

# Air pollution control

Environmental Technology

Solutions for multiple pollutants



**Let us  
manage  
your  
environmental  
compliance,  
so you can  
stay focused  
on your  
business.**

## Leveraging sustainable production

Clean air to protect human health and the environment

With 50+ years' industry experience and more than 10,000 systems installed worldwide, Dürr is a long-recognized, world-class supplier of environmental solutions for virtually any application where air pollution control is required.

We supply high-quality, complete solutions from design, engineering and manufacturing through installation, commissioning and servicing.

## Prepared to master every challenge

Multi-pollutant emissions control

We combine our technical expertise with global availability to support our customers throughout the world, offering solutions for multiple pollutants — from a single-source.

For our customers, this means single-point accountability and a seamless, integrated air pollution control project to achieve lowest emissions.



VOCS/CO/HAPS  
ODOR



PARTICULATE MATTER  
ACID MISTS



ACID GASES



LIQUID  
SOLVENTS



TEMPERATURE  
CONTROL



HEAT  
RECOVERY

### SUSTAINABLE PRODUCTS AND PRACTICES: OUR GUIDING PRINCIPLE

We reconcile economic activity with ecology and fair working conditions. As a technology leader, we reduce the consumption of resources with our sustainable products and actively assume our social responsibility. We maintain fair and respectful dealing with employees, suppliers and business partners.



# Industry experts for clean air

## At home in all industrial sectors

### PROCESS KNOWLEDGE ALONG THE VALUE CHAIN

A strong heritage of technical development and innovative solutions enables Dürr to provide consistently reliable

and energy-saving systems for new or upgrade, simple or complex, large or small projects covering a wide spectrum of applications.

### ODOR CONTROL

- Ethanol and biofuels
- Food and beverage: roasting, frying, rendering, fermentation
- Rubber production



### AUTOMOTIVE

- Paint booth
- Oven
- Color mixing room
- Electro-dipping oven vapor



### SURFACE TREATMENT

- Flexible packaging printing
- Film coating
- Metal packaging
- Wallpaper, flooring, decorative paper
- Textile coating and drying
- Styrofoam manufacturing
- Metal, plastics, and wood painting



### CHEMICAL

- Chemical processing
- Petrochemical and refining
- Pharmaceutical



### ENGINEERED WOOD PRODUCTS

- Oriented strand board (OSB)
- Medium density fiberboard (MDF)
- High density fiberboard (HDF)
- Plywood, particleboard, and other composite wood products
- Wood pellets



### FURTHER APPLICATIONS

- Metallurgical applications
- Building materials (cement, lime and insulation)
- Waste handling and recycling
- Production of glass products
- High temperature ovens for ceramic goods
- Semiconductors

**Lowest emissions  
thanks to in-depth process  
knowledge**

# Product portfolio

All sizes, all pollutants, all industries



## Part.X

### Particulate Control

Particulate control technologies function by physical separation of the pollutants from the exhaust gas stream.



## Catalytics

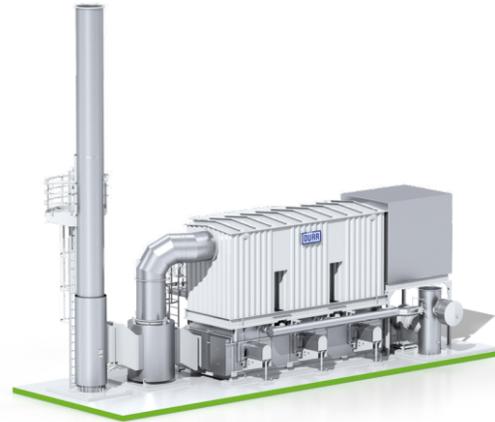
### Catalytic processes

Catalysts reduce the energy required to achieve a chemical reaction. Dürr uses catalysts for oxidation and reduction processes.

## Oxi.X

### Thermal oxidation

Oxidizers use thermal processes to eliminate pollutants and are applicable for various industries and different types of pollutants.



## Sorpt.X

### Adsorption, Absorption

Proven emissions control solutions utilizing both adsorption and absorption technologies.



