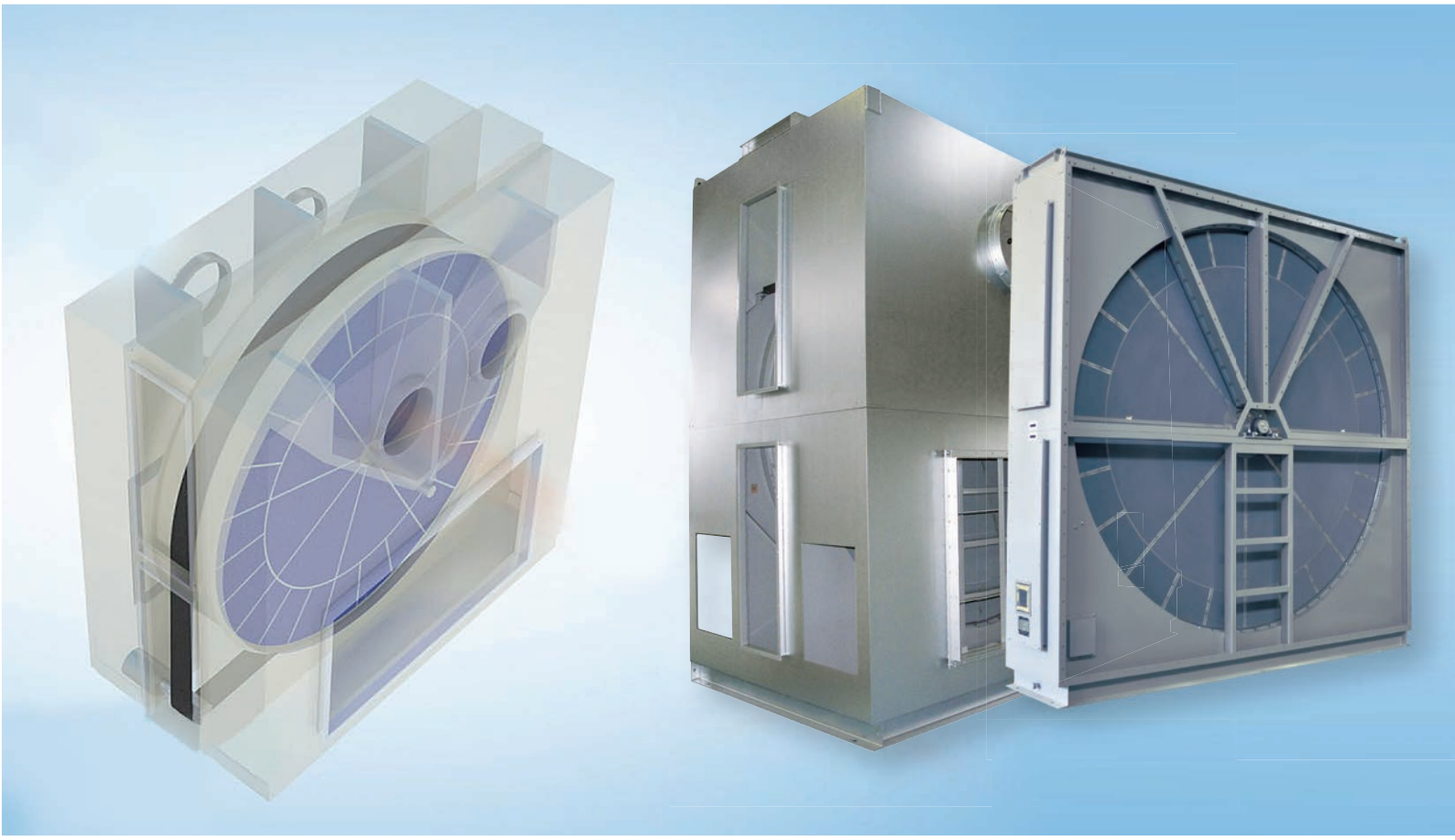
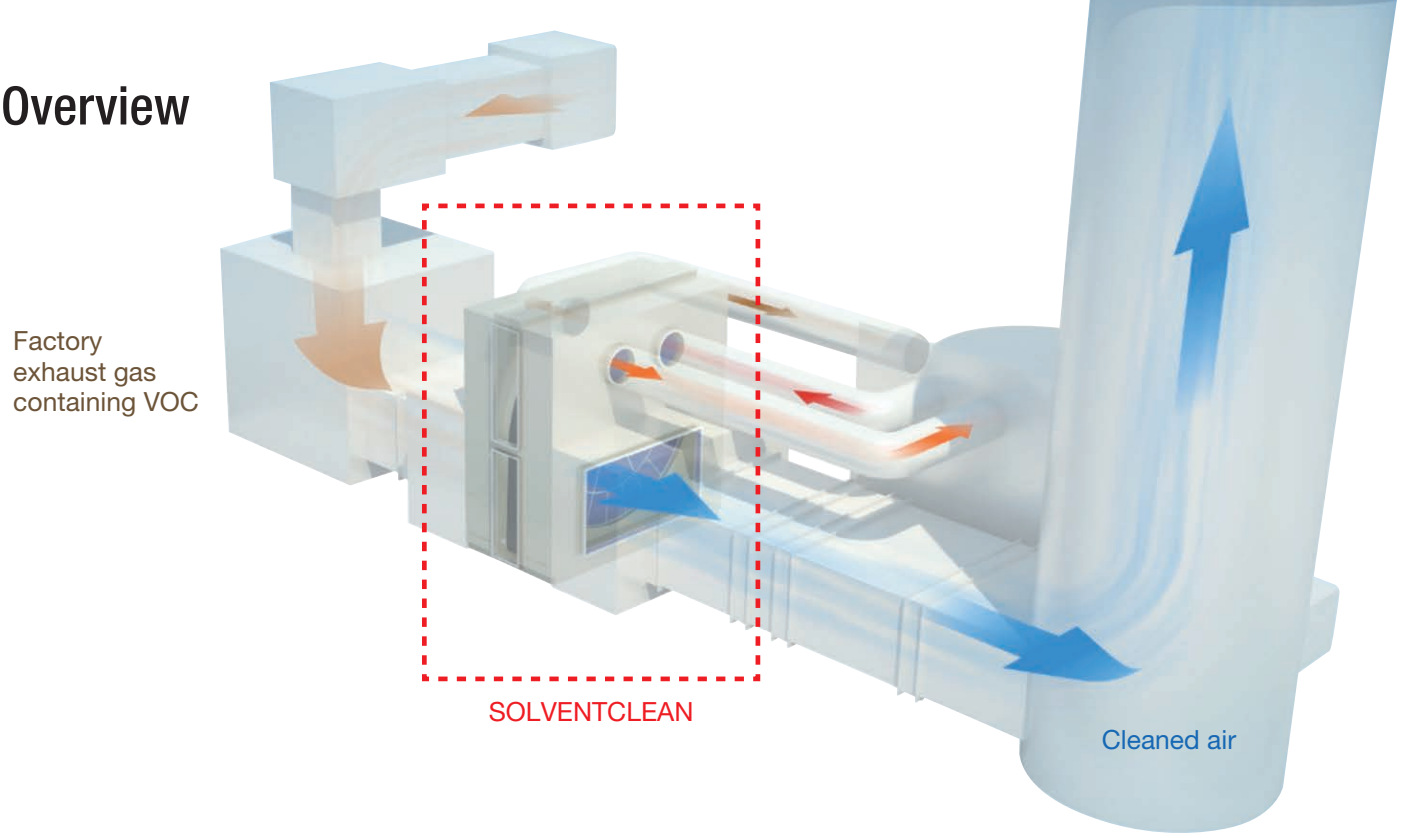
TOMBO™ BRAND

