sgl carbon

Flue gas quenching

Process Technology – White paper

↑ DIABON® pipe quencher with SIGRABOND® Chemical pipes

Hazardous flue gas streams from waste incineration units often contain acidic compounds such as hydrogen chloride (HCl) or hydrogen fluoride (HF) and need to be treated in scrubbing systems to comply with emission regulations. Such systems are typically made of plastic materials with limited temperature resistance. To make the off gases safe for processing, the flue gas temperature needs to be reduced. Quench equipment made of graphite is well-suited for this task, as it is fully corrosion resistant and can handle gases up to a temperature of 1,600°C.

A quencher promotes a strongly pronounced contact between the flue gas and quenching liquid. This allows rapid evaporation of the formed droplets which cools the flue gas to temperatures around the saturation point and prevents the formation of polyhalogenated organic compounds.

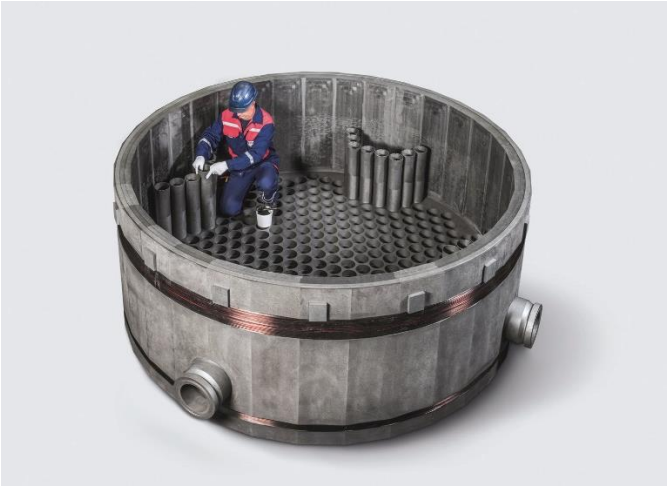
Depending on your individual needs regarding operation range, pressure drop, feed gas temperature or further specific demands, SGL offers a broad selection of quencher designs.

PQ type pipe quencher
Graphite pipe quenchers process the hot flue gas in heavily irrigated pipes. Even so, this design requires relatively low liquid circulation flow rates and has a minimal pressure drop, which is beneficial for reducing the operation costs of the unit. The simple, highly reliable design is also resistant against solid particles. Since it is compact and light, it can be directly connected to the flue gas line, lowering the capital investment needed for the structure and piping.

SGL offers many design options to suit your process requirements. For higher temperature applications, the graphite parts exposed to the hot flue gas are reliably kept cool by utilizing a rinsing film. Water-cooled graphite ring sections can also be installed at the connection to the hot flue gas pipeline. Packed bed sections can be added as an additional safeguard to prevent damage of down-stream equipment in case of pipe failure or larger turn-down requirements.

New pipe development
SGL has recently developed improved quencher pipes made of SIGRABOND® Chemical, a carbon fiber-reinforced carbon material. These pipes are lighter and stronger than graphite pipes. Additionally, their thinner wall design results in a more compact quencher, which simplifies the connection to the flue gas pipe and ensures a homogeneous gas distribution.

↑ DIABON® pipe quencher combined with DIABON® absorber



↑ DIABON® pipe quencher DN2700

Empty pipe quencher
When broad operation ranges and a low pressure drop is needed, empty pipe quenchers are employed. In this concept, a water curtain is generated, covering the full cross section of the quencher pipe. Compared to a normal pipe quench, empty pipe quenchers also require no minimum gas velocity in the pipes to achieve the quenching effect.

Process design for quench systems
Our process engineers can customize the quencher design according to your needs and provide the process design for a complete system, comprising the quench cycle and scrubbing system, including column sizing based on state-of-the-art simulation tools.

SGL also provides solutions to concentrate the generated acid or even recover the hydrogen halide as gas. Furthermore, concepts for energy recovery of the hot gases are available – using the heat to generate hot water or valuable steam and thus reducing emissions.

Are you looking for further information regarding components involved in the quench system such as our temperature and corrosion resistant POLYFLURON® PTFE bellows or our SIGRAFLEX® gaskets, which are flexible graphite foils manufactured from expanded graphite that are ideally suited for the challenging process conditions present in the quench system?

Feel free to contact us – we are looking forward to working together with you.

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