### YOUR BENEFIT

Environmental compliance for multiple pollutants

Comprehensive product portfolio using state-of-the-art technology

Industry-specific expertise

Lifetime service and support

Global availability

## Oxi.X

Oxidizer

### REGENERATIVE (RTO)

**RA**  
Regenerative Thermal Oxidizer

**RC**  
Regenerative Thermal Oxidizer

**RE**  
Regenerative Thermal Oxidizer

**RK**  
Regenerative Thermal Oxidizer

**RL**  
Regenerative Thermal Oxidizer

**RM**  
Regenerative Thermal Oxidizer

**RV**  
Flameless RTO

### RECUPERATIVE

**TM**  
Modular Recuperative Thermal Oxidizer

**TR**  
Recuperative Thermal Oxidizer

### DIRECT FIRED

**DF**  
Direct-Fired Thermal Oxidizer

## Sorpt.X

Adsorption, Absorption, Solvent Recovery

**AC**  
Evaporative Gas Cooling

**CA**  
Carbon Adsorption

**CC**  
Carousel Concentrator

**CD**  
Disc Concentrator

**LC**  
Liquid Condensation

**LD**  
Liquid Distillation

**NT**  
Atomizing Nozzles

**SB**  
Biogas Purification

**SD**  
Dry Scrubber

**SQ**  
Cross-Flow Packed Bed Filters

**SW**  
Wet Scrubber

## Part.X

Particulate Control

**PV**  
Venturi Scrubber

**PW**  
Wet Electrostatic Precipitator

## Catalytics

**CF**  
Catalytic Candle Filter

**CR**  
Selective Catalytic/Non-Catalytic Reduction

**PH**  
High-Pressure Catalytics

**PL**  
Low-Pressure Catalytics

**RO**  
Regenerative Catalytic Oxidizer



Flameless regenerative thermal oxidizer Oxi.X RV powered by renewable energy sources.

# Thermal processes

## Oxidation technologies for VOC control



Oxi.X RC RTO technology for efficient air pollution control.

### Oxi.X

Oxidizers use thermal processes to eliminate volatile organic compounds (VOCs), hazardous air pollutants (HAPs), and unpleasant odors from industrial exhaust air streams. Dürr offers a range of oxidation technologies and configurations enabling us to meet industry-specific or country-dependent challenges, providing the optimal solution for your application. The thermal processes are based on the separation principle

and use combustion to remove pollutants from exhaust air. In all cases in which pollutants cannot be collected for potential re-use respectively recovered, these VOCs have to be destroyed. This involves converting the pollutants in exhaust air into non-hazardous substances at specific temperatures, which allows the air to be purified.

### REGENERATIVE THERMAL OXIDIZERS

Oxi.X regenerative thermal oxidizers (RTOs) are designed for low to high volume air flows and feature high VOC destruction efficiencies of over 99.8%. RTOs are based on a highly efficient thermal process where the exhaust air contaminated with pollutants is fed through a regenerative heat exchanger with an extremely large surface area. The process is used to purify exhaust air containing solvents and unpleasant odors.

### RECUPERATIVE AND DIRECT-FIRED THERMAL OXIDIZERS

For moderate levels of pollutants, the Oxi.X TR recuperative thermal oxidizer with advanced burner technology is an economical choice for applications with secondary heat recovery systems. The Oxi.X DF direct-fired thermal incinerator for critical substances is ideal for heavily-polluted, corrosive gas streams.



#### YOUR BENEFIT

- High thermal efficiency
- Low-maintenance design
- Low operating expenditure
- Maximum heat recovery

## Different designs tailored to meet your operational and site conditions

10,000 installations worldwide support environmental protection.



## Catalytic processes

### Catalytic technologies for VOC and NO<sub>x</sub> control

Catalytic candle filter for simultaneous reduction of pollutants.



## Catalytics

### SCR/SNCR NO<sub>x</sub> CONTROL SYSTEMS

Dürr offers both selective catalytic reduction (SCR) systems for high-performance NO<sub>x</sub> control as well as selective non-catalytic reduction (SNCR) technology, a cost-effective solution for certain applications. SCR systems are available as a stand-alone unit, or can be combined with direct-fired or regenerative thermal oxidizers to support a multi-pollutant control strategy.

### LOW-PRESSURE AND HIGH-PRESSURE CATALYTIC SYSTEMS

Depending on the application, Dürr offers both low-pressure and high-pressure catalytic oxidation systems for VOC removal. Besides that, catalytic candle filter (CCF) technology provides simultaneous removal of particulate matter (PM), acid gases (HCl, SO<sub>x</sub>) and NO<sub>x</sub>. The lower oxidation temperatures in our catalytic systems lead to a reduction in energy consumption.