SOLVENTCLEAN™



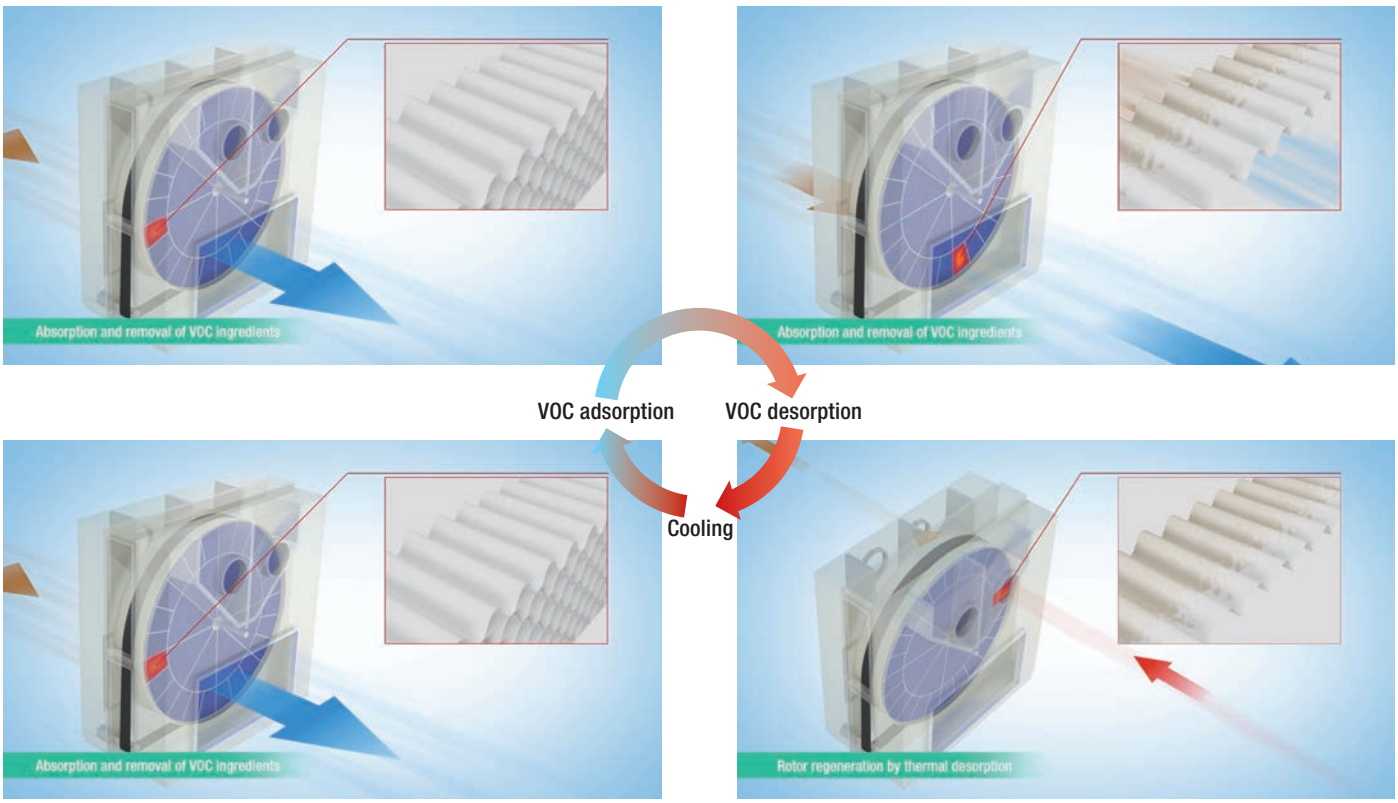
NICHIAS

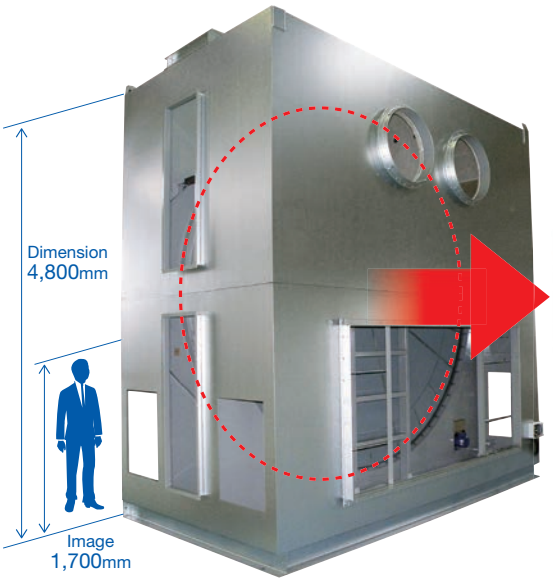
Overview



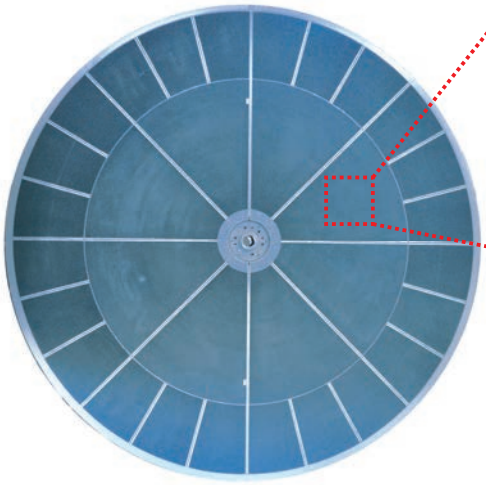
These days, with atmospheric pollution becoming a problem of global proportions, emission regulation of VOC(1) is being strengthened and interest in VOC processing technologies is increasing.
Up till now, when processing exhaust gases in large air volumes containing low concentrations of VOC, large-scale equipment has been required, greatly increasing both initial and running costs.
By using SOLVENTCLEAN, exhaust gases in large air volumes containing low concentrations of VOC, which have caused difficulties in the past, can be concentrated into low air volumes with high concentrations and, by combining SOLVENTCLEAN with existing (oxidization method, recovery method, etc.) processing equipmentes, efficient processing of exhaust gases containing VOC has become possible.

Note(1) VOC : volatile organic compound

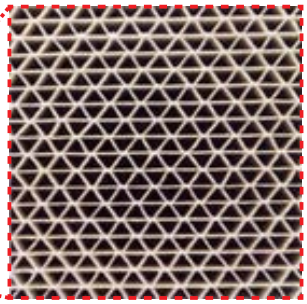




SOLVENTCLEAN



VOC concentration rotor



Zoom-up of honeycomb-structured VOC zeolite adsorbent

Structure	Honeycomb structure
Adsorbent	High performance hydrophobic zeolite
Standard desorption temperature	180 – 200°C
Temperature for high temperature desorption function (as option)(1)	300°C

Note(1) Japanese Patents : No. 3601007, and No. 3674867

Features

1 **Can provide a low operation cost**

SOLVENTCLEAN is suitable for a large airflow volume and low concentration of exhausted gas removal, and can save the operation cost for whole VOC removal system.

