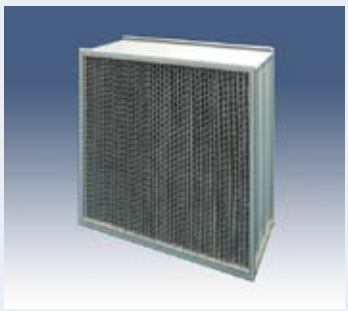


Structure drawing of filter (Mini pleats type)



PureChemix G (for RA processing / Granular activated carbon media type)





Model

ACG□ — □ — □ — □ — □□

- Type: L : Mini pleats　M : Separator
- Shows dimension : See Standard spec. ("Z" stands for special spec.)
- Shows frame depth (Mini Pleats): R : 75mm / RS : 65mm / S : 50mm
- Shows frame depth (Separator): P : 290mm (For frame type E)
- Frame (Mini Pleats): E : Aluminum / E＊＊ : Aluminum / K : Polyester laminated plywood
- Frame (Separator): E＊＊ : Aluminum / E : Aluminum
- Media (※): O : For Organic gas / A : For Acids / B : For Bases
- Add "Z" for special model

Standard specification

Type	Model	Dimension (mm) H×W×D	Rated face velocity (m/s)	Rated air volume (m³/min)	Pressure drop (Pa)	Gas removal efficiency (%)	Weight (kg)
Mini Pleats	ACGL -10 -R -E-※	610× 610× 75	0.5	10	40	90	5.5
	ACGL -20 -R -E-※	610×1220× 75		20			10.5
	ACGL -10 -RS-E-※	610× 610× 65		10	30		5.0
	ACGL -20 -RS-E-※	610×1220× 65		20			9.5
	ACGL - 7 -S -E-※	610× 610× 50	0.35	7	15		4.0
	ACGL -14 -S -E-※	610×1220× 50		14			7.0
Separator	ACGM-56 - E42-※	610× 610×290	2.9	56	98	90	16.5
	ACGM-56H- E42-※	610× 305×290		28			9.5

Materials and Temperature / Humidity

Type	Frame	Materials					Temp. & Hum. (Recommend)	
		Frame	Media	Separator	Ribbon	Sealant	Temperature (℃)	Humidity (%/RH)
Mini pleats	E	Aluminum	Granular activated carbon	—	Hot melt	Polyurethane resin	0～40	30～90
	E＊＊	Aluminum						
	K	Polyester laminated plywood						
Separator	E＊＊	Aluminum		Aluminum	—			

Dimension available

Shape	D	H	W
Mini pleats	50,65,75	150～760	1,500
Separator	290	150～610	915

Media type and targetgases

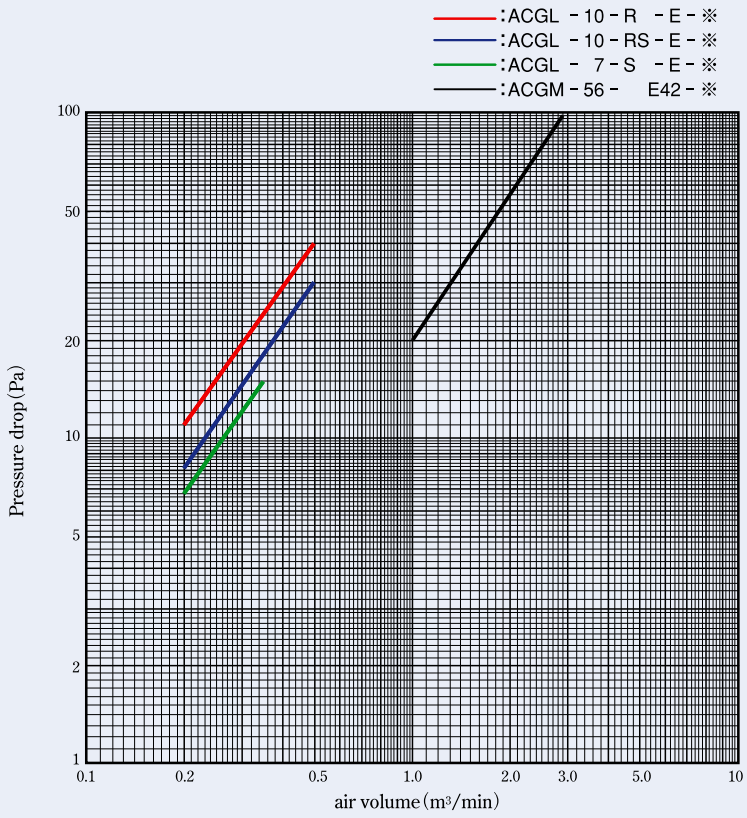
Media Type	Media		Target gases	
	Base material	Additive	Type	example
O	Granular activated carbon	—	For organic gases	Phtharic ester (DOP,BBP), Siloxane, OZ one, Phosphoric ester (TBP), Teluene
A		Potassium carbonate	For acids	Sulfar oxide (SOx), Hydro chloric oxide, Hydrofluoric acid, Boron
B		Phosphoric acid	For bases removal	Ammonia, Amine

