
PlasmaAir AG

ABLÜFTREINIGUNG

The absorption scrubber and its industrial applications



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Absorption scrubbers operated with counter-current flow provide favorable apparatus conditions for physical and chemical absorption in which high efficiencies in the removal of gas contaminants can be achieved in compact systems.

Advantages

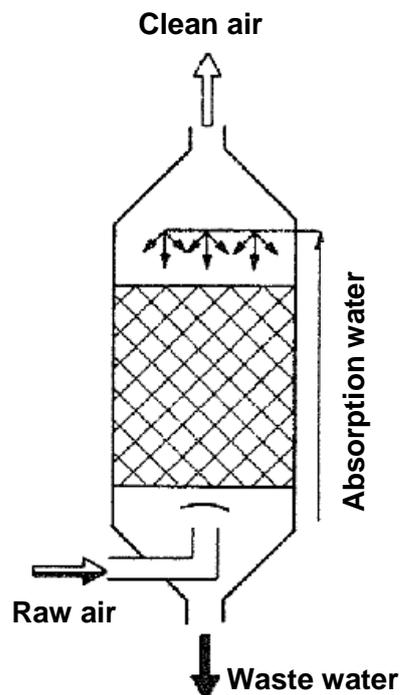
- Large boundary layers between gas and liquid that are constantly renewed
- Low pressure due to the use of specially engineered high-performance packing material
- Availability of absorption scrubber and integrated equipment in corrosion-resistant materials (i.e. plastics, stainless steel, ceramic materials)

Absorption scrubbers are often part of complex systems; they must meet legal requirements and at the same time guarantee an economic and reliable operation.

When the scrubber unit is successfully integrated in technological processes, the economic aspect is significantly improved, if either a closed material circuit can be achieved, or the resulting residues are inexpensive to dispose of, due to the continued increase in costs for the disposal of residues. Absorption scrubbers are preferably constructed as a packed column scrubber. Usually the pollutants react in acid or basic aqueous solutions. Therefore, the columns are usually made of plastic, mostly PP or PE. Due to these materials, the temperature range is limited to a maximum of 60°C (140°F). At higher raw gas temperatures, a cooler or a quench must be installed upstream.

The structure of packing can be either a loose bed of highly efficient packing material (rings) or an orderly packing is used. Subsequently after the packing, the gas phase flows through a droplet separator in the head of the column.

The pressure loss of the scrubber is mainly determined by the column diameter and the liquid loading of the packing. The degree of separation, however, is determined by the height of the packing. The diameter of the standard scrubber is determined by the gas volume flow, while the packing height depends largely on the type and concentration of contaminant and must be calculated and adjusted for each application.



Wet scrubber for removal of gaseous pollutants

Absorption scrubbers are installed to reduce the concentration of gaseous pollutants. Absorbable pollutants are mostly inorganic compounds such as

- Ammonia NH_3
- Hydrogen sulfide H_2S
- Hydrogen chloride HCl
- Sulphur dioxide SO_2 , etc.
- Amine

Areas of use

- Exhaust air from galvanic processes – Pollutants: HCl , NH_3 , HF
- Exhaust air from core shooters – Pollutants: Amines, SO_3
- Exhaust air from semiconductor production – Pollutants: HCl , NH_3 , SiH_4 , HF
- Exhaust air from sewage treatment plants – Pollutants: H_2S , NH_3
- Odour reduction

Advantages

- ❖ Separation rates up to 99,9%
- ❖ Compliance with limit values depending on the substance class

PlasmaAir absorption scrubbers are built in different sizes for exhaust air volume flows between 200 - 120.000 Bm^3/h .