2 **Can provide high VOC removal efficiency**

99% of VOC removal efficiency can be achieved.

3 **Can provide high concentration ratio**

Increase of VOC concentration in the exhaust gases multiplied by 3 to 30 times is the service available. (Normally the concentration limit is 1/4 of LEL [lower explosion limit] as standard design guideline.)

4 **Can provide low pressure loss**

Due to the usage of honeycomb-structured adsorbent, pressure loss is low and large airflow volume of VOC exhausted air is removal with minimizing the increase of operation power in the process fan.

5 **Can provide the continuous removal for VOC**

Since SOLVENTCLEAN uses a continuous desorption by unique rotation technique, the removal efficiency is relatively stable in comparison with traditional batch type concentration, and is not fluctuated.

6 **Can remove high boiling point of VOC**

Solventclean is suitable for a large airflow volume and low concentration exhausted gas remova. It can save the operation cost for whole system.

7 **Incombustible**

All raw materials for which the rotor is constructed are inorganic and the rotor is uncombustible.

8 **Maintenance is easy**

Since the construction of the rotor is simple, maintenance is easy.

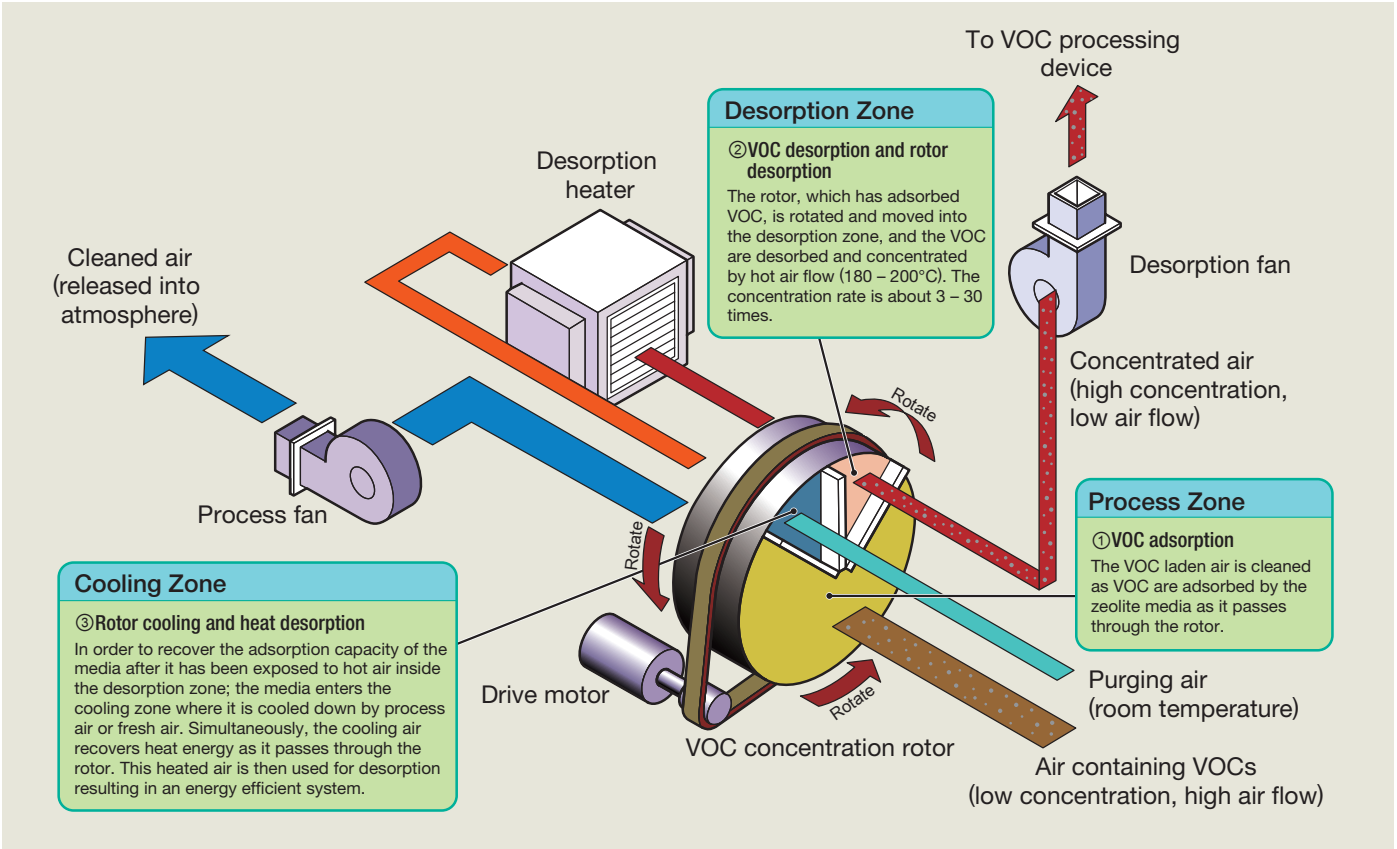
Zeolite Select for Typical VOC

	VOC	Rotor Type			
		HZ-AM	HZ-BM	HZ-XM	HZ-XO
Aromatic compounds	Toluene	B	A	B	B
	Xylene	A	C	A	A
	Tri methyl benzene	A	D	A	A
	Styrene	D	A	D	D
Ketones	Acetone	C	B	B	B
	MEK	B	A	A	A
	MIBK	B	A	A	A
	Cyclohexanone	A	C	A	A
Esters	Ethyl acetate	B	A	A	A
	Butyl acetate	B	A	A	A
	PGMEA	B	A	A	A
Alcohols	Methanol	C	C	C	C
	Ethanol	C	B	C	C
	IPA	C	B	B	B
	Butanol	B	A	A	A
Others	Naphtha(1)	B	C	B	B
	NMP	A	C	B	B
	DCM	D	B	C	C

