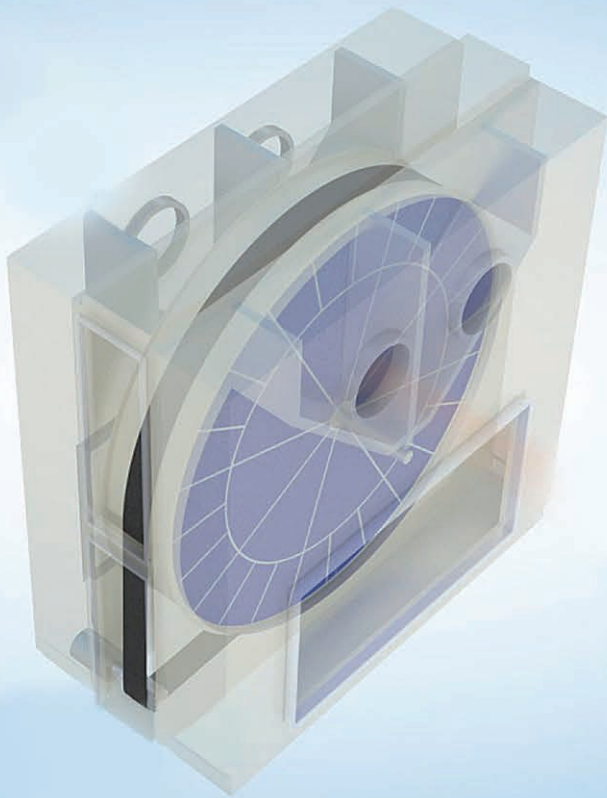
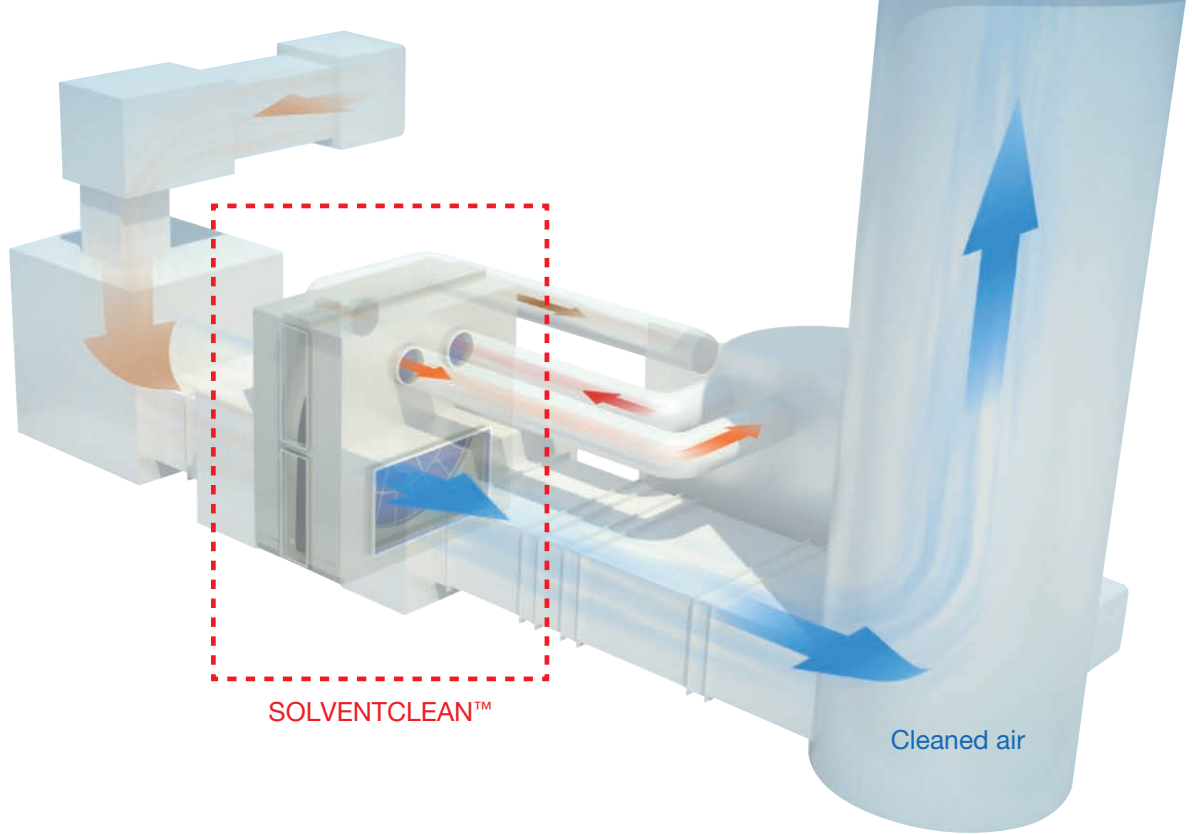


