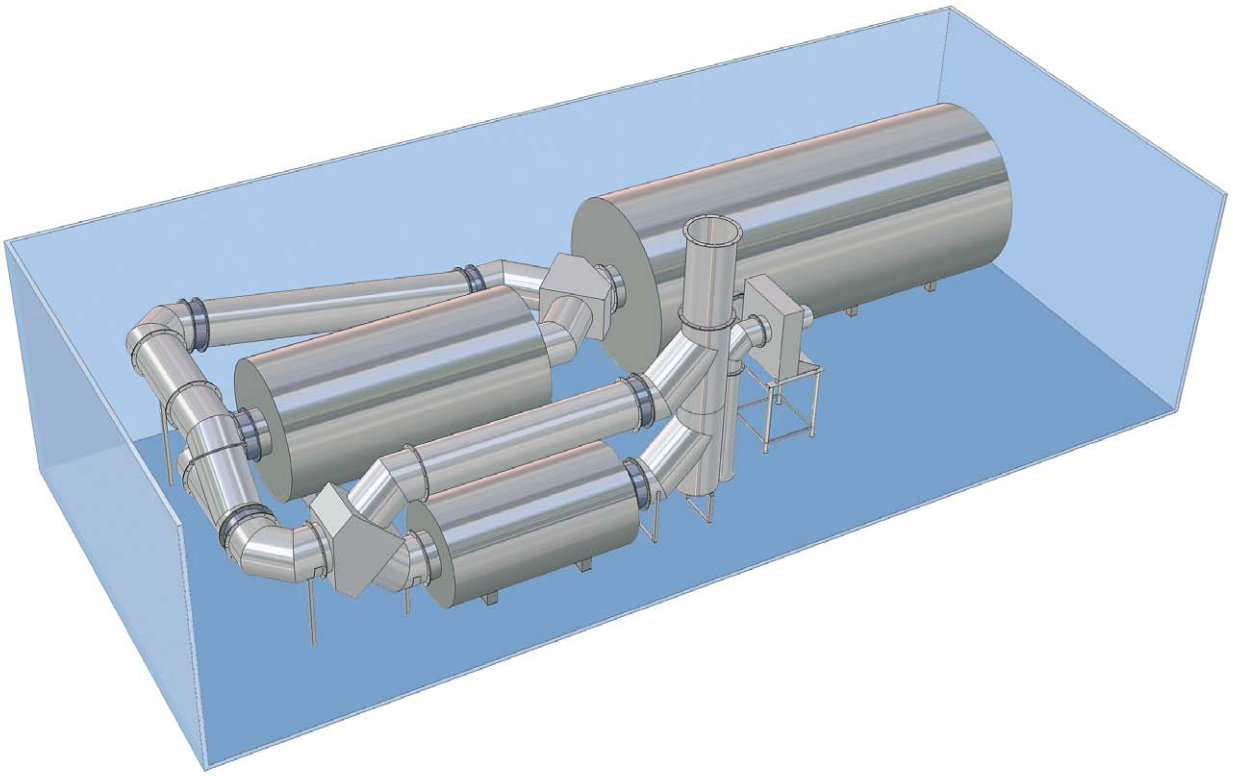
CLEENjet®

Schröter
LEADING QUALITY

ENVIRONMENTALLY FRIENDLY SYSTEMS

Schröter's exhaust cleaning systems are used everywhere that high-volume, highly-contaminated smoke streams need to be purified. Clients from all industries, such as meat processing firms, large-scale catering companies, and paint shops, use these systems to effectively purify their exhaust air.

When it comes to our CLEEN*jet* systems, we offer a wide range of solutions: Our exhaust cleaning system is available as an individual solution or as a central system for multiple emission sources. Downstream heat recovery units can also be integrated into the system. Schröter also develops individual solutions for other industries upon request, either in our classic design or as weatherproof, sound-insulated container solutions.