Fig. 1: chem. absorption scrubber for odour reduction 10.00 Bm^3/h

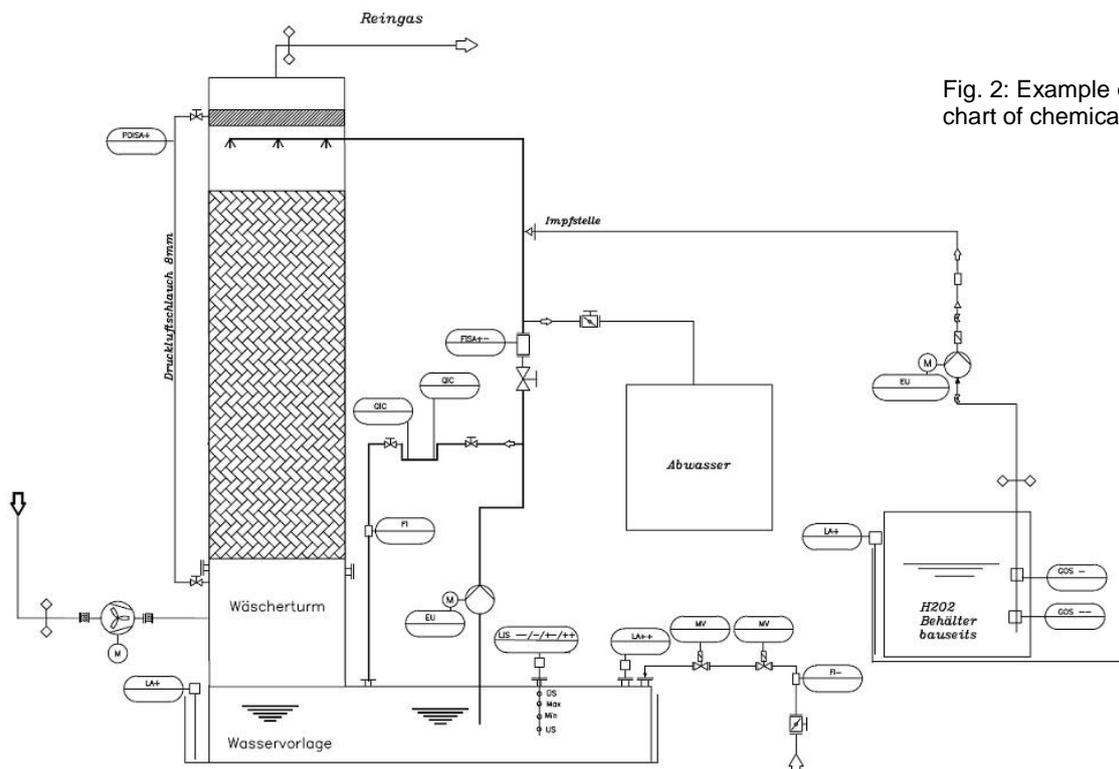


Fig. 2: Example of a flow chart of chemical scrubbers

Process Description

Exhaust air streams from production processes are cleaned in absorption scrubbers based on the solubility of noxious gases in washing liquids. If the deposition of noxious gases takes place solely due to this solubility in the washing liquid, then it is physical absorption. The separation efficiency is determined mainly by the solubility equilibrium of the noxious gas. If the solubility is reached, the physical absorption comes to a standstill. The usually also occurring chemical absorption is not limited by the solubility, as the noxious gas dissolved in the washing liquid is chemically absorbed. In case of very rapid chemical absorption processes, the absorption capacity is decisively determined by the size of the gas / liquid boundary layer.

The applied washing liquids are adapted to the respective pollutant to achieve optimum efficiency. The absorption scrubbers are designed as spray scrubbers (jet scrubbers) or as packed column scrubbers. The design can be horizontal or vertical in principle. PlasmaAir AG offers vertical packed scrubbers by default. Each scrubber or each exhaust air system is designed in terms of process engineering specifically according to the respective customer requirements.

Fig. 3: Amine scrubber for 50.000 Bm³/h

Equipment / Accessories

- packed column
- integrated washing liquid reservoir
- circulation pump
- demister for the separation of drops
- PLC operated controll unit
- remote maintenance installation for automatic operation of the system according to customer specifications
- flow measurement circulating water
- level probe incl. switch contacts
- pressure indication in circulating water
- overflow protection
- safety tank with leakage probe
- extraction hoods
- clean gas pipe, chimney
- raw gas pipe to emission source
- ventilator, baffle

Optional

- dosing stations for chemicals
- pH value measurement
- washing liquid heating for outdoor installation