### REGENERATIVE CATALYTIC OXIDIZERS

Ideally suited for applications with low VOC concentrations, regenerative catalytic oxidizers (RCOs) combine the low operating temperature of catalytic oxidizers with the heat storage and recovery characteristics of a regenerative thermal oxidizer.

### RTO TO RCO RETROFIT

While your existing RTO may have been designed for optimum thermal efficiency at the time it was manufactured, new advances in media and catalysts now give us more options for many exhaust streams that lend themselves to catalytic technology.



#### YOUR RCO BENEFIT

- High efficiency for low VOC concentrations
- Low operating cost compared to conventional RTOs
- Low combustion chamber temperature
- Low fuel consumption

# Sorptive processes

## Adsorption and absorption technologies

Sorpt.X

### Adsorption

#### SOLVENT RECOVERY CARBON ADSORPTION & LIQUID DISTILLATION

Sorpt.X CA activated carbon solvent recovery systems provide an ideal VOC control solution in processes that use valuable solvents. When recovered, these solvents can be re-used in the process rather than destroyed. Where recovery is not feasible, we offer non-regenerable carbon adsorbers suitable for low concentration emissions. Sorpt.X LD liquid distillation systems include complete extractive and azeotropic multi-component distillation systems for the recovery, separation and purification of solvent mixtures.

#### VOC CONCENTRATORS

The Sorpt.X CD/CC air pollution control system is a tried-and-tested solution for continuously purifying large exhaust air volume flows containing low levels of solvents (VOCs) using adsorptive concentration with a downstream purification phase.

#### CROSS-FLOW PACKED BED FILTERS

Sorpt.X SQ cross-flow packed bed filter systems are especially suitable for purifying hot exhaust gas flows. The adsorbent used is a bulk material which is generally limestone, which is an inexpensive but highly effective adsorbent for air pollution control.



#### YOUR SOLVENT RECOVERY BENEFIT

Recover up to 99+% solvents for reuse

Increase profitability by reducing solvent expense

Suitable for a wide variety of solvent types and solvent loadings



VOC concentration: Low CO<sub>2</sub> emissions and operating expenditure as a result of the high concentration ratio.



# > 50 billion

cubic meter of air concentrated every hour in Dürr Sorpt.X CD/CC systems throughout the world



Increase overall availability of your environmental operations.

### Absorption

#### WET SCRUBBERS

Sorpt.X SW wet scrubbers include spray, tray, and packed tower designs for the absorption of acid gases. For gas streams containing acid gases and particulate, we also offer a wet atomizing scrubber to control the contaminants in a single device. Wet scrubbers offer high removal efficiencies for a variety of acid gases, including SO<sub>x</sub> (SO<sub>2</sub> and SO<sub>3</sub>), HF, and HCl.

#### BIOGAS PURIFICATION

Sorpt.X SB biogas purification systems use water scrubbing to remove CO<sub>2</sub>, H<sub>2</sub>S, and light siloxanes from digester, wastewater treatment, landfill, or other biogas streams. Sorpt.X SB systems are designed to capture more than 98.5% of the methane and purify it to pipeline-quality natural gas.

#### EVAPORATIVE GAS COOLING & CONDITIONING

Sorpt.X AC evaporative gas cooling systems provide accurate temperature and humidity control of hot process gases. Central to our evaporative gas cooling systems are Sorpt.X NT atomizing nozzles, which introduce a controlled amount of finely atomized water into the hot gas stream to reduce and/or maintain gas temperature.



#### YOUR WET SCRUBBER BENEFIT

Simplicity of construction and flexibility of operation

Low capital equipment and installation cost

High removal efficiencies for a variety of acid gases

# Separation processes

## Particulate control technologies

### Part.X

#### PARTICULATE SCRUBBERS

Part.X PV venturi scrubbers offer high-efficiency performance for high particulate loading applications and can handle abrasive, sticky and difficult particulate. In applications where extremely low particulate concentrations are required, the scrubber is designed as a pre-scrubber preceding a wet electrostatic precipitator to achieve the required removal efficiency and maximize energy savings.

Multiple configurations are available to suit existing process layouts, including top inlet and outlet, upflow/downflow and downcomer/custom designs.

#### WET ELECTROSTATIC PRECIPITATORS

To clean industrial gases of fine particulate matter, acid mists and aerosols, we offer advanced wet electrostatic precipitator technology. The Part.X PW wet ESP offers highly efficient control of submicron particulate, heavy metals, acid mists, and condensed metal fumes and organics. It can remove up to 98% of particulate in a single stage, and depending on the characteristics of the gas stream, increased removal efficiency is possible with alternative configurations. We also offer the Part.X PW acid mist precipitator for sulfuric acid plant gas cleaning applications.