TOMBO™ BRAND SOLVENTCLEAN™



Overview

Factory exhaust gas containing VOC

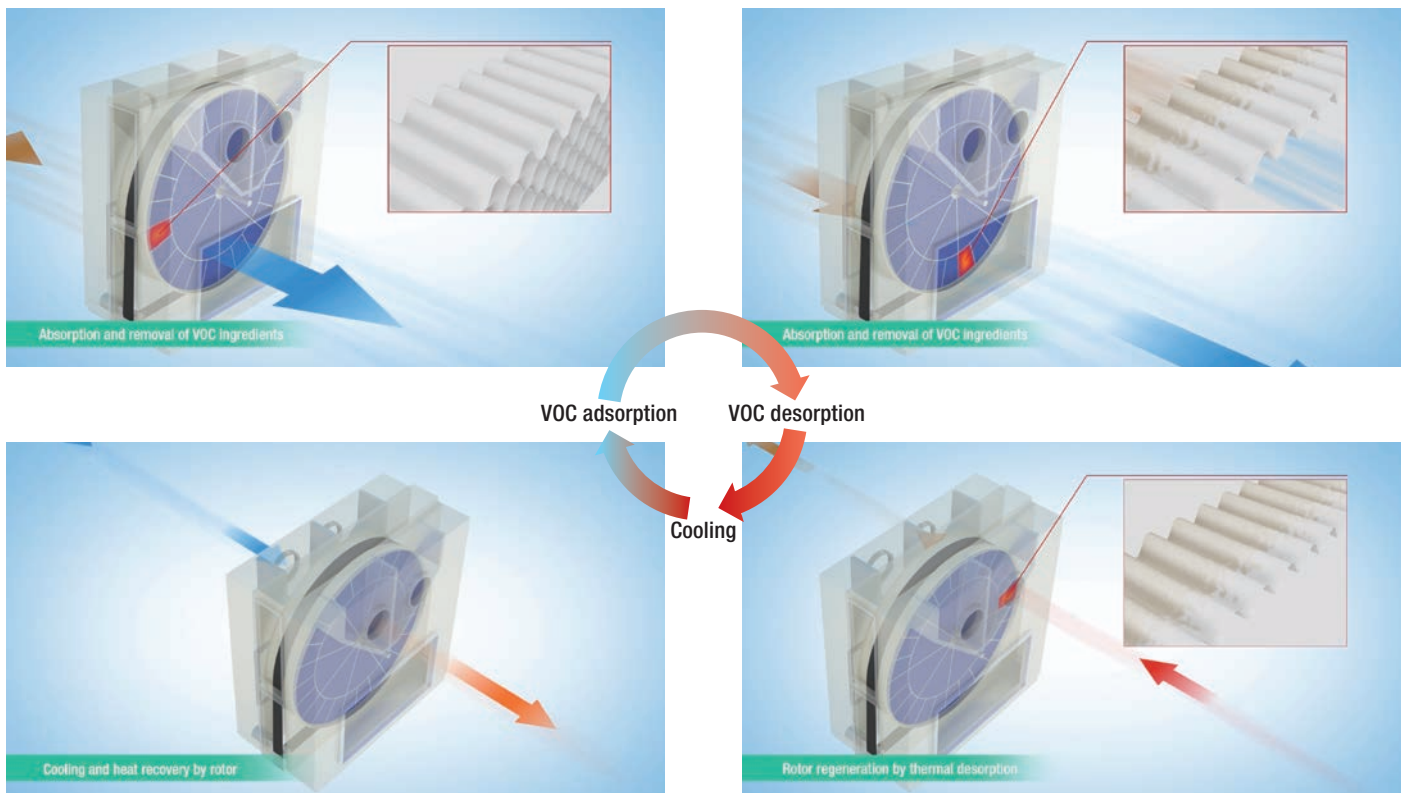


These days, with atmospheric pollution becoming a problem of global proportions, emission regulation of VOC* is being strengthened and interest in VOC processing technologies is increasing.

