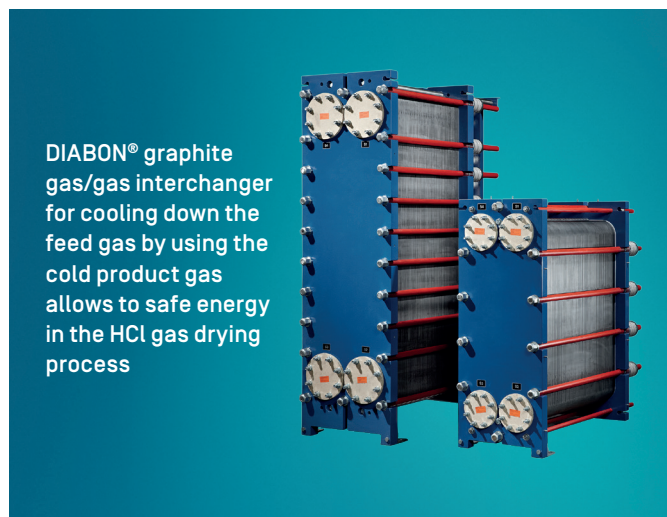


Process routes for drying of HCl gas

Process Technology – White paper

HCl (hydrogen chloride) gas is often required as dry gas with minimal moisture content, especially when it is further processed in equipment with limited corrosion resistance such as a compressor, carbon steel pipeline or stainless-steel equipment. Accordingly, effective HCl gas drying systems are crucial to minimize unscheduled down time caused by corrosion.



↑ DIABON plate and frame heat exchanger

Depending on the required moisture content, HCl gas condensation systems, molecular sieve systems or drying systems with hygroscopic substances such as sulfuric acid are typically applied.



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The non-electrolytic HCl gas has a limited risk of corrosion, therefore HCl gas drying is a key process step to minimize downtimes and to achieve optimum product quality. A common way to dry HCl gas is to chill it to very low temperatures, thereby removing water as concentrated hydrochloric acid condensate.

However, HCl hydrates may be formed at reduced temperatures, posing a risk of blockage by solids in the condenser. Furthermore, droplets and aerosols are formed when condensing wet HCl gas, requiring the use of specialized demisters to ensure HCl gas with minimal moisture content. Depending on the HCl gas temperature and pressure, typically moisture contents between 10-50 ppmw can be reached whenever a chiller and demister are used.

For applications requiring extremely low water content, molecular sieves may be recommended. These systems run batchwise; one adsorber is operated while the other adsorber is regenerated by applying a heated regeneration gas. Since no liquid drying media is used, the risk of contamination of the product gas is minimized. Such systems can feasibly deliver a moisture content of 2-5 ppmw. Wet regeneration gas is produced as a by product, which needs to be handled in an absorption device. The regeneration gas is typically heated using electric power.

Another option that can achieve very low water content in the HCl gas is a drying system that uses a liquid dehydrating agent, such as sulfuric acid. However, accumulated waste drying media needs to be processed further. Additionally, droplet entrainment of the dehydrating agent into the product gas may occur.

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