#### DRY ELECTROSTATIC PRECIPITATORS

Aging technology and lack of support can result in lost productivity and reduced efficiency of your electrostatic precipitator. As a trusted service partner, Dürr's parts, service, and upgrade business can help keep your ESP running effectively.

#### YOUR WET ESP BENEFIT



- High-intensity, offline automatic cleaning
- Reimagined gas flow distribution system
- Optimized operating voltage requiring less surface collecting area



up to  
**99,9%**  
particulate removal  
efficiency possible



Application of Part.X PV venturi scrubbers, Part.X PW wet ESPs and Oxi.X RC RTOs in the engineered wood products industry.

# Your partner for successful production

Dürr's services & solutions customer service offers support around the world. Dürr is always on-site to help to reduce production costs, increase plant availability and guarantee rapid technical support. Whether you are dealing with an emergency or planning or implementing a revamp project – we are available.

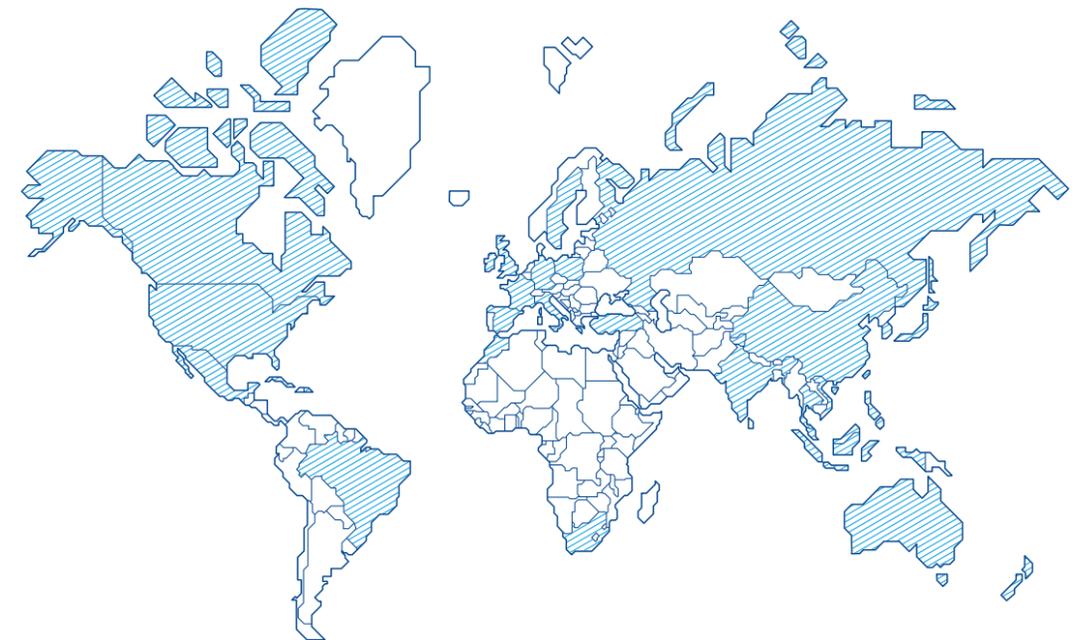
#### OUR SERVICE AT YOUR DEMAND



- Ramp-up and launch management
- Modifications and upgrades
- Engineering with experience
- Spare parts service
- Inspection and maintenance
- Service locations all over the world

# Anytime and worldwide

## ENVIRONMENTAL SERVICES BY DÜRR CLOSE TO YOUR PLANT



- |        |         |        |              |             |             |
|--------|---------|--------|--------------|-------------|-------------|
| CANADA | FRANCE  | ITALY  | MOROCCO      | JAPAN       | MALAYSIA    |
| USA    | SPAIN   | POLAND | SOUTH AFRICA | SOUTH KOREA | INDONESIA   |
| MEXICO | BELGIUM | RUSSIA | CHINA        | VIETNAM     | AUSTRALIA   |
| BRAZIL | GERMANY | TURKEY | INDIA        | THAILAND    | NEW ZEALAND |
| UK     | SWEDEN  |        |              |             |             |

# LEADING IN PRODUCTION EFFICIENCY



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Clean Technology Systems

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