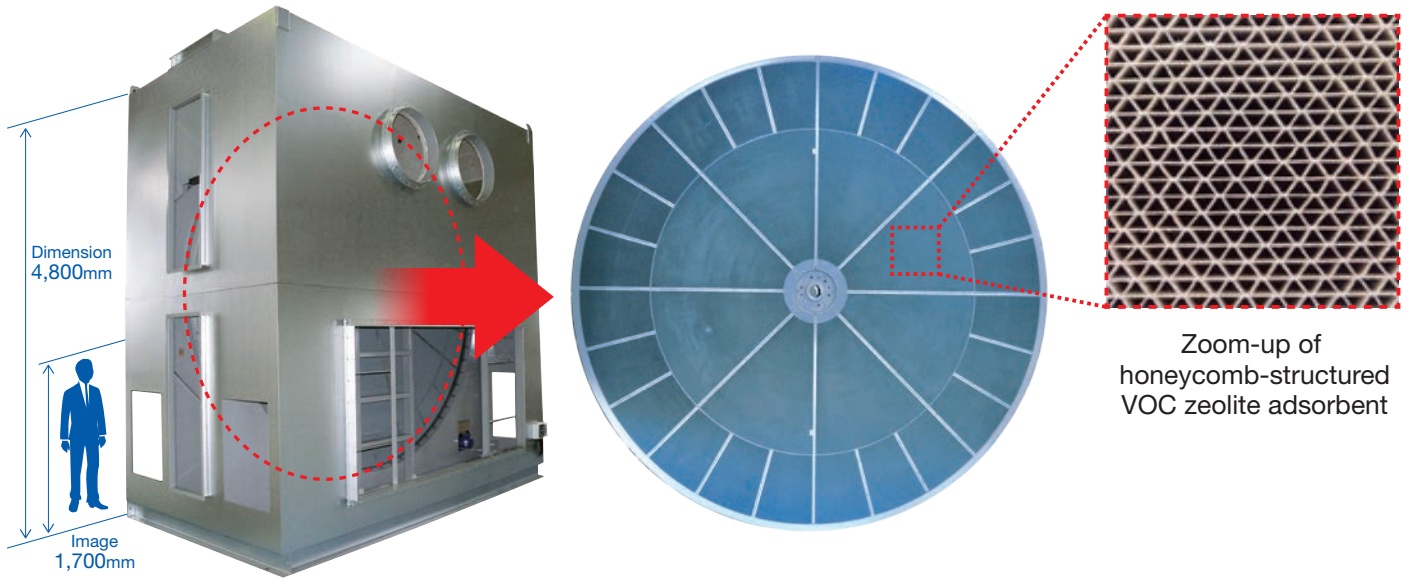
Up till now, when processing exhaust gases in large air volumes containing low concentrations of VOC, large-scale equipment has been required, greatly increasing both initial and running costs.

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 equipments, efficient processing of exhaust gases containing VOC has become possible.

*VOC : volatile organic compound



*TM is a trademark of Nichias Corporation.



SOLVENTCLEAN™

VOC concentration rotor

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

*Japanese Patents : No. 3570621, No. 3601007, and No. 3674867

Features

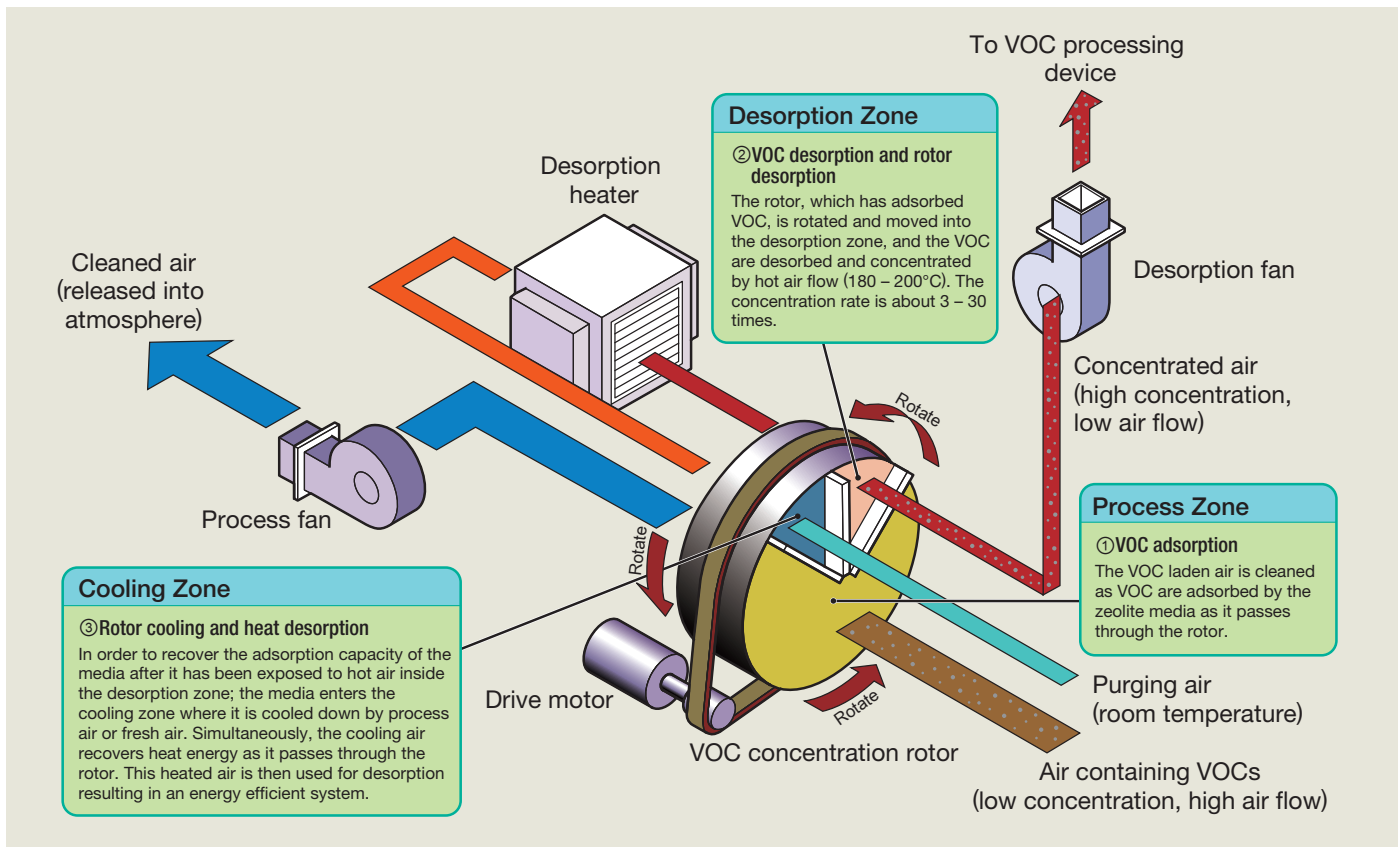
<p>1</p> <p>Can provide a low operation cost</p> <p>SOLVENTCLEAN is suitable for a large airflow volume and low concentration of exhausted gas removal, and can save the operation cost for whole VOC removal system.</p>	<p>2</p> <p>Can provide high VOC removal efficiency</p> <p>99% of VOC removal efficiency can be achieved.</p>	<p>3</p> <p>Can provide high concentration ratio</p> <p>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.)</p>	<p>4</p> <p>Can provide low pressure loss</p> <p>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.</p>
<p>5</p> <p>Can provide the continuous removal for VOC</p> <p>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.</p>	<p>6</p> <p>Can remove high boiling point of VOC</p> <p>Solventclean is suitable for a large airflow volume and low concentration exhausted gas removal. It can save the operation cost for whole system.</p>	<p>7</p> <p>Incombustible</p> <p>All raw materials for which the rotor is constructed are inorganic and the rotor is uncombustible.</p>	<p>8</p> <p>Maintenance is easy</p> <p>Since the construction of the rotor is simple, maintenance is easy.</p>