Specification

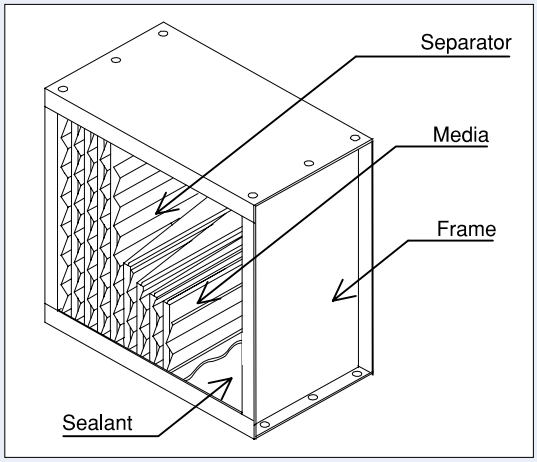
Gas removal efficiency (Sample)

Type		Element		Mini pleat			Separator			Measaring method
		Name	Chemical formula	Concentration(μg/m^3)		Efficiency (%)	Concentration(μg/m^3)		Efficiency (%)	
				Up Stream	Down Stream		Up Stream	Down Stream		
O	Organic gases removal	Organic substance	—	8.4	0.05	99	10.5	0.4	96	GC-MS
A	For acids removal	Fluoride ion	F^-	1.0	0.02	98	1.0	0.03	97	IC
		Nitrite ion	NO_2^-	0.5	<0.01	98<	0.6	0.01	98	
		Nitrate ion	NO_3^-	0.1	<0.01	90<	0.1	<0.01	90<	
		Sulfate ion	SO_4^{2-}	0.2	0.01	95	0.2	<0.01	95<	
		Boron	B	0.3	0.01	97	0.3	0.01	97	ICP-MS
		Acetic acid	CH_3COOH	9.3	0.20	98	8.9	0.28	97	IC
		Formic acid	HCOOH	0.15	<0.01	93<	0.12	<0.01	92<	
B	For bases removal	Ammonium ion	NH_4^+	3.5	<0.05	99<	4.5	0.15	97	

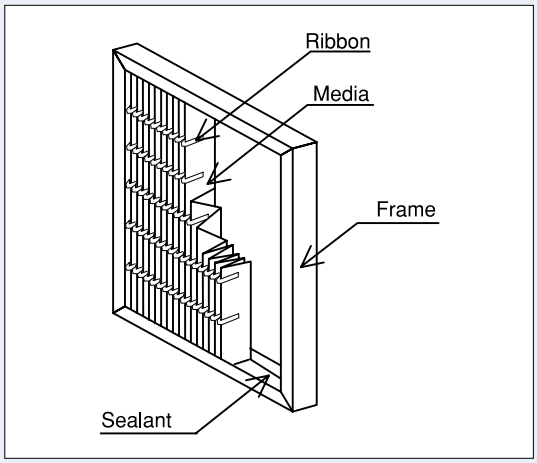
Face Velocity vs. Pressure Drop



Structure drawing of filter (Separator type)



Structure drawing of filter (Mini pleats type)



PureSmell filter (for AHU/MAU, EX processing)

Model

PUR — □ — □□

- Add "Z"for special model
- Media(※):See table below
- Shows dimension:See Standard spec.("Z" stands for special spec.)

