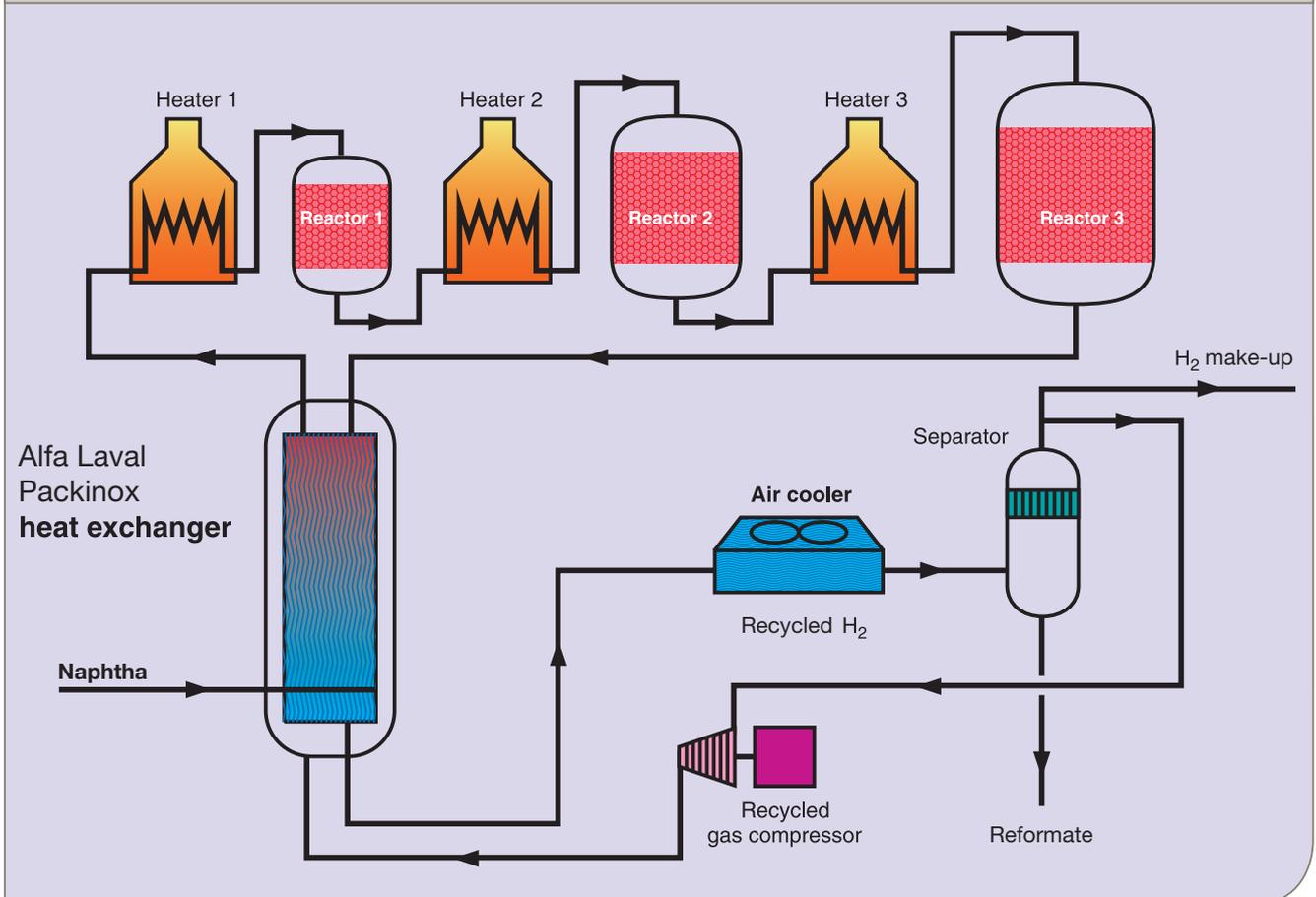




Alfa Laval Packinox for catalytic reforming

Standard combined feed/effluent heat exchanger



Alfa Laval Packinox supplied the first Standard Combined Feed/Effluent Heat Exchanger to a Catalytic Reforming Unit in 1982. Over a decade later, a report from the client congratulated Alfa Laval Packinox on the heat exchanger's constant good performance and minimum maintenance requirements.

In one piece of equipment, Alfa Laval Packinox large welded plate heat exchangers offer the superior efficiency of plate exchangers together with the resistance to high temperatures and pressures generally associated with Shell & Tubes. Moreover, the compact design of a single Alfa Laval Packinox can replace several tubulars, thus enhancing the impact on capex and opex by cutting installation costs and pressure drop consumption.