Zeolite Select for Typical VOC

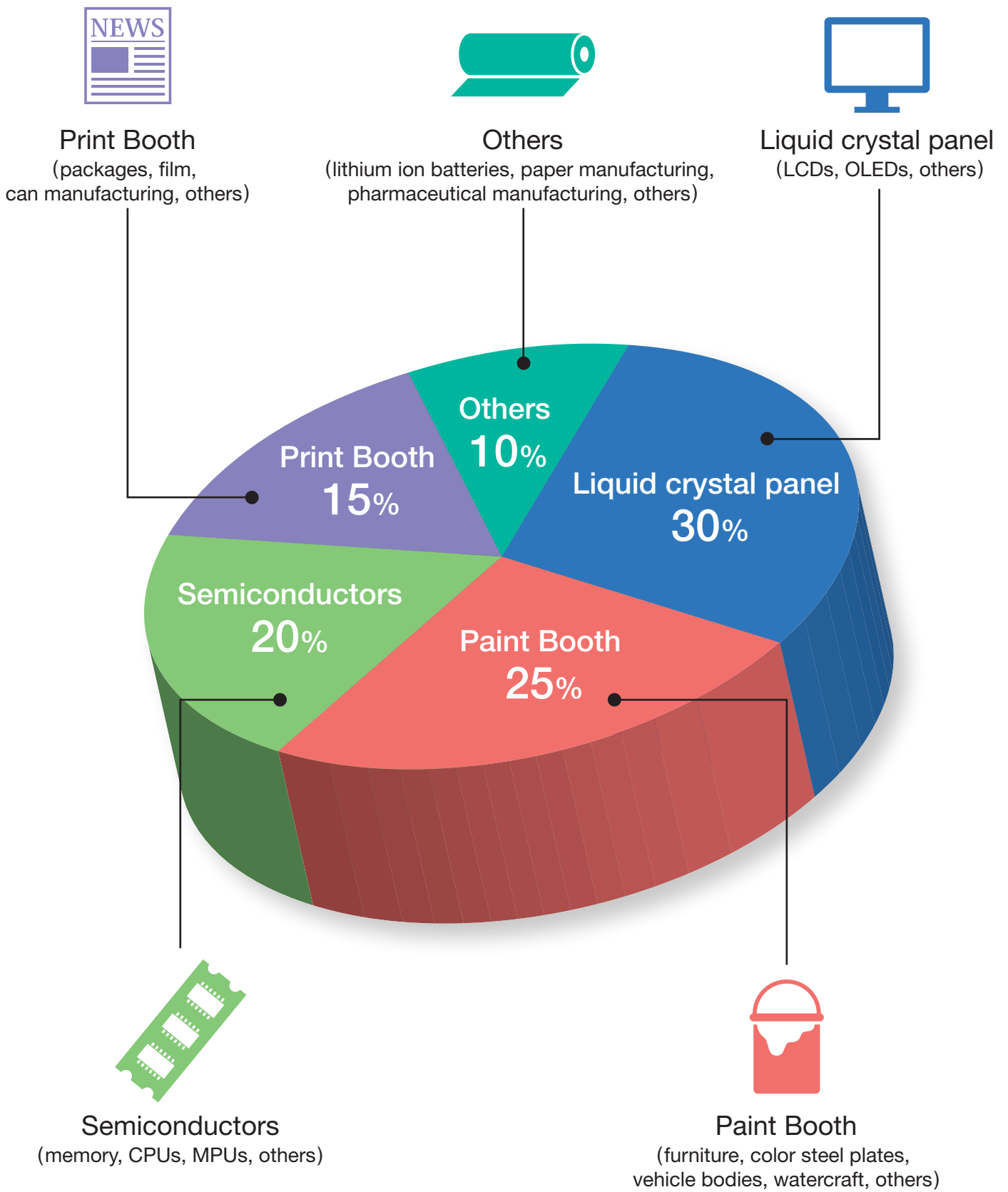
	VOC	Rotor Type		
		HZ-AM	HZ-BM	HZ-XM
Aromatic compounds	Toluene	B	A	B
	Xylene	A	C	A
	Tri methyl benzene	A	D	A
	Styrene	D	A	D
Ketones	Acetone	C	B	B
	MEK	B	A	A
	MIBK	B	A	A
	Cyclohexanone	A	C	A
Esters	Ethyl acetate	B	A	A
	Butyl acetate	B	A	A
	PGMEA	B	A	A
Alcohols	Methanol	C	C	C
	Ethanol	C	B	C
	IPA	C	B	B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