Standard specification

Model	Dimension(mm) H×W×D		Rated air volume (m³/min)	Pressure drop (Pa)	Gas removal efficiency(%)	SV value	Absorbent volume
	Frame	Tray(element)					
PUR-56W -※	610×610×630	590×600×45	56	167/265	90	29,000	116
PUR-56WH-※	610×305×630	590×295×45	28				57
PUR-56 -※	610×610×440	410×600×36	56	118/196	90	53,000	63
PUR-56H -※	610×305×440	410×295×36	28				31
PUR-28 -※	610×610×230	205×600×33	28	78/127	90	60,000	29
PUR-28H -※	610×305×230	205×295×33	14				14

1:With pre/after filter model is available.
2:Dimension available (HxW): 610x610, 610x305, 305x610 and 305x305
3:Pressure: drop is depend on type of absorbent.(Pellet/Grain)
4:Removal efficiency is influenced by air volume, target gases and temperature.
5:Model "PUR-56W" is long-lifetime model which has about 1.8times much volume than "PUR-56". This model is suitable to remove high concentration gases or use with mixed adsorbent.

Materials and Temperature / Humidity

Materials			Temp. & Hum. (Recommend)	
Frame	Tray(element)	Media	Temperature(℃)	Humidity(%RH)
Steel Plate(melamine baking paint)	Steel Plate(melamine baking pain)	Special absorbent	0～40	30～90

Types of adsorbent and target gases

Absorbent(※)	Additive	Base Material	Type	
E3	Potassium permanganate	Activated alumina	Pellet	Nitric oxide(NO),Sulfur oxide(SOx)
E5		Activated carbon	Grain	Sulfur oxide(SOx),Sulfur oxide(No2)Sulfur compoun (Methyl sulfide,Methyl mercaptan)
E5H		High refined Activated carbon		
F	Phosphoric acid	Zeolite	Pellet	Basic gases such as Ammonia, Amine etc.
F4		Activated carbon	Grain	
F4H		High refined Activated carbon		
A2	Calcium hydroxide	Zeolite	Pellet	Acid gases such as Hydrochloric acid,Nitric acid,Sulfuric acid,Acetic acid etc.
A3H	Potassium carbonate	High refined Activated carbon	Grain	Acetic acid (SO_4^{2-},Cl^-,$NO3^-$,F^- etc),Sulfur oxide(SOx) Sulfur compound(Hydrogen sulfide,Methyl sulfide,Methyl mercaptan)
O2	Manganese dioxide	Activated carbon	Pellet	Ozone,Chlorine,Organic solvent,Nitrogen oxide(NO_2)
C	—	Activated carbon	Grain	Organic gases (Organic solvent) Nitogen oxide

Note 1) Adsorbent E5H / F4H has about 1.5times higher performance than E5 / F4, and suitable to remove low concentration gases.

Weight

Model	Filter weight (kg)								Absorbent weight (kg)							
	O2	E5H, C	A3H	E5	E3, F4H	A2	F4	F	O2	E5H, C	A3H	F5	E3, F4H	A2	F4	F
PUR-56W -※	128	134	139	145	157	163	167	171	47	52	58	64	75	81	86	90
PUR-56WH-※	74	77	80	83	88	91	93	95	23	26	29	31	37	40	42	44
PUR-56 -※	74	77	80	83	90	93	95	97	25	28	32	35	41	44	47	49
PUR-56H -※	43	45	46	48	51	52	54	55	13	14	16	17	20	22	23	24
PUR-28 -※	39	41	42	44	47	48	49	50	12	13	14	16	19	20	21	22
PUR-28H -※	24	24	25	26	27	28	28	29	5	6	7	8	9	10	10	11