EXHAUST CLEANING SYSTEM

DESIGN AND FUNCTION: EXHAUST CLEANING SYSTEM

The TNV system is comprised of a kettle-shaped burning chamber with an integrated raw gas preheater.

If the exhaust air which needs to be purified is brought to combustion directly, extremely large amounts of energy would need to be expended to heat the raw gas to the optimal combustion temperature. That's why the exhaust cleaning system uses the energy coming out of the burning chamber to preheat the relatively cold raw gas in a heat exchanger. In this process, the hot exhaust gases from the burning chamber and the cold raw gases stream into the heat exchanger at the same time, which allows a temperature to be achieved that corresponds to approx. 30–40 % of the temperature in the burning chamber.

The temperature in the burning chamber is maintained using heat energy in the form of gas or heating oil which is fed into the system through the burner. Doing so maintains the target temperature, even with a wide range of different raw gas amounts.

SECONDARY ENERGY USE:

After cooling in the raw gas preheater, about 60–70 % of the amount of energy present in the burning chamber remains in the clean gas, which in most applications is fed into an additional (secondary) heat exchanger that is used to generate process heat for heating water, process water, thermal oil, oil for deep frying, steam, hot water, or hot air. Doing so improves the TNV system's energy balance.

PURIFICATION FUNCTION:

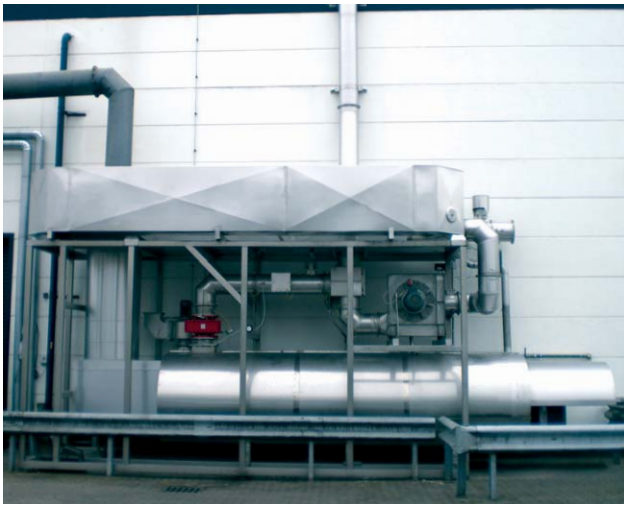
The prerequisite for using any exhaust cleaning system is that the substances contained in the raw gas are combustible and oxidizable. The smoke exhaust emissions are purified by converting the carbon compounds and the aerial oxygen found in the raw gas into CO2 und water vapor (H2O). This occurs in the TNV system at burning chamber temperatures ≥ 750 °C. This is almost a complete conversion, what remains is only a small amount of residual matter on various carbon compounds (TOC), as well as compounds like CO and NOx which result from the combustion process.

Germany's Technical Instructions on Air Quality Control and Federal Air Pollution Control Act set forth the amount of residual matter allowed in Germany. In case of thermal post-combustion, the following amounts of residual matter are permitted in clean gas:

TOC :	50 mg/Nm³
CO :	100 mg/Nm³
NOx :	100 mg/Nm³

A CLEAN AFFAIR

In the meat products industry, smoke emissions which pollute the environment are generated during production. As a manufacturer of climatic and hot smoke systems, Schröter is tackling this problem head-on. With its exhaust cleaning system, as well as other systems, Schröter offers customized solutions to do its part in protecting the environment. And now companies in other industries, such as the waste management industry, can also benefit. And this especially applies to Remondis Medison GmbH, a subsidiary of Remondis AG & Co. KG - one of the leading international recycling companies with locations in over 25 countries.



The equipment manufactuer from East Westphalia places a great deal of importance on innovation and research. For example, thanks to continuous advancements to various exhaust cleaning processes, the overall efficiency of the systems has been improved, which in turn protects the environment. Furthermore, great success has been acheived through the systematic use of waste heat. Whether used to heat processing water, integrated into heating equipment, or to heat thermal oil for fry lines - optimizations can be made in a number of ways. That's why Schröter's specialists analyze both the resulting amount of exhaust air as well as the pollution level beforehand in order to offer clients a system solution which fits their needs. In addition to biological exhaust air purification systems, this primarily includes the tried and tested exhaust cleaning system.