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

Basic System



Sales Performance



Number of supplied SOLVENTCLEAN™ : more than 1,000

High Temperature Desorption System

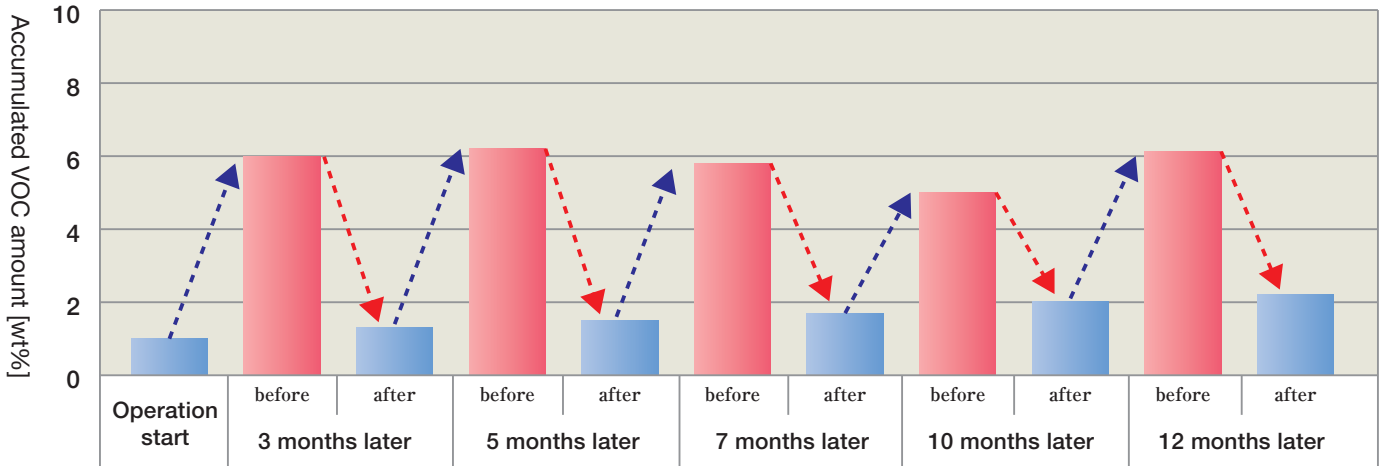
Japanese Patents : No. 3570621, No. 3601007, and No. 3674867

■ 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

⚠ 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.