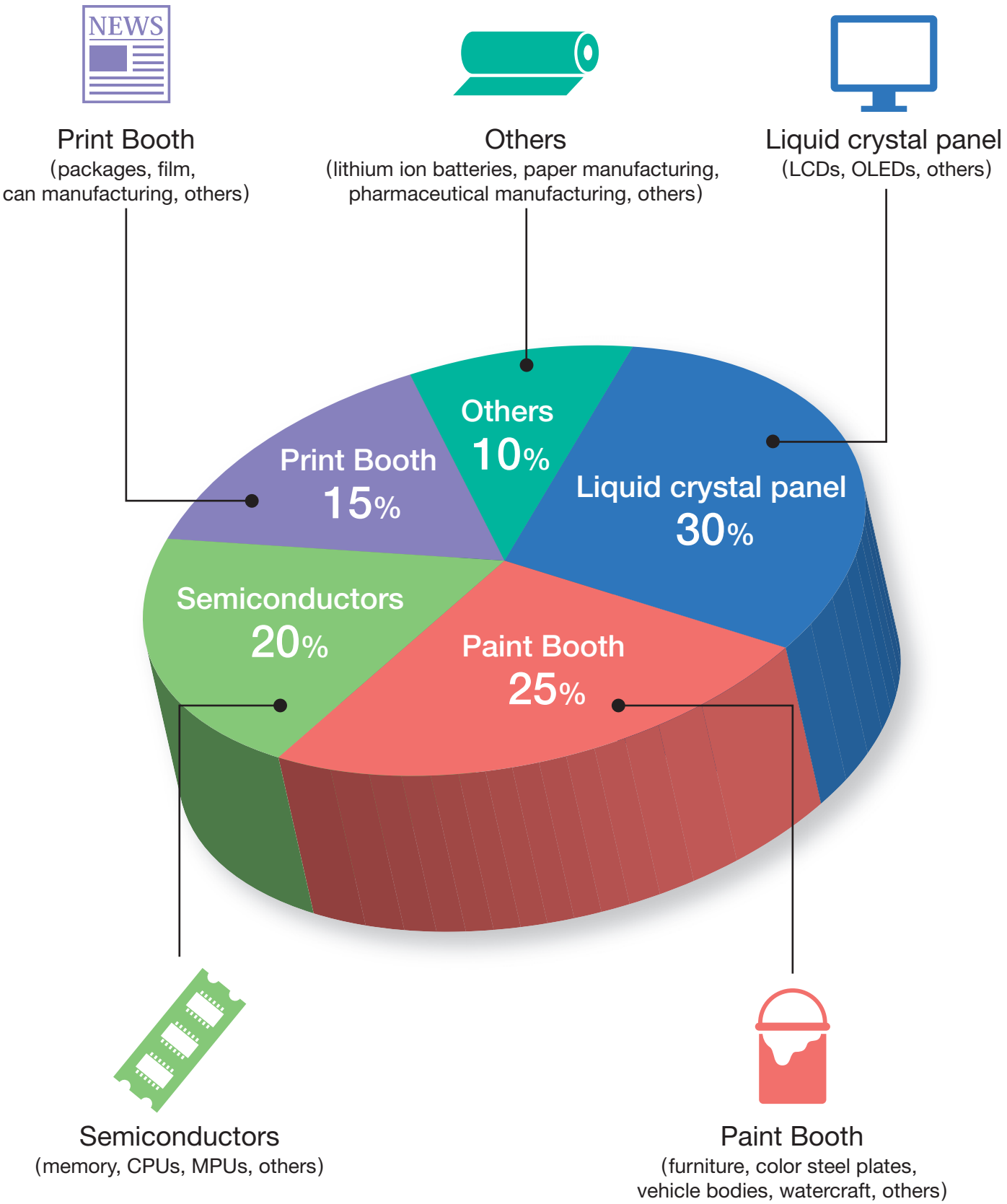
Performance : A (excellent), B (good), C (possible), and D (not possible)

Note(1) : Boiling point less than 200°C

Basic System



Sales Performance



Number of supplied SOLVENTCLEAN : more than 2,000
(as of March 31, 2020)

High Temperature Desorption System

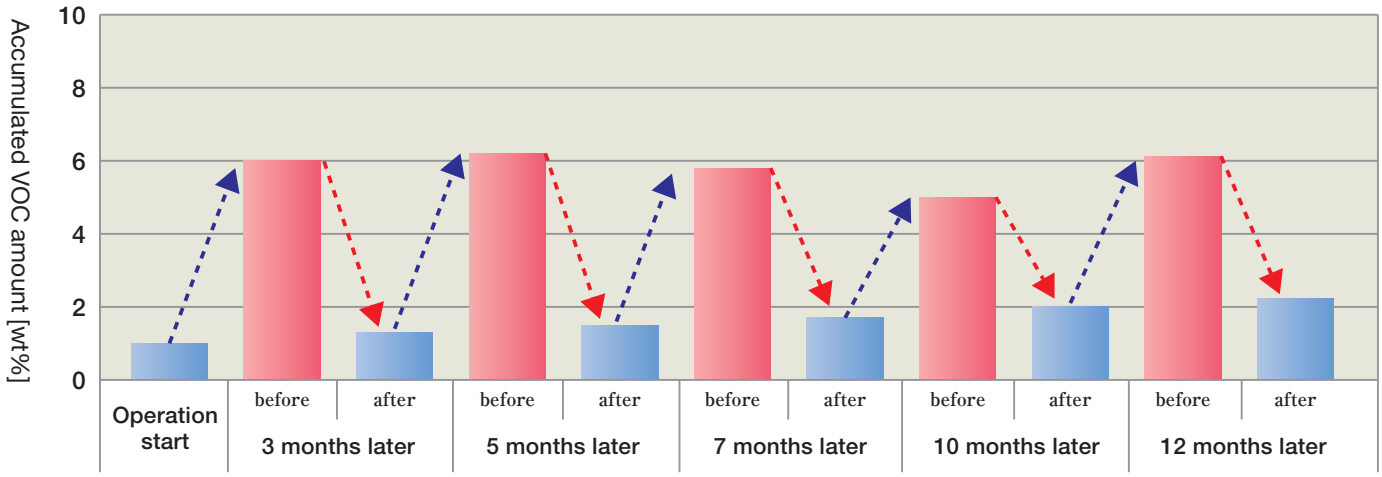
Japanese Patents : No. 3601007, and No. 3674867

Features

A system that periodically conducts a “300°C desorption operation (high temperature desorption operation)” to desorb accumulated high boiling point substances and prolong the life of the rotor. The 300°C compatible sealing material is a mechanism that is unique to Nichias.

Usage results

Purposes : Semiconductor and liquid crystal panel production line exhaust gases, photogravure print drying exhaust gases, chemical production line exhaust gases, etc.



Behavior of remaining organic matter amount reduction by periodic high temperature desorption

