



Gas Cleaning Solutions

for the glass industry



GLASS AND MORE...

Glass manufacturing, like other process industries, is facing even more strict emission limits. GEA has a long relationship with the glass industry, providing clients around the world with complete support for all aspects of emission control.

Clean air for the glass industry

The key to sustainable glass production

A wide array of solutions

Glass comes in many shapes and colors – and so do emissions. Though a high-tech product, tailor-made and unique for each individual application, glass is made of ingredients from natural sources. Furthermore, glass can be easily recycled, helping to preserve our environment. As a side product of glass production, emissions are produced by combustion of fuels or released by melting of the raw materials.

GEA offers a wide array of custom gas cleaning solutions, helping to turn these undesired emissions into harmless compounds like pure nitrogen and water. Furthermore, precipitated reaction products can often be recirculated into the production batch.

Sustainable production of glass means protecting our environment, leaving nothing behind but clean air.

To securely achieve this goal our portfolio offers (among others):

- SOx control
- Removal of acid compounds
- Dust control
- NOx control
- Energy recovery
- Recycling of separated dust

More than just the sum of individual parts

Every process can be viewed as just a chain of independent steps, but for gas cleaning solutions this simply will not work. GEA has more than 100 years of experience in this application field and will carefully consider the impact of every step in the production process.

As your resource for reliable and cost-efficient gas cleaning solutions, we can provide solutions for converting waste heat into valuable energy. Besides preserving our natural fuel sources, GEA Energy Recovery also pays off economically, especially when considering the ever rising cost for power and fuel.

GEA Service – For your continued success

Excellent equipment or plants are only one part of the equation, the right service program is the other. We offer several options under our innovative service concept “GEA Service – For your continued success”. This program provides GEA customers with support throughout the entire life cycle of their installed systems and components. From project engineering, installation, and commissioning, to maintaining and improving the performance of the customer’s plant and equipment.

Experts in Emission Control

Competence throughout the gas treatment chain

Desulfurization DeSO_x

GEA has several process options available for the secure removal of SO_x and other acidic compounds:

- Dry desulfurization by in-duct reagent injection in combination with a DeSO_x-reactor for the necessary retention time. Proven over many years in plants all around the world. Can be operated with standard and high-grade lime.
- Dry desulfurization by use of a lime reagent in combination with a candle filter.
- Semi-dry desulfurization by injection of lime slurry in a spray drying absorber or reaction tower resulting in SO_x removal rates of up to 98%.
- Wet desulfurization by means of a caustic counter flow scrubber.



SO_x control

- Dry, semi-dry or wet
- High efficiency
- Excellent results with standard lime



Dust control

GEA has utilized electrostatic precipitators (ESPs) over many decades for gas treatment after glass furnaces. Our ESPs use the latest high-voltage technology for secure dedusting, while keeping energy consumption low.

SCR DeNO_x

GEA is well known for its long term proven application of selective catalytic reactors (SCR) for NO_x control:

- Excellent efficiency with lowest outlet values of NO_x and NH₃.
- Long catalyst life: There are many plant references showing 10 – 15 years of operation before the first catalyst exchange.
- Can be operated either with ammonia water or urea.
- Low temperature NO_x control available for increased flexibility.

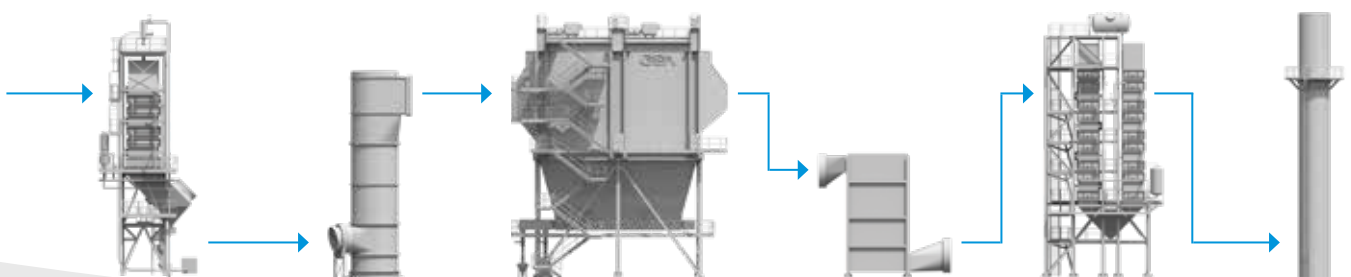


NO_x control

- Long catalyst lifetime
- High removal rates
- Extremely low NH₃ slip

Dust control with ESP

- Long-term proven ESP
- Secure dedusting
- Minimized power consumption



GEA Energy recovery

By way of intelligent engineering, we can offer gas cleaning plants that save energy by recovering waste heat from flue gas:

- GEA has expertise in production of hot water, steam and electrical energy from left over heat in the treated gas.
- Heat transfer by thermal oil for a wide range of applications.
- Application of ORC (Organic Rankine Cycle) technology for production of electricity, capable of high efficiency even at partial load operation.
- Quick ROI and sustainable reduction of energy costs.
- Usable for co-generation of compressed air.



