

# STEAM GENERATION PACKAGE

## FOR MERSEN HCL SYNTHESIS UNIT



**Innovation** is the core of Mersen's development. We keep on developing new solutions to match new market requirements. Mersen is concerned with the environmental issues and therefore works on **technical improvements** among its large range of portfolio. Heat exchangers and systems are the two equipment that benefit from innovation improvements to increase the **energy efficiency**.

The latest innovation from Mersen is the **steam generation package** for the HCl synthesis unit. This option is already installed in some production sites with **successful return of experience**. We can mention Borregaard in Norway and Chemfab in India whose steam generation packages are currently running.

# HCl synthesis unit with steam generation package

Mersen is the leader in supplying HCl synthesis units that produce hydrochloric acid from hydrogen and chlorine. With more than 600 references all over the world since 50 years, we have acquired in-depth knowledge and expertise.

The synthesis of chlorine and hydrogen is an exothermic reaction that generates high temperature up to 2 500 °C. This source of available energy can be used to generate steam.

The steam generation package is a modification of the synthesis unit to recover the heat generated from the combustion of hydrogen and chlorine. This steam can be re-used by the customer in his own production flow, such as boiler. In case of synthesis unit producing more than 40 metric tons 100% HCl per day, the heat recovery option is designed to generate around 1 000 kg/hour of saturated steam at 4.5 bara (147°C). The pressure can be increased up to 8 bara, depending on the process (check case by case).

Savings are clearly substantial, mostly for Synthesis Unit USS that produce at least 40 tons per day HCl 100% basis.

- Less consumption of cold water
- Usually, water is used to cool / protect the graphite. Instead of cool water, hot water that is heated by the heat of combustion is used.
- Less use of raw material to produce the steam
- Return on investment in less than 1 year
- Up to date, the cost of steam production through standard boiler is estimated at 219K€ per year with a price of steam of 20-25€ per ton. The additional price for the modification of the current synthesis unit is less than 200K€ (\*). In less than 1 year, the new option of the synthesis unit is amortized.

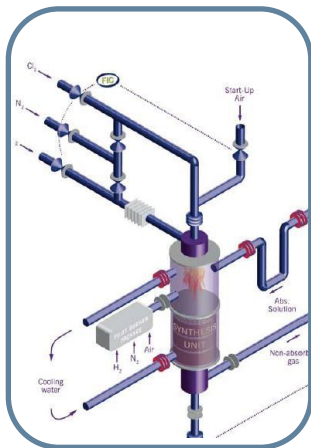
(\* price only includes additional graphite parts and modifications of main graphite equipment.

## Technical solution

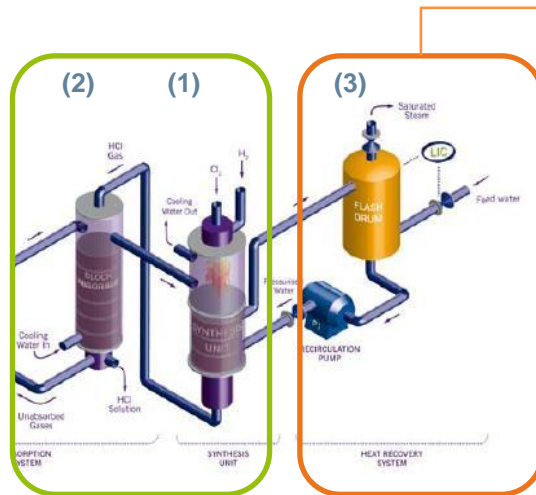
The recovery of the heat generated by the combustion of hydrogen and chlorine is achieved in 2 apparatus instead of a single synthesis unit. The synthesis unit will be split into two main equipment :

- one furnace-cooler (1)
- one falling-film absorber (2)

Heat is retrieved in the furnace-cooler unit thanks to a pressurized-water loop flowing toward a flash vessel (3). This system generates steam at a pressure of approximately 4.5 bara.



Classic Synthesis Unit



Synthesis Unit with steam generation



## Module 1 : the new synthesis unit split into 2 parts

- Furnace-cooler with set of steel part for cooler part
- Absorption unit

Engineering documents ( QC documentation and final Documentation )

## Module 2 : Steam generation package

- One flash vessel (carbon steel)
- One horizontal centrifugal pump for pressurized water
- Interconnecting piping between flash vessel and gas cooler (carbon steel)
- Hand valves
- Necessary field instruments (flow control valves..)
- Steel frame in case of skid version

## Module 3 : Engineering for steam generation package

- General drawings for synthesis unit and absorber
- Parts lists for above apparatus
- Installation and maintenance handbooks
- P&ID inc. Mass balances at minimum and maximum loads
- Field instruments specifications (design data for manufacturer inquiry)
- Control and interlock specifications (start-up sequence diagram and narrative description of interlocks, start-up sequence and control loops)
- Operator's handbook (incl. Process description, trouble-shooting guide, operation)

## Mersen, your partner for technical expertise

The lifetime of synthesis units in production sites are about 25 years-old. Some systems need to be revamped or some parts to be replaced. The long-term experience and expertise position Mersen as your partner to analyze the strengths and weaknesses of your system and recommend some improvements.

Our experts are based all around the world and our technical centers make the difference in terms of proximity and maintenance

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