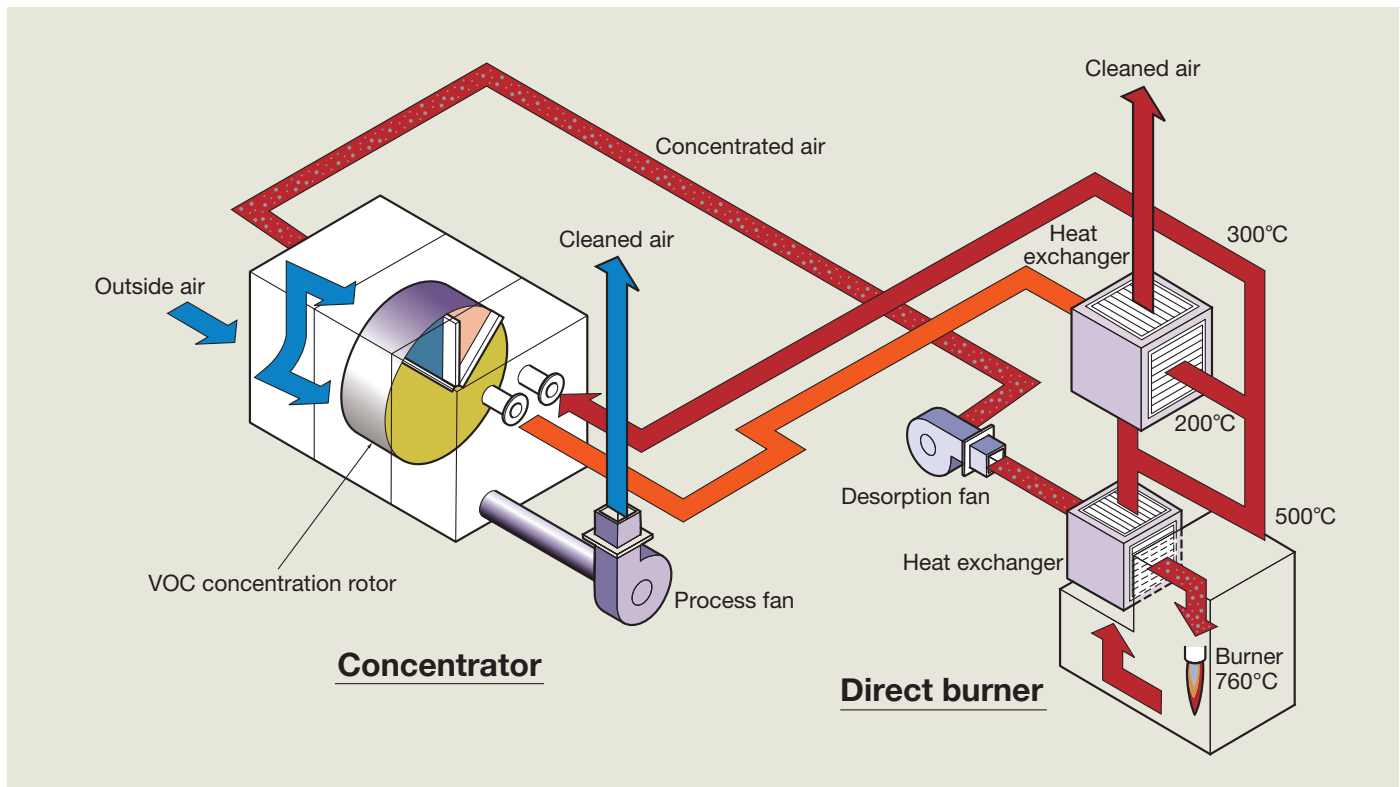
The necessity for a mist filter (activated carbon etc.) to be installed at the stage prior to the concentration rotor is fundamental.

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

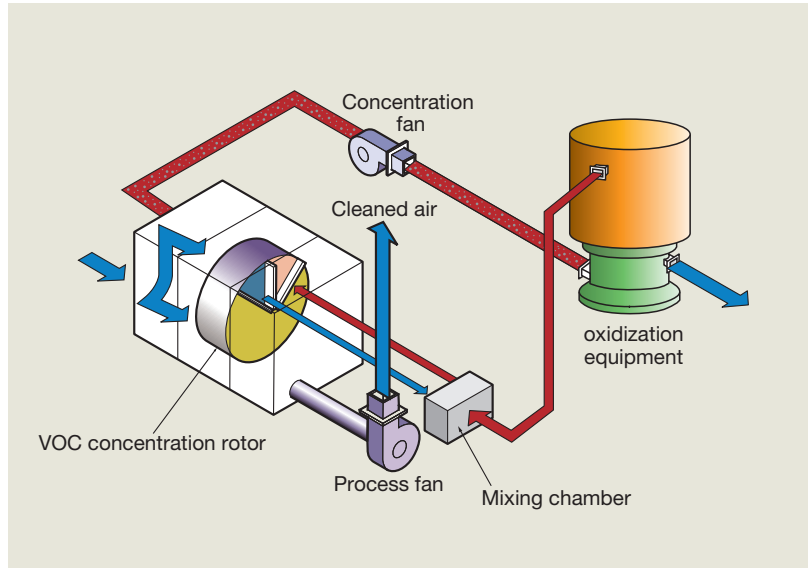
After low concentration, high flow amount air containing VOC is converted to high concentration, low flow amount air by the concentrator, it is oxidization decomposed in a oxidization equipment.