Specification

Gas removal specification

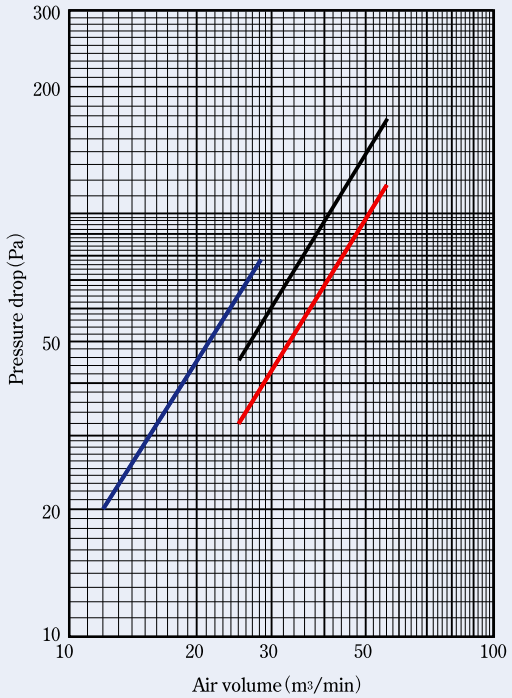
Type		E3	E6	E5H	F	F4	F4H	A2	A3H	O2	C
For acids	F^-,CL^-,NO_2^-, NO_3^-,SO_4^{2-}	○	○	○	—	—	—	◎	◎	—	—
Nitric oxide	NO	◎	—	—	—	—	—	—	—	—	—
Nitrogen oxide	NO_2	—	○	○	—	—	—	—	○	○	○
	SO_2	△	◎	◎	—	—	—	△	○	—	—
Hydrogen sulfide	H_2S	—	○	○	—	—	—	△	◎	—	—
Boron	B H_3BO_3	—	○	○	—	—	—	—	○	—	—
For Bases	NH_3, NH_4^+ Na^+, K^+	—	—	—	○	◎	◎	—	—	—	—
Organic gases		—	—	—	—	—	—	—	—	○	◎
Organic gases		—	○	○	—	△	△	—	○	○	◎
Chlorine	CL_2	—	△	△	—	—	—	—	△	◎	—
Ozone	O_3	—	△	△	—	—	—	—	△	◎	○

◎:Very effective ○:Effective △:Removable —:Scarcely removable

Air Volume vs. Collection Efficiency

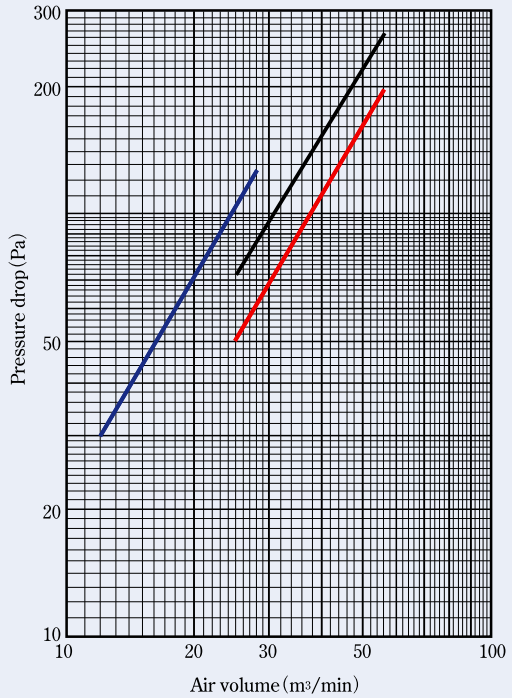
Pellet type adsorbent (E3, F, A2, O2)

: PUR - 28 - ※
: PUR - 56 - ※
: PUR - 56W - ※



Grain type adsorbent (E5, E5H, F4, F4H, A3H, C)

: PUR - 28 - ※
: PUR - 56 - ※
: PUR - 56W - ※



Clean Coal filter (for AHU/MAU, EX processing)

Model

CHW −13□□

- 13mm: Depth of activated carbon media
- H:610×305×223mm
- Add "Z" for special model

Standard specification

Model	Dimension (mm) H×W×D	Rated air volume (m³/min)	Pressure drop (Pa)	Rmoval efficiency (%)	SV value	Absorbent volume (L)	Weight (kg)	Absorbent weight (kg)
CHW-13	610×610×223	30	69	90	60,000	30	50	14