RAW GAS TREATMENT BY REMONDIS

At Remondis Medison, an interesting challenge with an unusual set of requirements needed to be mastered. At its locations in Braunschweig and Stadthagen, exhaust air contaminated with solvents results from the distillative treatment of solvents, used for example, in the automotive or printing industries. In this case, questions regarding explosion control, ATEX guidelines, deflagration suppression, and last but not least raw gas treatment needed to be analyzed and answered. The contaminants in the exhaust air which needed to be treated posed a particular challenge, since depending on its composition, the raw gas contains various flammable substances such as alcohol, ester, ketone, or hydrocarbons. The particular challenge: Ensuring the absolute operating safety of the exhaust cleaning system and at the same time using the energy content of the raw gas.

BOTH THE ENVIRONMENT AND COMPANIES BENEFIT

Working closely with the technical experts at Remondis, Schröter designed a closed-loop, controlled raw gas treatment system which uses infrared gas detectors to feed the ideal amount of raw gas into the exhaust air purification system. As an added bonus, the exhaust cleaning system contains an integrated heat recovery system. “This allows us to also use the system’s waste heat to support the heating system and in the end, to completely replace it,” says Dr. Jörg Krause, Head of Engineering at Redmondis Medison GmbH, enthusiastically. This not only significantly reduced production costs, but in the future, a heat transfer oil heater for existing distillation equipment will make further savings possible.

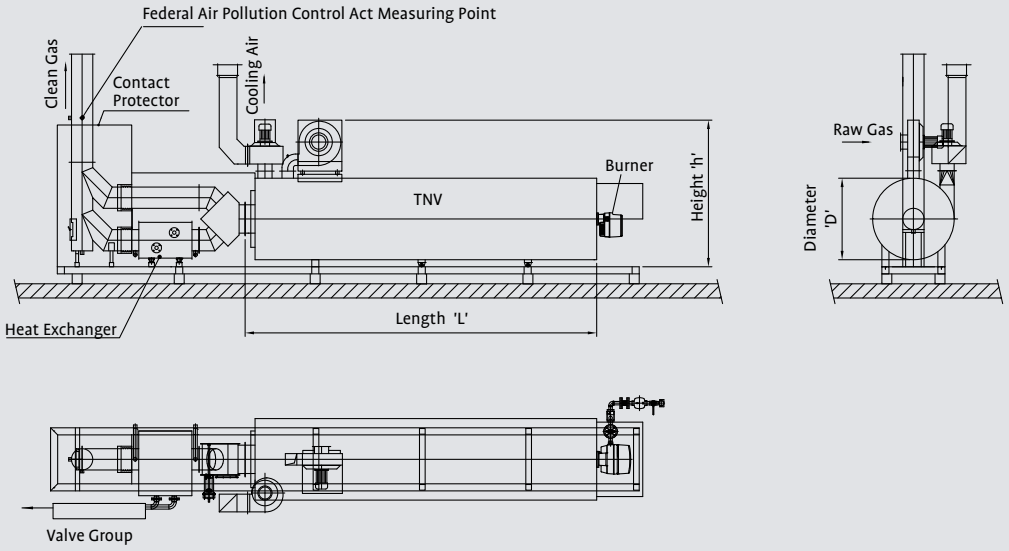
CLEENjet®: MEASUREMENTS AND CONNECTED LOAD VALUES