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

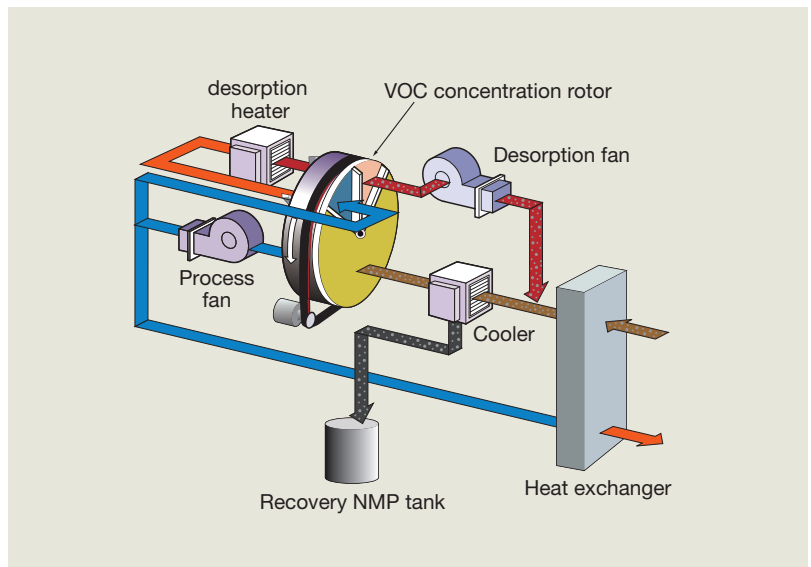
After low concentration, high flow amount air containing VOC is converted to high concentration, low flow amount air by the concentrator, it is recovery processed by a cooling recovery equipment.

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

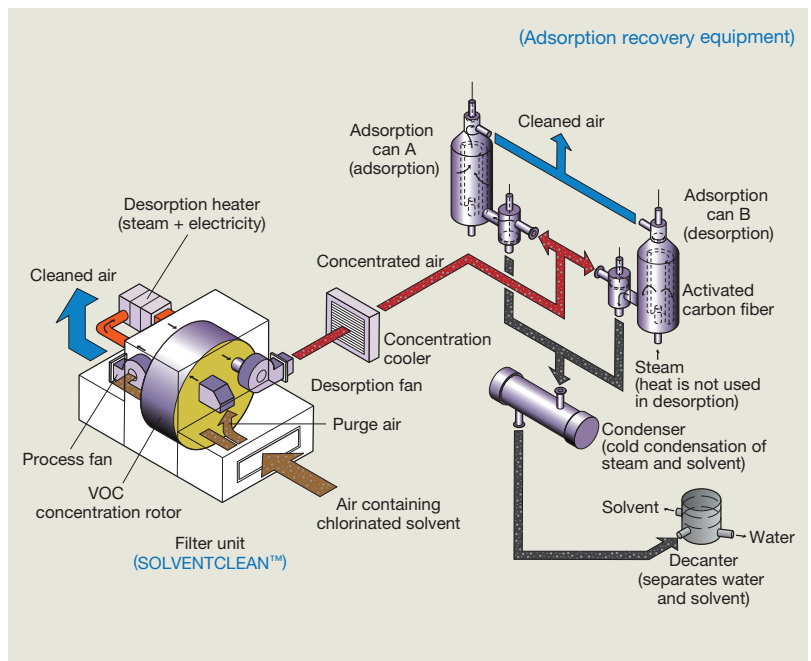
After low concentration, high flow amount air containing VOC is converted to high concentration, low flow amount air by the concentrator, it is recovery processed by an adsorption recovery equipment.

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 (Nm ³ /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



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

Type (SCC-)	Process air flow amount (Nm ³ /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



*1 : The process air flow amount and concentrated air flow amount vary depending on the usage conditions.

*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 <input type="checkbox"/> Interior, <input type="checkbox"/> Exterior / ② <input type="checkbox"/> Ground level, <input type="checkbox"/> Rooftop		
Utilities	V × Hz		

● Upstream side of SOLVENTCLEAN™ (factory exhaust gas)

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

[Temperature] _____ °CDB

[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



Contributing to a bright future for the Earth with “insulation and protection” technology

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 September 30, 2016)

Company Name : NICHIAS Corporation

Establishment : April 9, 1896

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

Capital : 11,997,957,072 yen

Number of associated employees : 5,352

● 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

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



Network

● Main overseas group companies

▶ Indonesia

PT. NICHIAS SUNIJAYA

Sales and installation of sealing materials, insulation, fluorine resin products, automotive components, and building materials

PT. NICHIAS ROCKWOOL INDONESIA

Production of sealing materials, insulation, and automotive components

PT. NICHIAS METALWORKS INDONESIA

Production of sealing materials and building materials

▶ Malaysia

NICHIAS FGS SDN. BHD.

Production and sales of sealing materials, fluorine resin products, automotive components, and building materials

NICHIAS SOUTHEAST ASIA SDN. BHD.

Sales of sealing materials, insulation materials, fluoropolymer products, auto parts and Engineering and insulation work

NT RUBBER-SEALS SDN. BHD.