Materials and Temperature / Humidity

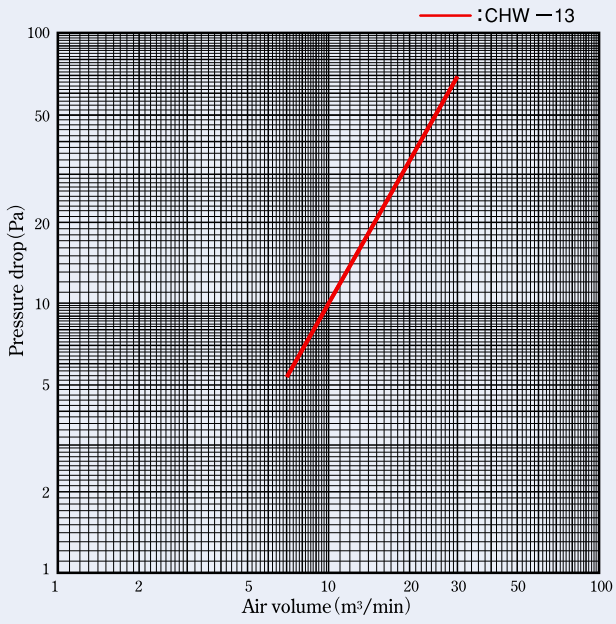
Materials			Temp. & Hum. (Recommend)	
Frame	Cell (element)	Media	Temperature(℃)	Humidity(%/RH)
Steel plate (melamine baking pain)	Steel plate (melamine baking paint)	Activated carbon	0～40	30～90

Types of adsorbent and target gases

adsorbent	Additive	Base Material	Type	Target gases
C	—	Activated carbon	Grain	Organic gases (organic solvent), Nitrogen oxide

Specification

Air Volume vs. Collection Efficiency



Gas removal efficiency

Gas type		Gas type		Gas type		Gas type		Gas type	
Acrylic acid	◎	Fruits smell	◎	Ethyl acetate	◎	Kitchen smell	◎	Plastic smell	◎
Acrylonitrile	◎	Gasoline	◎	Sulfur trioxide	○	Toilet smell	◎	Paint smell	◎
Acrolein	○	Mold	○	Carbon tetrachloride	◎	Animal smell	○	Hexane	○
Asphalt smell	◎	Pollen	○	Resin	◎	Trichloroethylene	◎	Benzene	◎
Sweat smell	◎	Cannery smell	◎	Nitric acid	○	Toluene	◎	Insecticide	◎
Acetone	○	Xylene	◎	Antiseptic	◎	Naphtha	◎	Antiseptic	◎
Alcoholic beverage	◎	Fish smell	◎	Camphor	◎	Naphthalene	◎	Phosgene	○
Isopropyl alcohol	◎	Cresol	◎	Food smell	◎	Nicotine	◎	Anesthetic	○
Medical-supplies smell	◎	Chlorbenzene	◎	Styrene	◎	Carbon bisulfide	○	Anhydrous acetic acid	◎
Ethyl alcohol	◎	Chloroform	◎	Hydrocyanic acid	○	Garlic smell	◎	Methyl ethyl ketone	◎
Ethyl ether	○	Sewer smell	◎	Oil refinement	◎	Burning gas smell	○	Methyl alcohol	○
VCM/PVC	○	Kerosene	◎	Soap smell	◎	Pitch smell	◎	Methyl-ether	◎
Chlorine	◎	Industrial waste	○	Adhesives	◎	Hospital, Sickroom smell	◎	Mercaptan	◎
Ozone	◎	Rubber smell	◎	Body smell	◎	Incomplete combustion gas	○	Iodine	◎
Furniture smell	◎	Acetic acid	◎	Smoke of lamplight	◎	Butyl alcohol	◎	Hydrogen sulfide	○
House animal smell	◎	Amyl acetate	◎	Orion smell	◎	Decomposition smell	◎	Sulfuric acid	◎

◎:High adsorption capacity equivalent to 20～50% of activated carbon quantity.
○:Middle adsorption capacity equivalent to 10～25% activated carbon quantity.
Please consult with us about adsorption capacity of other kinds gases.