CLEENjet

	MEASUREMENTS				CONNECTED LOAD VALUES						
TNV	D	L	Electricity	Weight	Required output	Gas burner		Oil burner		WRG	Electricity
	mm	mm	kW	kg	kW**	Typ	kW	Typ	kW	kW	kW
300	1000	2950	3	700	70	WG 20	35–200	WL 20	55–130	22	0.4
600	1000	3450	3	1150	140	WG 30	60–350	WL 30	72–215	43	0.4
900	1250	4000	4	1575	210	WG 30	60–350	WL 30	72–215	65	1.1
1200	1250	4450	4,5	1875	280	WG 30	60–350	WL 30	72–215	87	1.1
1500	1250	4950	4,5	2175	350	WG 40	80–550	WL 30	72–215	108	1.7
2000	1400	5160	7	2700	470	WG 40	80–550	WL 40	120–355	145	2.2
2000	1400	5160	7	2700	470	G 3	50–630			145	2.2
3000	1400	5160	7	2850	700	G 5	100–940	RL 3	190–775	217	4.5
4000	1900	4680*	8	3500	1275	G 7	150–1750	RL 5	300–1190	289	7.5
5000	1900	5120*	8	4000	1600	G 7	150–1750	RL 7	570–1965	361	7.5

* = without integrated raw gas preheater | ** = these are approx. values and are dependant on the actual conditions on-site

TECHNICAL DETAILS



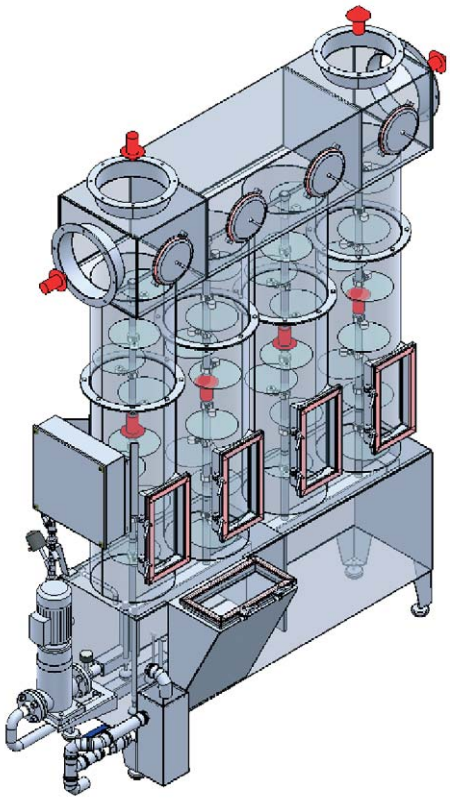
CLEENjet® RWK (FOUR-COLUMN SCRUBBER)

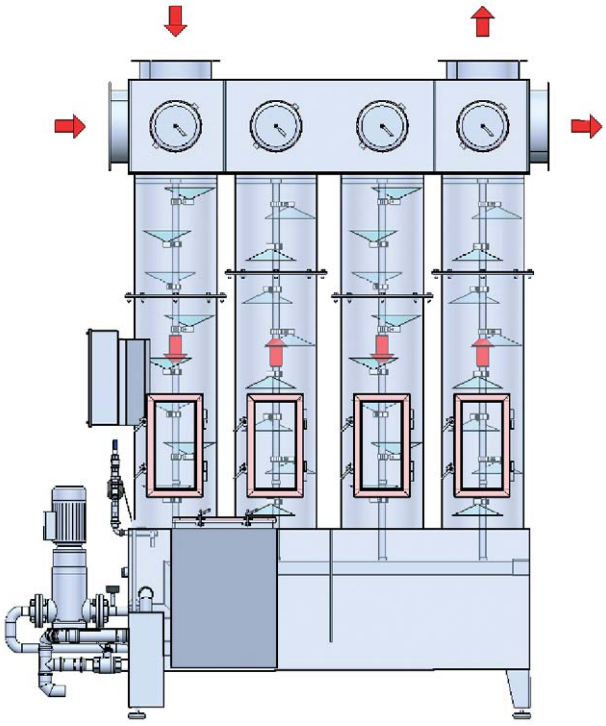
In order to ensure that the purification of exhaust air using water sprayed through spray nozzles is carried out in an ideal manner, a pressure gauge is installed in the feed line to the nozzle holder. If multiple nozzles are blocked, the increase in pressure is recorded and a warning is sent to the control box. A warning lamp indicates that the nozzles are clogged and need to be checked.