Production of sealing materials

▶ Singapore

NICHIAS SINGAPORE PTE LTD.

Sales of sealing materials, insulation, filters, fluorine resin products, automotive components, and building materials

▶ Vietnam

NICHIAS HAIPHONG CO., LTD.

Production and sales of sealing materials, filters, and fluorine resin products

NICHIAS VIETNAM CO., LTD.

Sales of automotive components

▶ Thailand

NICHIAS (THAILAND) CO., LTD.

Production and sales of automotive components

THAI NICHIAS INTERNATIONAL CO., LTD.

Sales of sealing materials, insulation, and fluorine resin products

THAI-NICHIAS ENGINEERING CO., LTD.

Sales and installation of insulation

▶ China

NICHIAS (SHANGHAI) TRADING CO., LTD.

Sales of sealing materials, insulation, filters, fluorine resin products, and building materials

NICHIAS (SHANGHAI) TRADING CO., LTD. GUANGZHOU BRANCH

Sales of sealing materials, insulation, filters, fluorine resin products, and building materials

NICHIAS (SHANGHAI) AUTOPARTS TRADING CO., LTD.

Sales of automotive components

SUZHOU NICHIAS INDUSTRIAL PRODUCTS CO., LTD.

Production of fluorine resin products and automotive components

SUZHOU NICHIAS SEAL MATERIAL CO., LTD.

Production of sealing materials, insulation, and filters

SHANGHAI KINGSHENG GASKET CO., LTD.

Production and sales of automotive components

SHANGHAI GOYU AUTOPARTS CO., LTD.

Production and sales of automotive components

▶ India

NICHIAS INDUSTRIAL PRODUCTS PRIVATE LTD.

Production and sales of automotive components

▶ Germany

NICHIAS AUTOPARTS EUROPE GmbH

Sales of auto parts

▶ United Kingdom

NICHIAS EUROPE (UK) LTD

Sales of sealing materials, insulation materials, Filters, fluoropolymer products and building materials

▶ Czech Republic

NICHIAS AUTOPARTS EUROPE a.s.

Production and sales of automotive components

▶ Mexico

NAX MFG, S.A.DE C.V.

Production and sales of automotive components

● Main domestic group companies

NICHIAS CERATECH CO., LTD.

Sales of insulation and building materials

SAKAI NICHIAS CORPORATION

Production of insulation

KOKUBU INDUSTRY CORPORATION

Production of insulation and automotive components

TOKYO MATERIALS CORPORATION

Sales of fluorine resin products

TATSUTA INDUSTRY CORPORATION

Production of insulation, filters, automotive components, and building materials

OHTA KASEI CORPORATION

Production of insulation

NICHIAS MECHATECHNO CO., LTD.

Sales of sealing materials and fluorine resin products

NICHIAS KANTO SALES CORPORATION

Sales of sealing materials, insulation and fluorine resin products

NISHI-NIPPON NICHIAS CORPORATION (formerly AKITSU INDUSTRY CORPORATION)

Sales of sealing materials and fluorine resin products

NIPPON THERMAL ENGINEERING CORPORATION

Temperature control and cooling installation

NICHIAS ENGINEERING SERVICE CORPORATION

Temperature control and cooling installation

INOCRETE CO., LTD.

Temperature control and cooling installation

NICHIAS KYUSHU SALES CO., LTD.

Sales of sealing materials, insulation, and fluorine resin products

FUKUSHIMA NICHIAS CORPORATION

Production of insulation, fluorine resin products, and automotive components

KUMAMOTO NICHIAS CORPORATION

Production of fluorine resin products

METAKOTE INDUSTRY CORPORATION

Production of automotive components

APJ CORPORATION

Manufacture of auto parts

NIPPON ROCKWOOL CORPORATION

Sales of building materials

KIMITSU ROCKWOOL CORPORATION

Production of building material products (Rockwool products)

NICHIAS CEMCRETE CORPORATION

Sales and installation of building materials

NICHIAS KYOSHIN CORPORATION

Insurance agency



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: <http://www.nichias.co.jp/>

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United Kingdom

NICHIAS EUROPE (UK) LTD

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Malaysia

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Thailand

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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

SUZHOU NICHIAS INDUSTRIAL PRODUCTS CO., LTD.

(苏州霓佳斯工业制品有限公司)

SUZHOU NICHIAS SEAL MATERIAL CO., LTD.

(苏州霓佳斯密封材料有限公司)

SHANGHAI XINGSHENG GASKET CO., LTD.

(上海兴盛密封垫有限公司)

SHANGHAI GOYU AUTO PARTS CO., LTD.

(上海五友汽车零部件有限公司)

India

NICHIAS INDUSTRIAL PRODUCTS PRIVATE LTD.

Czech

NICHIAS AUTOPARTS EUROPE a.s.

Mexico

NAX MFG, S.A.DE C.V.

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