1. Technical term for gas concentration

(1) %, ppm, ppb, ppt

These terms represent ratio of volume / volume, mass / mass and others.
For gas concentration in atmosphere, these generally represent "volume of target gases / volume of atmosphere".

%	(per cent)	:10^{-2}
ppm	(parts per million)	:10^{-6}
ppb	(parts per billion)	:10^{-9}
ppt	(parts per trillion)	:10^{-12}

(2) mg/m^3, $\mu g/m^3$, ng/m^3, /μg/L, ng/L, Pg/L

These terms represent mass / volume.
For gas concentration in atmosphere, these represent "volume of target gases / volume of atmosphere".

$mg/m^3 = \mu g/L$
$\mu g/m^3 = ng/L$
$ng/m^3 = pg/L$

Prefix of unit

Multiplier	Prefix
10^{12}	T (Tera)
10^{9}	G (Giga)
10^{6}	M (Mega)
10^{3}	k (Kilo)
10^{2}	h (Hecto)
10^{-2}	c (Centi)
10^{-3}	m (Milli)
10^{-6}	μ (Micro)
10^{-9}	n (Nano)
10^{-12}	p (Pico)

2. Conversion method of gas concentration (ppb⇔μg/m³)

Conversion between concentration of volume / volume and concentration of weight / volume can be calculated with calculation below by using molecular weight and molar volume of ideal gas at 0℃, 1atm.

$$Y(\mu g/m^3) = \frac{X[ppb] \times M[g/mol]}{22.4[L/mol] \times K}$$

$$K = (273+T)/273$$

X: Figure at ppb unit
Y: Figure at $\mu g/m^3$ unit
M: Molecular weight of target gas
22.4: Molar volume of ideal gas at 0℃, 1atm
K: Correct coefficient by temperature
T: Temperature of atmosphere (℃)

Conversion example of gas concentration (at 23℃)			1ppb→Yμg/m^3	1μg/m^3→Xppb
Name	Chemical formula	Molecular weight		
Fluoride ion	F^-	19.0	0.78	1.28
Chloride ion	CL^-	35.5	1.46	0.68
Nitrite ion	NO_2^-	46.0	1.89	0.53
Nitrate ion	NO_3^-	62.0	2.55	0.39
Sulfate ion	SO_4^{2-}	96.0	3.95	0.25
Boron	B	10.8	0.44	2.25
Ammonium ion	NH_4^+	18.0	0.74	1.35
Toluene	$C_6H_5CH_3$	92.0	3.79	0.26

3.SV value (Space Velocity)

SV represents ventilated air volume per volume of adsorbent (see calculation below), to show conditions of adsorbent loaded type chemical filter.
When SV is lower, this means ventilated air contact to adsorbent longer, so removal efficiency of the filter become higher.
In case of processing same concentration gases, service lifetime become longer because ventilated air volume is smaller.
(Correspond to air velocity for mini-pleats type chemical filter).

$$SV[1/h] = \frac{\text{ventilated air volume } (m^3/h)}{\text{filled volume of adsorbent } (m^3)}$$

SV should be small when processing high concentration gases, high efficiency is required and long lifetime is needed.
(Please refer us for details)

Introductions to handle filters:

1. In transport

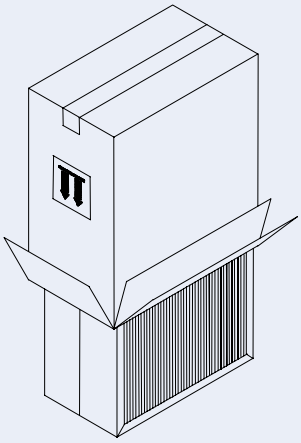
(1) Handle carton box as instructed. Hold carton box firmly with both hands, and do not carry it on the shoulder. Especially when handling "Puresmell" and "Clean Coul, please take care" because these are heavy.
(2) Unload carton box gently as frame and filter media are easily damaged. Open carton box to check damage if dropped.
(3) Load carton box vertically only. Up to 3 cartons can be put upon.
(4) Avoid traveling on unpaved road even filter is designed to withstand vibration in transit. Load carton box in truck equipped to prevent cargo from rain.

