



# FILTRATION APPLICATIONS IN HYDROGEN PRODUCTION

(Steam Methane Reforming)

Hydrogen is used in a wide variety of applications including electricity production, refining oil, chemical processes, and many more industrial uses. Due to the increased use of heavier crude oils containing higher amounts of sulfur and nitrogen, to meet stringent emission standards, the need for hydrogen is experiencing rapid growth in the refining and chemical industries.

Many facilities will produce hydrogen as a by-product. For example; petrochemical plants release hydrogen as a by-product of their olefin production. Refineries will produce by-product hydrogen from catalytic reforming of naphtha into higher value high-octane products. However, hydrogen as a by-product will only meet a fraction of their needs.

One of the primary forms of on-purpose hydrogen production is using Steam Methane Reformers (SMR). Refineries, industrial gas producers, and other chemical manufacturers all use the same SMR technology, which is 90% efficient in producing hydrogen.

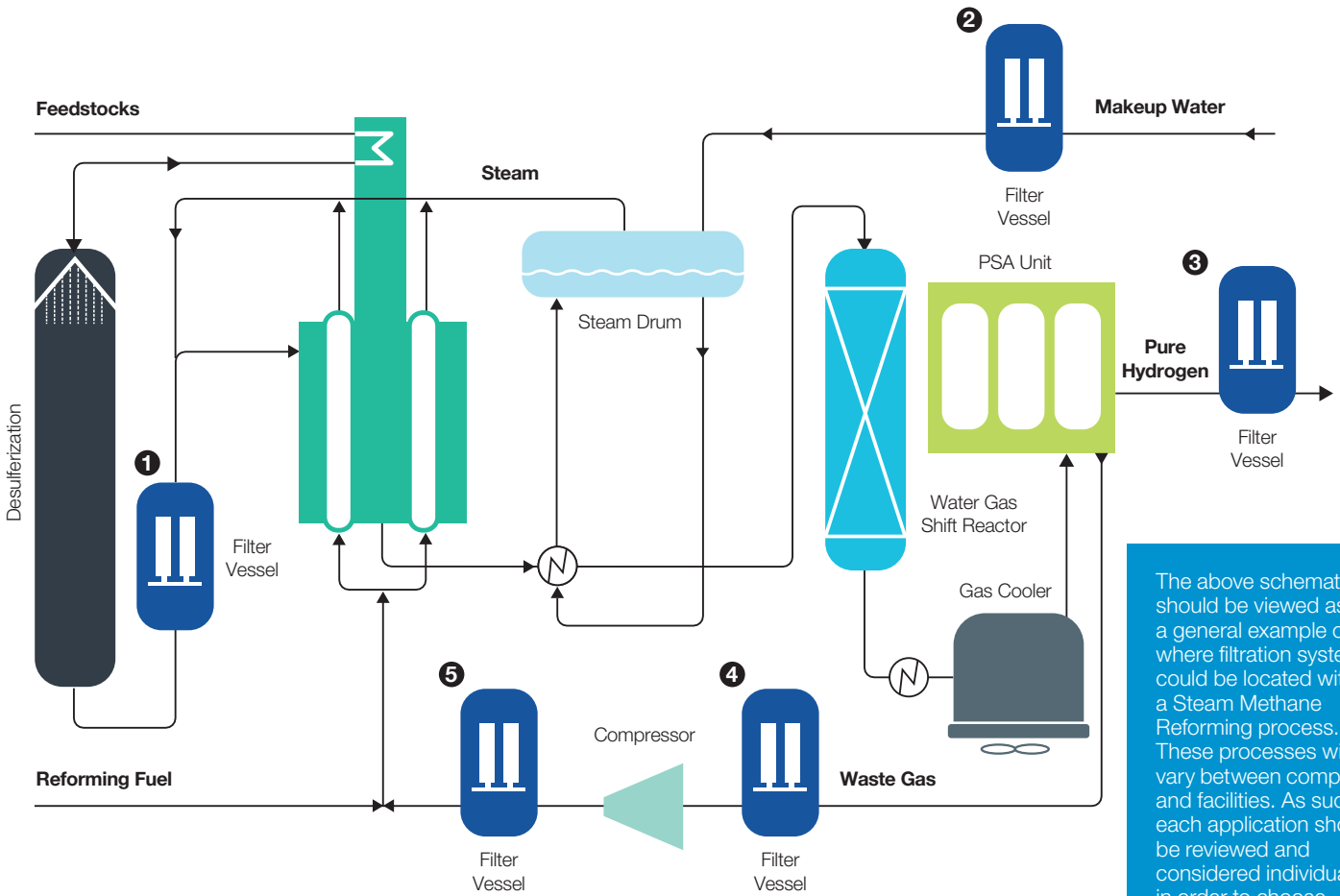
The SMR process using steam to produce hydrogen from a hydrocarbon source, such as natural gas. Methane reacts with steam under pressure in the presence of a catalyst to produce hydrogen, carbon monoxide, and a relatively small amount of carbon dioxide. SMR is endothermic— heat must be supplied to the process for the reaction to proceed.

Afterwards, in the water-gas shift reactor, the carbon monoxide and steam are reacted using a catalyst to produce carbon dioxide and more hydrogen. At this stage, the gas is approximately 75% hydrogen. After cooling, it then passes through the Pressure Swing Adsorption Unit to absorb the impurities, leaving essentially pure hydrogen. Left over tail gas is recycled as furnace fuel.

## The Benefits of an optimized filtration system include:

- Improved operation efficiency
- Protect downstream equipment
- Lower operating and maintenance costs
- Improved heat transfer and process controls
- Ability to meet final product sales specification

# Filtration Solutions for Steam Methane Reforming Process



The above schematic should be viewed as a general example of where filtration systems could be located within a Steam Methane Reforming process. These processes will vary between companies and facilities. As such, each application should be reviewed and considered individually in order to choose the correct system technology.

Filter Solution	Filter Purpose	Filter Benefit
<b>01</b> GasPleat™ Series Pleated Gas Filter Elements and Vessel	Removal of liquid and solid contaminants from feed stock gas	Improved reforming efficiency, longer service life, and reduced maintenance costs
<b>02</b> LiquidPleat™ Series Pleated Liquid Filter Elements and Vessel	Removal of solid contaminants from the make up water	Improved heat transfer and process control. Lowers maintenance costs and maintains optimum plant performance
<b>03</b> GasPleat™ Series Pleated Gas Filter Elements and Vessel	Removal of carry over carbon fines and solid contaminants	Maintains hydrogen gas quality specifications
<b>04</b> Micro-LOK™ or Micro-DEP™ Series Coalescer Elements and Vessel	Removal of lube oil from compressor discharge gas	Efficient hydrogen compressor operation and significantly reduced maintenance costs
<b>05</b> Micro-LOK™ or Micro-DEP™ Series Coalescer Elements and Vessel	Removal of lube oil from compressor discharge gas	Lower maintenance costs and improved furnace operation