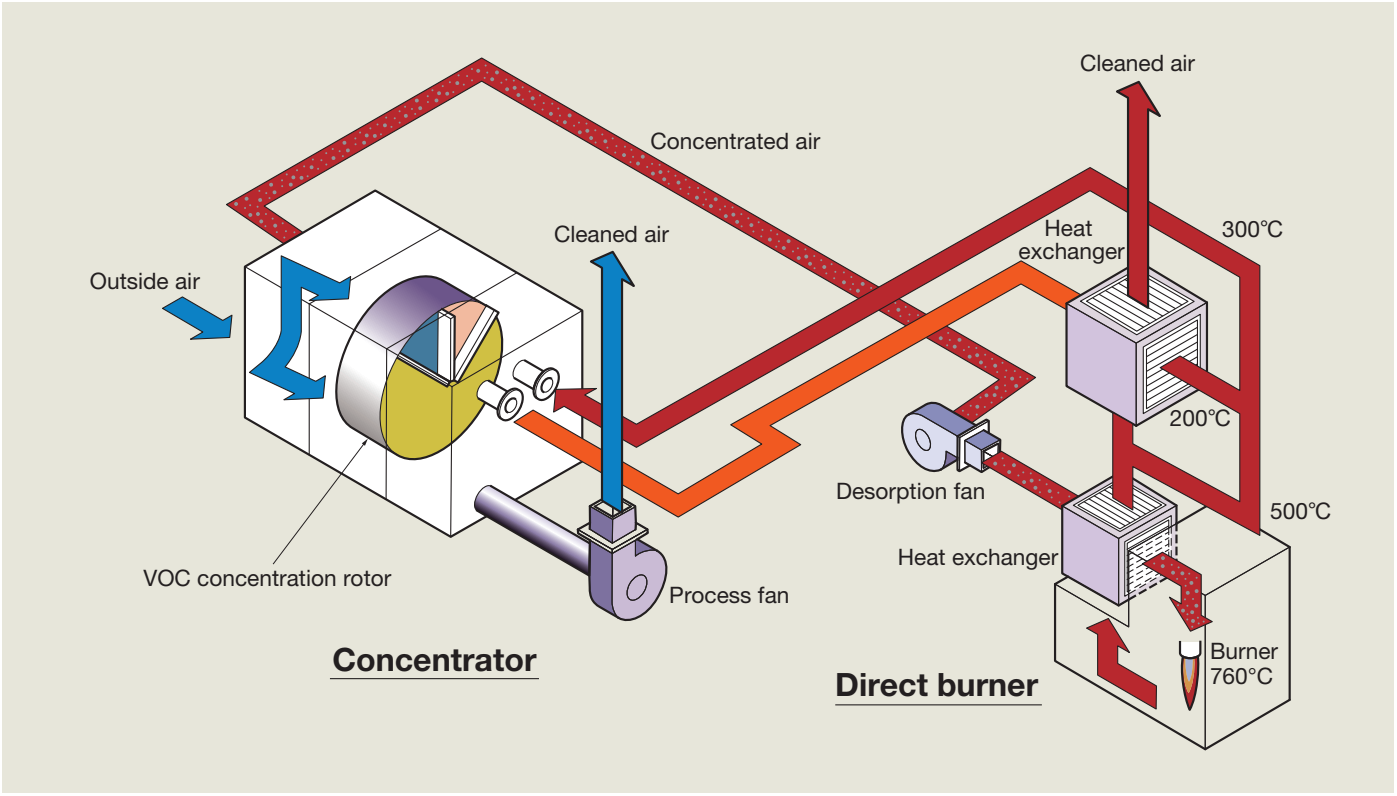
Measurement organization : NICHIAS

*These are measured values and not guaranteed values

Precautions regarding use

This system is for eliminating organic matter that has accumulated on the concentration rotor, not for recovery of the rotor to its original state.
The necessity for a mist filter (activated carbon etc.) to be installed at the stage prior to the concentration rotor is fundamental.
If ingredients that cannot be eliminated by high temperature desorption (generation temperature of 300°C) are included, the concentration rotor does not recover. Also, this system cannot respond to all substances with a boiling point of or below 300°C.
There are cases where this system cannot be applied, depending on conditions (such as large amounts of high boiling point materials etc.).
The desorption outlet temperature rises to about 250°C, therefore it is necessary to select ducts, sealing materials, and fans that are suitable for that temperature.

〈During high temperature desorption〉



Examples of Combinations of Concentrators with Various Systems

Concentrator with oxidization system

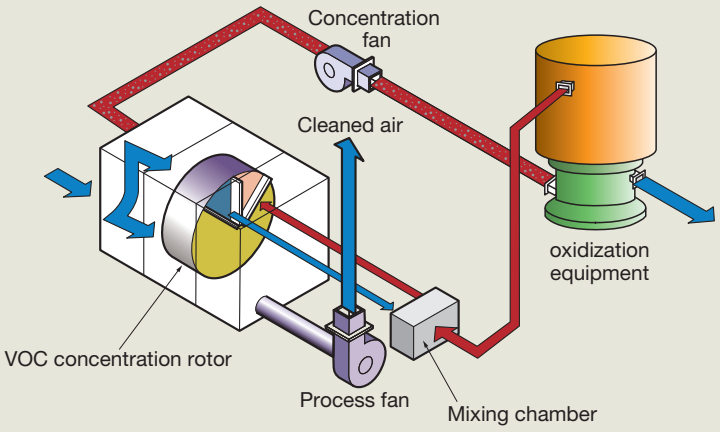
After low concentration, high flow amount air containing VOC is converted to high concentration, low flow amount air by the concentrator, it is oxidation decomposed in a oxidization equipment.

Features

1. The oxidization equipment is small due to the concentration process, reducing overall cost and space.
2. The amount of fuel consumption of the oxidization equipment can be reduced due to the concentration process (the desorption heat source of the concentrator uses the oxidization exhaust gas).

Application

- Paint Booth
- Print line local ventilation
- Coating zone ventilation



Concentrator with cooling recovery system

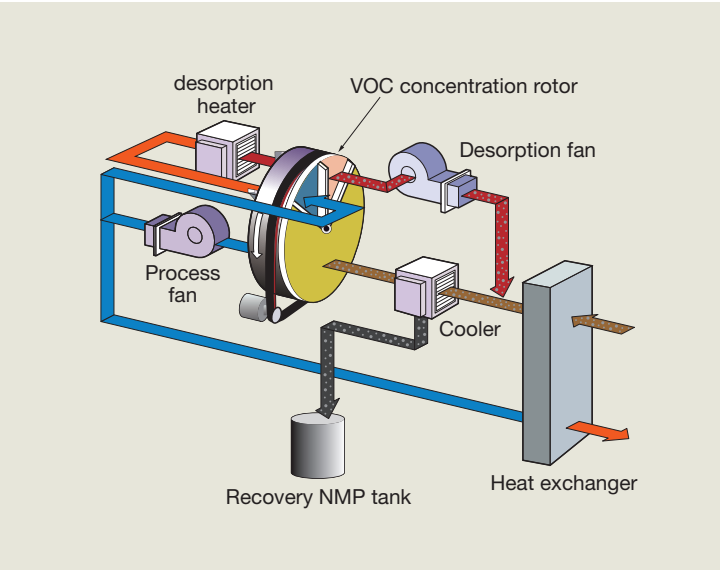
After low concentration, high flow amount air containing VOC is converted to high concentration, low flow amount air by the concentrator, it is recovery processed by a cooling recovery equipment.

Features

1. It can be operated at a cooling temperature close to room temperature.
2. It can be operated when the processing air is in low concentrations.
3. The combination of concentration and cooling makes purification of 90% and higher possible by concentration recycling (using cooling recovery alone, the exhaust concentration is several hundreds of ppm).