2. In storage

(1) Do not place the carton directory on a floor. Use pallet to take space.
(2) Store carton box at well-ventilated warehouse with temperature between 0 to 40 degrees and humidity between 30 to 90%, and avoid direct sunlight and water stained.
(3) Load carton box vertically only. Up to 3 cartons can be put upon.
(Except "Iochemix" to 2 cartons and element of "Puresmell" to 6 cartons)
(4) Store carton box as originally packed. Repack filter with PE bag tightly sealed when carton is unpacked.
(5) Check filter's quality before use if it has been stored for more than 1 year.

3. In installation

(1) To decrease damage on filter, pull carton box upward as instructed (shown on the figure).
(2) In order not to damage filter media, hold frame only to handle filter.
(3) Never step on filter.
(4) Never sit and stand on filter as it is easily damaged.
(5) Install filter ("Purechemix G" and "Iochemix") as pleats to be vertical.
(6) Install filter ("Puresmell" and "Clean Coal") horizontal to avoid inclination of adsorbent.
(7) Install filter with direction as noticed on the label.
(8) When using chemical filter for Acid, Alkali and Organic combined, please refer us for installation order.
(9) Install filter by tightening evenly with gasket to be about 2/3 of its original depth. Do not remove filter once installed until replacement to avoid leakage caused by damage on gaskets.
(10) Do not install filter long before using (test running) to avoid deterioration on specification.
(11) Keep filters away from ultraviolet rays (sunshine or lump).



4. In use

(1) Idle once upon installation.
(2) Turn on/off airflow gradually. Do not turn airflow on/off suddenly.
(3) Keep initial pressure drop record.
(4) Chemical filter might generates particles when start/stop operation. Please use after-filter to collect the particles if it is problem.
(5) Though "Purechemix" and "Iochemix" scarcely generates particles, these are not suitable as final filter. High efficiency filters are recommended as final filter.
(6) Please refer us in case to process special gases or chemicals.
(7) After long operation to process organic gases, chemical filters with activated carbon might media release organic gases with less adsorptive (mainly low boiled point) as it collect the gases with more adsorptive (high boiled point gases).
(8) Filters with activated carbon media might release NO2- at its end of service life.
(9) Filters for Alkali might generate carboxylic acid (ex. acetic acid) or alcohol by hydrolysis when there are esters (ex. PGMEA: propylene glycol monomethyl ether acetate) in circumstances.
(10) Removal efficiency and service life of the filter are influenced by condition of circumstance. Please use the filter with under rated air volume, check effect of the filter regularly.
(11) When stop operation for long time, please remove filter and keep it in PE bag with carton.
(12) Keep filters from water and condensation.
(13) Discard filter as industrial disposal.

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NIPPON MUKI CO., LTD.

HEAD Office
Kokubu Bldg., 1-1-1, Nihonbashi, Chuo-ku, Tokyo,103-0027, Japan Tel.+81-3-5290-5905
Tohoku Office
Sompo Japan Sendai KY Bldg., 3-10-19, Chuo, Aoba-ku, Sendai City, 980-0021, Japan Tel.+81-22-266-7531
Osaka Office
Sumitomo Bldg., 4-5-33, Kitahama, Chuo-ku, Osaka City, 541-0041, Japan Tel.+81-6-6201-3751
Chubu Office
Seifu Bldg., 3-21-25, Marunouchi, Naka-ku, Nagoya City, 460-0002, Japan Tel.+81-52-957-5900
Kyushu Office
Solon Akasaka Bldg., 1-9-33, Daimyo, Chuo-ku, Fukuoka City, 810-0041, Japan Tel.+81-92-715-1651
Hiroshima Office
Nomura Fudousan Otemachi Bldg., 2-8-5, Otemachi, Naka-ku, Hiroshima City, 730-0051, Japan Tel.+81-82-248-3920
NIPPON MUKI(SHANGHAI)CO., LTD.
Room 6406, Business Center, Rui Jin Guest House, 118 Rui Jin 2 Road, Shanghai, 200020, China Tel.+86-21-6445-0176

http://www.nipponmuki.co.jp/

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