A level sensor calculates the maximum and minimum water levels. This allows for fully-automated partial and full water exchanges. Furthermore, upon falling below the minimum water level - which can occur as a result of a defective valve, for example - a warning is immediately sent to the control panel. A warning lamp indicates that there is a water shortage.

If installed, a pH gauge records the current pH value. In case of a deviation from the target value (pH=7.0), the pH value of the washing medium is corrected automatically by adding an acid or alkaline solution.

If the exhaust air scrubber is installed outside, an automatically-controlled electric heater prevents the water from freezing during the cold season.





Designs available upon request.

BIOLOGICAL EXHAUST AIR PURIFICATION SYSTEM

Today, biological exhaust air purification is the preferred method used to purify strong-smelling exhaust air - especially when dealing with large amounts of air. In this case, exhaust air from a wide variety of sources, from animal husbandry to the chemical industry, can be effectively purified as long as the exhaust air does not contain a large amount of contaminants. Biological exhaust air purification is considered a particularly environmentally-friendly process. The low amount of energy and water needed are two main benefits of this system. Except for a small amount of additives (sodium hydroxide solution, for example), this system does not make use of any harmful substances, which means that it also does not produce any harmful waste products. This system requires regular maintenance and inspections.

The purification process can be described as a process of neutralizing smells using filter materials and microorganisms. In this process, strong-smelling molecules are a held by the filter material (adsorbed) which also serves as a carrier material for microorganisms, and are then subsequently taken on by the microorganisms (absorbed) and converted. This causes the filter to regenerate as an adsorbent, which means odorous substances can be continously bonded.

The odorous ambient air is collected through the exhaust air system and is directed to the biological exhaust air purification unit through a collective duct. A central fan is responsible for the underpressure required in the duct system, which is installed after the scrubber and before the biological bed. Exhaust air purification is carried out in two stages.

In the first stage of purification, highly water-soluble substances and fine particulate matter are removed in the exhaust air scrubber. Due to the cooling effect of the sprayed water, several other substances condense. The exhaust air is simultaneously humidified with water (conditioning), which ensures that the subsequent biological filter does not dry out. The exhaust air undergoes its main purification process in the biological filter during the second stage. Any smells which have passed through the scrubber are neutralized within the filter material (a mixture of compost and bark mulch).

Since the strong-smelling exhaust air has a low level of contaminants and stems from normal operations, the odorous substances - particularly organic acids and biogenic gases - are readily and completely biodegradable. This means that after use, the filter material should be able to be reused (without any further action necessary) as fertilizer for gardening or agriculture, for example.

A wide variety of filter and carrier materials can be used in the biological bed. Natural materials, such as a compost-bark mulch mixture are significantly less expensive than articifical carrier materials like a trickling filter. In addition, the filter material does not need to be spiked with microorganisms, however it does decompose over time, which means that depending on how often the biological bed is used, the materials need to be exchanged after two or three years. As an alternative, only a part of the material can be exchanged or fresh bark mulch can be mixed in, which allows the filter to be used for approx. two or three years longer. The material needs to be aerated after six to twelve months at the latest. The easiest way to aerate the material is using a machine, but it can also be done manually with commercially available garden tools.

We recommend covering the filter, since particularly when it's colder and rainier, the filter material can become waterlogged, which has the undesired effect of increasing the filter's resistance and reducing its effectiveness. If the filter is not covered, the filter material needs to be aerated one additional time during the rainy and cold season.

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SCHRÖTER TECHNOLOGIE GMBH & CO. KG | BAHNHOFSTRASSE 86 | D-33829 BORGHOLZHAUSEN | GERMANY

GLC CERTIFIED ISO 9001

BKR

PG

Tel. +49 (0) 54 25.95 00
Fax +49 (0) 54 25.18 28

info@schroeter-technologie.de
www.schroeter-technologie.de