Application

- Lithium ion battery production



Concentrator with adsorption recovery system

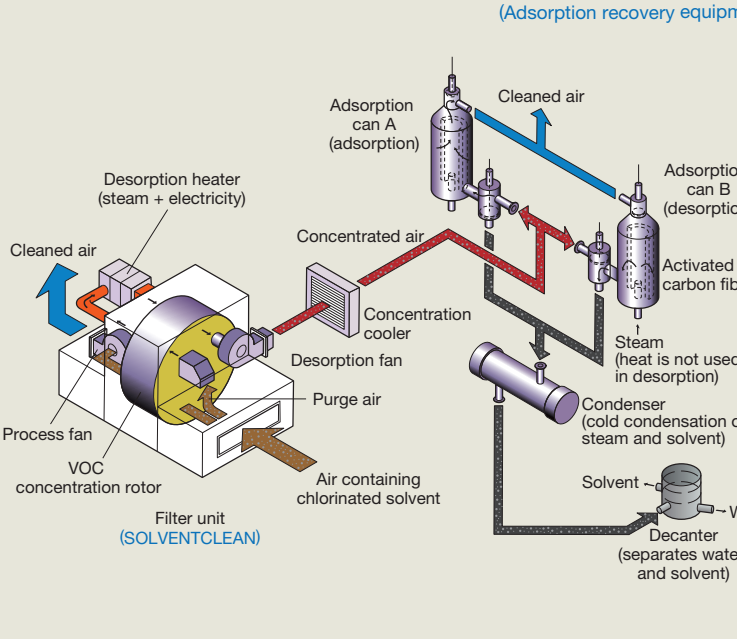
After low concentration, high flow amount air containing VOC is converted to high concentration, low flow amount air by the concentrator, it is recovery processed by an adsorption recovery equipment.

Features

1. The adsorption recovery equipment is small due to the concentration process, reducing overall cost and space.
2. The efficiency of the adsorption recovery equipment is increased due to the concentration process, enabling improvement in VOC recovery efficiency and reduced overall energy consumption.

Applied solvents

- Processing of exhaust gases containing chlorinated solvents (methylene chloride etc.)
  e.g. processing of cleaning process exhaust gas
- Adsorption recovery device backup (addition of concentrator)
  e.g. post-adsorption exhaust gas cleaning process



Specifications

Concentrator with oxidization system (concentration rotor, air seal, operating section, plenum chamber, and duct entrance)

Type (SCB-)	Process air flow amount (Nm³/min)(1)	Dimensions (mm)(2) Length × width × height (L × W × H)	Estimated weight (tons)(2)
1220	~200	2100 × 1550 × 1650	1.2
1525	180~300	2100 × 1850 × 1950	1.5
1740	250~400	2100 × 2050 × 2150	1.6
1940	350~500	2100 × 2250 × 2350	1.7
2190	450~600	2100 × 2500 × 2600	2.6
2450	550~750	2100 × 2800 × 2925	3.0
2650	650~900	2100 × 3000 × 3125	3.5
2950	850~1100	2100 × 3300 × 3525	4.0
3250	1000~1300	2100 × 3600 × 3850	4.6
3550	1200~1600	2100 × 3900 × 4150	5.2
3850	1400~1900	2100 × 4200 × 4450	5.8
4200	1700~2300	2100 × 4550 × 4800	7.0
4500	2000~2500	2100 × 4850 × 5100	8.2

Note(1) : The process air flow amount and concentrated air flow amount vary depending on the usage conditions.
Note(2) : Dimensions and weight may be changed without notice.

Solvent concentration cassette (concentration rotor, air seal, and operating section)

Type (SCC-)	Process air flow amount (Nm³/min)(1)	Dimensions (mm)(2) Length × width × height (L × W × H)	Estimated weight (tons)(2)
1220	~200	840 × 1550 × 1650	0.8
1525	180~300	840 × 1850 × 1950	1.0
1740	250~400	840 × 2050 × 2150	1.2
1940	350~500	840 × 2250 × 2350	1.3
2190	450~600	840 × 2500 × 2600	2.0
2450	550~750	840 × 2800 × 2925	2.4
2650	650~900	840 × 3000 × 3125	2.8
2950	850~1100	840 × 3300 × 3525	3.3
3250	1000~1300	840 × 3600 × 3850	3.6
3550	1200~1600	840 × 3900 × 4150	4.3
3850	1400~1900	840 × 4200 × 4450	5.1
4200	1700~2300	840 × 4550 × 4800	5.7
4500	2000~2500	840 × 4850 × 5100	6.2

Note(1) : The process air flow amount and concentrated air flow amount vary depending on the usage conditions.
Note(2) : Dimensions and weight may be changed without notice.

SOLVENTCLEAN™ Inquiry Sheet

When determining the specifications of SOLVENTCLEAN, we require the items described in the Inquiry Sheet.
Please supply as much information as possible.

Company name			
Department name		Name	
Phone	( ) —	Fax	( ) —
Delivery destination company			
Delivery destination area	／ (e.g. Chiba, Japan; Shanghai, China, etc.)		
Purpose of concentration	(e.g. automotive paint exhaust gas, FPD production exhaust gas, etc.)		
Installation location	① ☐Interior, ☐Exterior ／② ☐Ground level, ☐Rooftop		
Utilities	V × Hz		

●Upstream side of SOLVENTCLEAN (factory exhaust gas)

[Amount of air flow] _____ ☐Nm³/min, ☐Nm³/hr

[Temperature] _____ ℃DB

[Humidity] _____ ☐%RH, ☐g/kg'

[Contaminants] (particles) _____ mg/Nm³, (mist) _____ mg/Nm³

[VOC ingredients contained in exhaust gas] _____ units:☐v-ppm, ☐mg/Nm³

Solvent name	Concentration	Solvent name	Concentration
(e.g.) Acetone	(e.g.) 100		

●Downstream side of SOLVENTCLEAN ① (cleaned air)

[Concentration contained after cleaning] _____ ☐v-ppm or less, ☐mg/Nm³ or less

or [Cleaning efficiency] _____ % or more

●Downstream side of SOLVENTCLEAN ② (concentrated air)