Alfa Laval Packinox heat exchangers improve the overall economics of greenfield units, and also serve as a low cost retro-

fitting basis for debottlenecking existing units as Alfa Laval Packinox allows higher duty with lower pressure drop. No other change to the unit's existing equipment (compressors, heaters, etc.) is needed to obtain higher throughput and/or higher H₂ production.

As a result of general satisfaction with the performance of Alfa Laval Packinox Standard Combined Feed/Effluent Heat Exchangers in catalytic reforming, Alfa Laval Packinox is now considered the industry standard for CRUs and is specified by the main process licensors for both semi-regenerative and CCR units.

Typical process conditions:

Flow:	5 000 to 70 000 bpd (with one exchanger)
Temperatures:	from 80°C (cold end) to 530°C (hot end)
Hot approach:	as low as 30°C or less
Operating pressure:	7 to 45 bars depending on process
ΔP in exchanger:	2 to 0.7 bar

New unit case study

50 000 bpsd Continuous Catalytic Reforming Process Unit

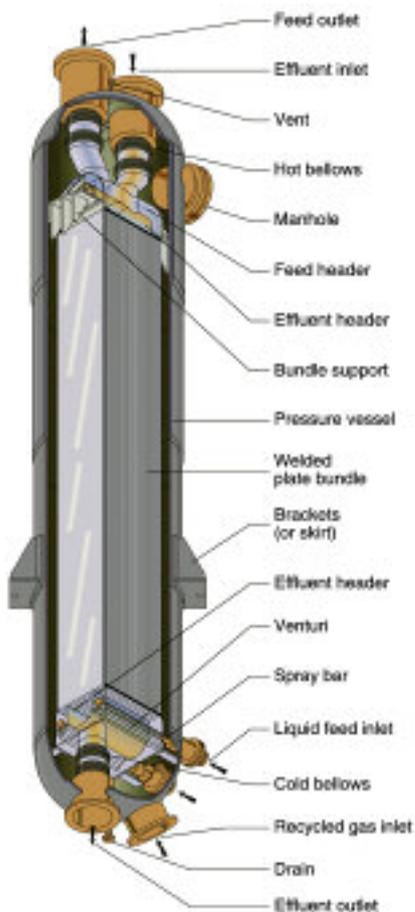
Hot End Approach	ALFA LAVAL PACKINOX		S&T
		HEA = 28°C	HEA = 44°C
Number of shells		1	4
Duty	MW	130	123
	MM Btu/h	443.6	419.7
Heat recovery	MW	7	
	MM Btu/h	23.9	
Estimated dry weight	kg	150,000.00	275,000.00
CAPEX			
Estimated equipment cost	\$US	3,300,000	3,000,000
Estimated installation cost	\$US	1,320,000	2,100,000
Estimated installed cost	\$US	4,620,000	5,100,000
CAPEX Savings on installed heat exchanger	\$US	480,000	
CAPEX Savings on other installed equipment (Heater, Cooler)		500,000	
TOTAL CAPEX SAVINGS	\$US	980,000	

OPEX

ENERGY SAVINGS PER YEAR:

CHARGE HEATER, COMPRESSOR, ...	\$US	3,150,000
EMISSIONS SAVINGS PER YEAR: Nox, Sox, GHG	\$US	560,000

assuming: 10.5 \$US/ MM BTU, 1 Euro = 1,2 \$US, GHG = 20 \$US/Ton, Nox = 0,5 \$US/Lb, Sox = 0,5 \$US/Lb



Revamp case study from an actual catalytic reforming revamp

	Prior to revamp	Packinox solution
Naptha flow rate	15,000 b/d	20,000 b/d
Arrangement	12 (2 x 6) horizontal S&Ts	1 vertical
Total weight	236 tons	114 tons
Total H.E. duty		82 MW
Feed outlet temp.	440 °C	475 °C
Hot approach	60 °C	25 °C
Total pressure drop	4 bar	1.3 bar
		(no new compressor needed)

In this case as in others, one Alfa Laval Packinox heat exchanger replaced 12 horizontal tubulars with no changes to the unit's compressor or furnaces (only new connections were required).

Capacity rose by 33% at this unit where a Alfa Laval Packinox exchanger has been in service for over 12 years without major maintenance or repair operations.

A report from the client furthermore says Alfa Laval Packinox improved the unit's energy efficiency, resulting in a reduction of SO₂ emissions and a significant drop in total fuel consumption.

PPI00202EN 0705

Alfa Laval reserves the right to change specifications without prior notification.

How to contact Alfa Laval

Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com