Energy recovery

- High efficiency also at reduced load
- Compatible with co-generation
- Low pay back time

Spray drying absorption (SDA)

A semi-dry flue gas desulfurization process facilitates a reaction that efficiently transforms gaseous pollutants into a lime absorbent, forming a stable and dry powdery product that is easy to store and transport.

GEA BisCat – the smart candle filter solution

While standard candle filters only offer dedusting, GEA's innovative BisCat technology combines dedusting with catalytic NOx control, without an added SCR:

- SOx, dust and NOx removal in one single process step.
- Temperature resistant candles with special catalytic enhancement.
- Complete gas cleaning solution in a compact size package.
- For lowest outlet emissions.



GEA SDA

- >90% SOx removal
- Dry product
- Highest availability



GEA BisCat

- Catalytic candles
- Excellent efficiency
- Small footprint solution

Clean air across the globe

For more than a century, GEA has assisted customers in remaining compliant with the strictest environmental regulations via long-term, cost-effective solutions. Here are just a few of our many installations worldwide.

Emission control for three glass production lines

In Tracy, California (USA) GEA has provided three gas cleaning systems for the treatment of flue gases coming from furnaces used to produce glass containers. Each line is equipped with DeSOx reactor, ESP, ID-fan and stack.

In a second step, after several years of operation, each of the three gas cleaning lines were extended by a SCR for NOx control.

As with many plants, the future extension by DeNOx already has been taken into consideration during the planning phase of the main plant (DeSOx and ESP). It was therefore possible to keep the small footprint of the plant, minimizing the requirement for new connecting ducts and ultimately keeping investment costs low.

New emission control for Luxemburg plant

For a large scale European float glass production line, GEA provided a complete emission control solution.

Among ESP and DeNOx the plant also utilizes a special DeSOx reactor featuring water injection for gas cooling. This provides for secure cooling of the gas and also reduces the effective volume of gas treated, allowing for improved equipment size and footprint.

Water cooling is always the technology of choice when it comes to large gas flows and high gas temperatures and is utilized in many GEA plants. Additionally, the DeSOx reactor at this facility also serves as a retention vessel for evaporation of the injected water, so the plant does not require a longer straight raw duct section for water cooling.

COMPLETE GAS CLEANING

GEA emission control technology is installed at Guaratinguetá, a Brazilian float glass factory. It combines the dry desulfurization reactor with an electrostatic precipitator for dust removal, followed by a low-dust selective catalytic plant for NOx control.

The plant is designed for operation with either lime or soda used as dry reagent for desulfurization.



Guaratinguetá (Brazil)

Gas cleaning and hot water production

A Swiss glass producer has decided to invest in a gas cleaning system including energy recovery for production of hot water at its Straza plant. The installed equipment includes two DeSOx reactors and two ESPs for dust control in flue gas coming from three furnaces. After the ESP, the gas is passing a common gas/water heat exchanger upstream of two ID-fans and the flue gas stack.

While the gas cleaning is set up individually for each production furnace – ensuring optimized performance – a single waste heat recovery system is shared for both lines. In addition to reduced investment cost, efficiency is increased through minimal heat losses.

SDA for Chinese glass factory

GEA Spray Drying Absorption technology is installed at a glass factory in Zhonglian, China. The SDA reduces SO₂, SO₃, HCl and HF acid gases by injection of an alkaline slurry. The plant achieves more than 90% SO₂ and HCl removal and no wastewater treatment is required.



Tracy, California (USA)



Dudelange (Luxemburg)



Straza (Croatia)



We live our values.

Excellence • Passion • Integrity • Responsibility • GEA-versity

GEA is a global technology company with multi-billion euro sales operations in more than 50 countries. Founded in 1881 the company is one of the largest providers of innovative equipment and process technology. GEA is listed in the STOXX® Europe 600 Index. In addition, the company is included in selected MSCI Global Sustainability Indexes.

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