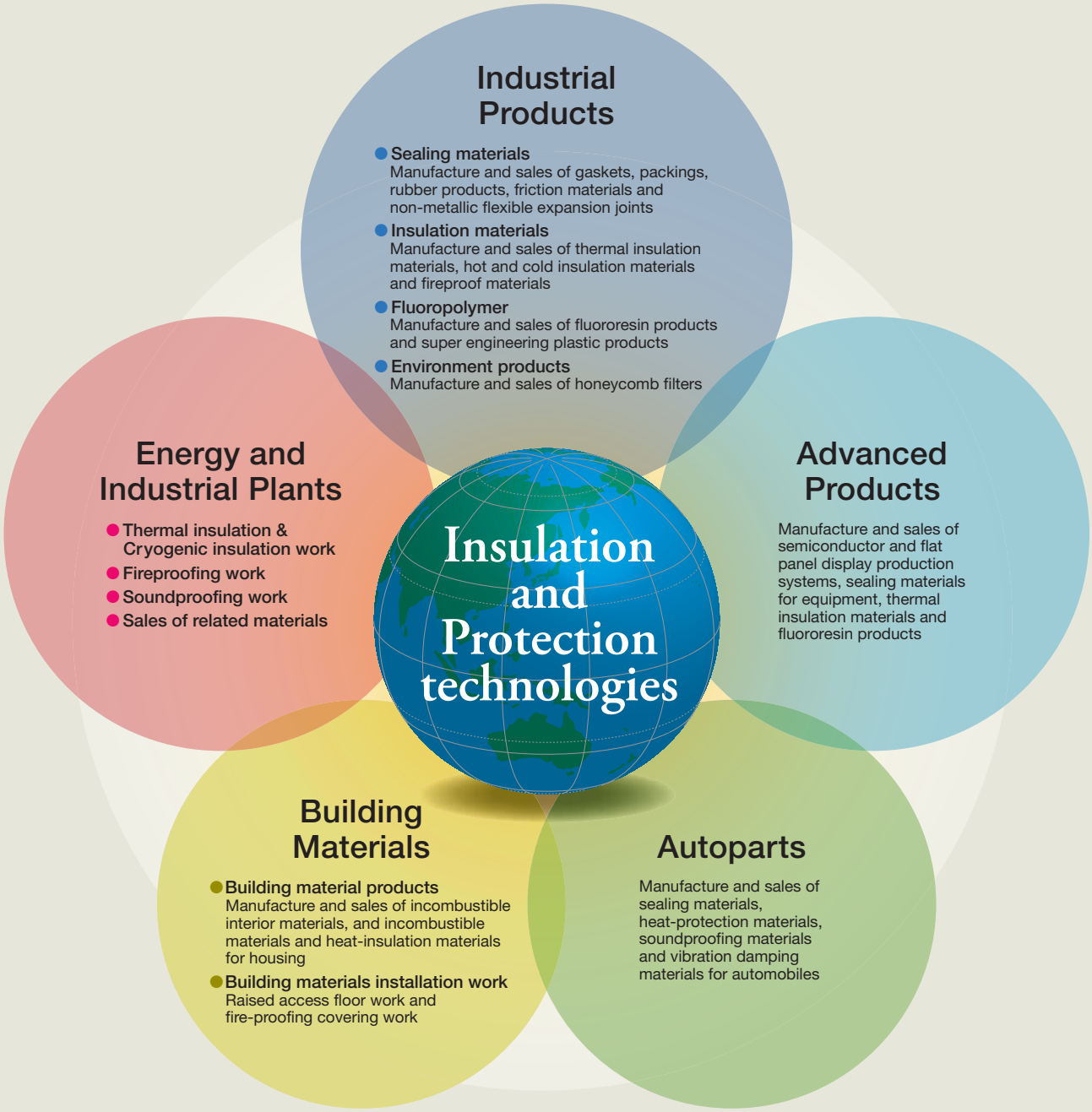
[Concentration rate] _____ times

NICHIAS

NICHIAS contributes to the Earth's bright future through our Insulation and Protection technologies

The Nichias Group, founded in 1896 as a pioneer in the field of thermal insulation, has expanded its range of activities, starting with electricity and gas, from such key industries as petroleum production and petrochemicals, chemicals, shipbuilding, steel, automobiles, construction, etc. to industrial fields such as electronics, environment-related businesses, etc.

We will continue to contribute to the Earth's bright future with our "insulation and protection" technology.



Company overview (as of March 30, 2020)

Company Name : NICHIAS Corporation

Establishment : April 9, 1896

Head Office : 1-6-1, Hatchobori, Chuo-ku, Tokyo

Capital : 12,128,352,879 yen

Number of associated employees : 6,260

●Domestic factories

Tsurumi Factory	Yokohama, Kanagawa Prefecture
Ohji Factory	Kitakatsuragi, Nara Prefecture
Hashima Factory	Hashima, Gifu Prefecture
Fukuroi Factory	Fukuroi, Shizuoka Prefecture
Yuki Factory	Shimotsuma, Ibaraki Prefecture

●Laboratories

Tsurumi Research Laboratory	Yokohama, Kanagawa Prefecture
Hamamatsu Research Laboratory	Hamamatsu, Shizuoka Prefecture

Network

●Main domestic group companies

Sales & Construction Companies

NICHIAS CERATECH CO., LTD.
Manufacture and Sales of insulation materials and building materials

TOKYO MATERIALS CORPORATION
Sale of sealing materials and fluoropolymer products

NICHIAS KANTO SALES CORPORATION
Sale of sealing materials, insulation materials and fluoropolymer products

NISHI-NIPPON NICHIAS CORPORATION
(formerly AKITSU INDUSTRY CORPORATION)
Manufacture and sale of sealing materials, insulation materials and fluoropolymer products

HAMAASU CORPORATION
Sale of sealing materials, insulation materials, fluoropolymer products and building materials, Industrial thermal insulation work and installation work of building materials

NIPPON THERMAL ENGINEERING CORPORATION
Industrial thermal insulation work

NICHIAS ENGINEERING SERVICE CORPORATION
Industrial thermal insulation work

INOCRETE CO., LTD.
Industrial thermal insulation work

NICHIAS KYUSHU SALES CO., LTD.
Sale of sealing materials, insulation materials and fluoropolymer products

NIPPON ROCKWOOL CORPORATION
Sales of building materials

NICHIAS CEMCRETE CORPORATION
Sales and installation work of building materials

Factories

NICHIAS CERATECH CO., LTD.
Manufacture and Sales of insulation materials and building materials

SAKAI NICHIAS CORPORATION
Manufacture of insulation materials

KOKUBU INDUSTRY CORPORATION
Manufacture of sealing materials, insulation materials, filters and auto parts

TATSUTA INDUSTRY CORPORATION
Manufacture of sealing materials, insulation materials, auto parts and building materials

OHTA KASEI CORPORATION
Manufacture of insulation materials

NICHIAS MECHATECHNO CO., LTD.
Manufacture of sealing materials and fluoropolymer products

NISHI-NIPPON NICHIAS CORPORATION
(formerly AKITSU INDUSTRY CORPORATION)
Manufacture and sale of sealing materials, insulation materials and fluoropolymer products

FUKUSHIMA NICHIAS CORPORATION
Manufacture of insulation materials, fluoropolymer products and auto parts

KUMAMOTO NICHIAS CORPORATION
Manufacture of fluoropolymer products

METAKOTE INDUSTRY CORPORATION
Manufacture of auto parts

APJ CORPORATION
Manufacture of auto parts

N&A TECH CO.,LTD.
Manufacture of auto parts

KIMITSU ROCKWOOL CORPORATION
Manufacture of building material

●Main overseas group companies

Sales & Construction Companies

▶Indonesia

PT. NICHIAS SUNIJAYA
Sales of sealing materials, insulation materials, fluoropolymer products, auto parts, building materials, and Industrial thermal insulation work

▶Malaysia

NICHIAS SOUTHEAST ASIA SDN. BHD.
Sales of sealing materials, insulation materials, fluoropolymer products, auto parts and Engineering and insulation work

▶Singapore

NICHIAS SINGAPORE PTE LTD.
Sales of sealing materials, insulation materials, Filters, fluoropolymer products, auto parts, and building materials

▶Vietnam

NICHIAS VIETNAM CO., LTD.
Sales of sealing materials, insulation materials, fluoropolymer products, and auto parts

▶Thailand

NICHIAS (THAILAND) CO., LTD.
Manufacture and sales of auto parts

THAI NICHIAS INTERNATIONAL CO., LTD.
Sales of sealing materials, insulation materials, fluoropolymer products and building materials

▶China

NICHIAS (SHANGHAI) TRADING CO., LTD.
Sales of sealing materials, insulation materials, filters and fluoropolymer products

NICHIAS (SHANGHAI) TRADING CO., LTD. GUANGZHOU BRANCH
Sales of sealing materials, insulation materials, filters and fluoropolymer products

NICHIAS (SHANGHAI) AUTOPARTS TRADING CO., LTD.
Sales of auto parts

SHANGHAI XINGSHENG GASKET CO., LTD.
Manufacture and sales of auto parts

SUZHOU SHUANGYOU AUTOPARTS CO.,LTD.
Manufacture and sales of auto parts

▶India

NICHIAS INDUSTRIAL PRODUCTS PRIVATE LTD.
Manufacture and Sales of sealing materials, insulation materials and auto parts

▶Germany

NICHIAS AUTOPARTS EUROPE GmbH
Sales of auto parts

▶Czech Republic

NICHIAS AUTOPARTS EUROPE a.s.
Manufacture and sales of auto parts

▶Mexico

NAX MFG, S.A.DE C.V.
Manufacture and sales of auto parts

Factories

▶Indonesia

PT. NICHIAS ROCKWOOL INDONESIA
Manufacture of sealing materials, insulation, and auto parts

PT. NICHIAS METALWORKS INDONESIA
Manufacture of sealing materials and building materials

▶Malaysia

NICHIAS FGS SDN. BHD.
Manufacture of sealing materials, fluoropolymer products, auto parts and building materials

NT RUBBER-SEALS SDN. BHD.
Manufacture of sealing materials

▶Vietnam

NICHIAS HAIPHONG CO., LTD.
Manufacture of sealing materials, filters, and fluoropolymer products

▶Thailand

NICHIAS (THAILAND) CO., LTD.
Manufacture and sales of auto parts

THAI-NICHIAS ENGINEERING CO., LTD.
Sales of insulation materials, and Engineering and insulation work

▶China

SUZHOU NICHIAS INDUSTRIAL PRODUCTS CO., LTD.
Manufacture of sealing materials, fluoropolymer products and auto parts

SUZHOU NICHIAS SEAL MATERIAL CO., LTD.
Manufacture of sealing materials, insulation materials and filters

SHANGHAI XINGSHENG GASKET CO., LTD.
Manufacture and sales of auto parts

SUZHOU SHUANGYOU AUTOPARTS CO.,LTD.
Manufacture and sales of auto parts

▶India

NICHIAS INDUSTRIAL PRODUCTS PRIVATE LTD.
Manufacture and Sales of sealing materials, insulation materials and auto parts

▶Czech Republic

NICHIAS AUTOPARTS EUROPE a.s.
Manufacture and sales of auto parts

▶Mexico

NAX MFG, S.A.DE C.V.
Manufacture and sales of auto parts

E58 Issued in Oct. 2020

NICHIAS Corporation

Head Office

6-1, Hatchobori 1-chome, Chuo-ku, Tokyo 104-8555, Japan
International Marketing and Sales Group
Phone: 81-3-4413-1132 Fax: 81-3-3552-6108
Web Site: https://www.nichias.co.jp/

Overseas Sales Companies

Indonesia
PT. NICHIAS SUNIJAYA
Panin Life Center, 2nd Floor, Room 205, Jl. Letnan Jenderal S. Parman
Kav. 91, Jakarta 11420, Indonesia
Phone: +62-21-56956207 Fax: +62-21-56956208/56956209

Malaysia
NICHIAS SOUTHEAST ASIA SDN. BHD.
Suite A1102, 11th Floor, West Wing, Wisma Consplant 2,
No. 7, Jalan SS 16/1, 47500 Subang Jaya, Selangor Darul Ehsan, Malaysia.
Phone: +60-3-5636-4067 Fax: +60-3-5636-4078

Singapore
NICHIAS SINGAPORE PTE. LTD.
25 International Business Park, #01-15/17 German Centre,
Singapore 609916
Phone: +65-6571-0830/0838 Fax: +65-6265-7681

Vietnam
NICHIAS VIETNAM CO., LTD
Room 12-K, 12Floor, Center Building,
Hapulico Complex No1 Nguyen Huy Tuong,
Thanh Xuan Trung, Thanh Xuan, Hanoi, Vietnam
Phone: + 84-4-3791-7194 Fax: + 84-4-3791-6203

Thailand
NICHIAS (THAILAND) CO., LTD.
85 Moo 1, Wellgrow Industrial Estate T. Homsin, A. Bangpakong
Chachoengsao 24180, Thailand
Phone: +66-38-570-600 Fax: +66-38-570-601

THAI NICHIAS INTERNATIONAL CO., LTD.
Unit 1107, 11th Floor, AIA Capital Center
89 Ratchadaphisek Road, Dindaeng, Dindaeng, Bangkok 10400 Thailand
Phone: +66-2-001-2060 Fax: +66-2-001-2062

China
NICHIAS (SHANGHAI) TRADING CO., LTD.
霓佳斯（上海）贸易有限公司
Room 1701, THE PLACE, Tower A, No. 100 Zun Yi Road,
Changning District, Shanghai, P.R.China Postcode 200051
中国上海市长宁区遵义路100号虹桥南丰城A栋1701室 邮编200051
Phone: +86-21-6236-1783 Fax: +86-21-6236-1781

NICHIAS (SHANGHAI) TRADING CO., LTD. Guangzhou Branch
霓佳斯（上海）贸易有限公司 广州分公司
17F-G, Gold Sun Building, No.109 Tiyu West Road, Guangzhou,
Guang Dong Province, 510620, P.R.China
中国广东省广州市天河区体育西路109号高盛大厦17楼G室 邮编 510620
Phone: +86-20-3879-1640 Fax: +86-20-3879-1647

NICHIAS (SHANGHAI) AUTOPARTS TRADING CO., LTD.
霓佳斯（上海）汽车零部 贸易有限公司
Room 1702, THE PLACE, Tower A, No. 100 Zun Yi Road,
Changning District, Shanghai, P.R.China Postcode 200051
中国上海市长宁区遵义路100号虹桥南丰城A栋1702室 邮编200051
Phone: +86-21-6236-2668 Fax: +86-21-6236-2667

Germany
NICHIAS AUTOPARTS EUROPE GmbH
Prinzenallee 7, 40549 Düsseldorf, Germany
Phone: +49 (0)211-52391-058 Fax: +49 (0)211-52391-200

Overseas Construction Companies

Malaysia
NICHIAS SOUTHEAST ASIA SDN. BHD.
Suite A1102, 11th Floor, West Wing, Wisma Consplant 2,
No. 7, Jalan SS 16/1, 47500 Subang Jaya, Selangor Darul Ehsan, Malaysia.
Phone: +60-3-5636-4067 Fax: +60-3-5636-4078

Thailand
THAI-NICHIAS ENGINEERING CO., LTD.
45 Huaypong-Nongbon Road, Huaypong, Muang Rayong,
Rayong Province 21150, Thailand
Phone: +66-38-682-242 Fax: +66-38-691-156

Overseas Factories

Indonesia
PT. NICHIAS ROCKWOOL INDONESIA
PT. NICHIAS METALWORKS INDONESIA

Malaysia
NICHIAS FGS SDN. BHD.
NT RUBBER-SEALS SDN. BHD.

Vietnam
NICHIAS HAIPHONG CO., LTD.

China
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