

## Improved Uptime And Throughput In Demethanizer Low Side Heater Duty

Tranter WPHE withstands flow fluctuations and upsets that cause previous brazed aluminum HE to fail.

A 152-MMcf/d natural gas processing facility had been using a brazed aluminum heat exchanger as the low side heater (LSH) on the demethanizer column. The LSH had experienced loss of pressure integrity resulting in leakage on three occasions over 10 years. Each event required repair or replacement of the unit attended by extensive costly downtime. Failure was attributed to a combination of thermal shock, thermal cycling and hydraulic shock.

### Uncertain causes

The low side heater mediates a partial phase change within both channels; vaporization within the cold channel and condensation within the hot channel. While events connected with failure of the brazed aluminum HE s had not been understood or completely rectified, they were judged by the manufacturer to rest within the 1% annual “undefined failure mode” allowance. The only operational anomalies observed were intermittent pressure fluctuations and possible slug flow, working together to potentially exceed the brazed aluminum HE’s published *permissible thermal change rate of 2°F/min (1°C/min)*.

### Better controllability and capacity

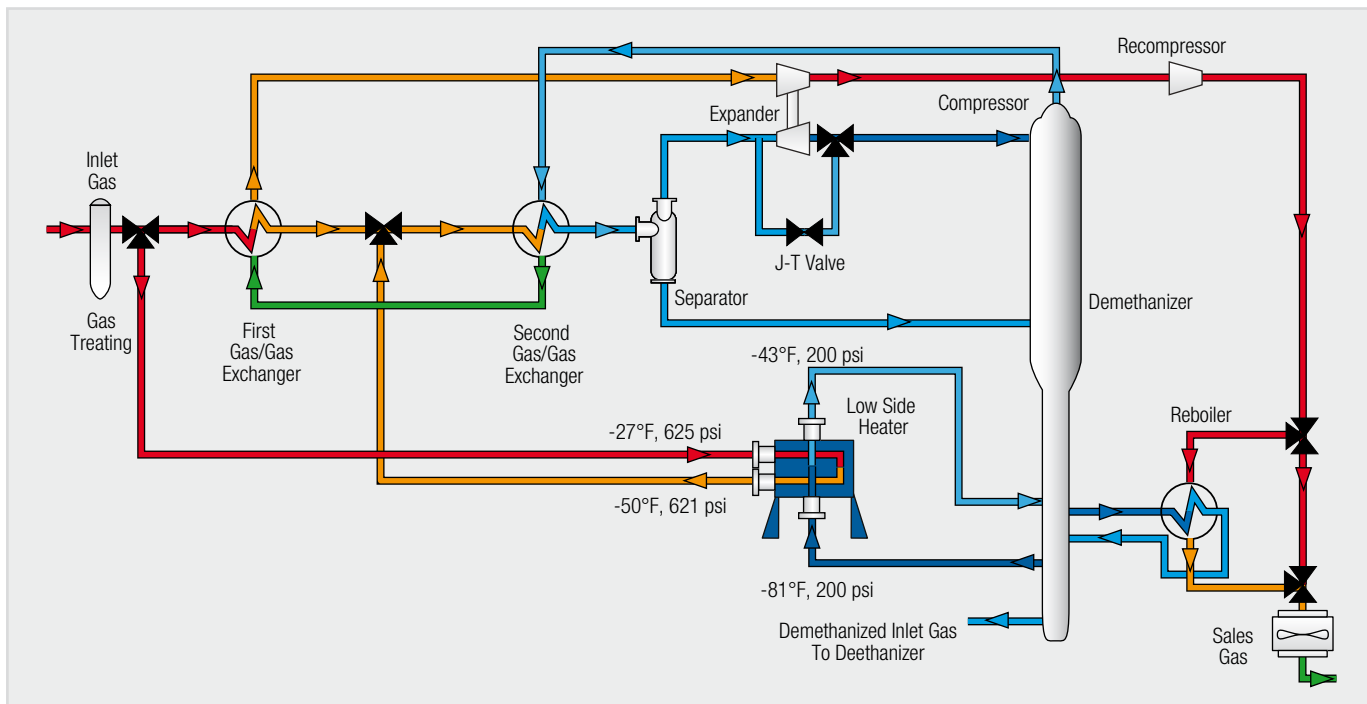
In an effort to reduce repair costs and downtime, plant management decided to install a Tranter WPHE for the LSH duty. It proved to be an easy retrofit, well within footprint of brazed aluminum unit. There was minimal disruption of pipework to make connections.

The Tranter WPHE has performed without damage over several years through incidents that damaged the brazed aluminum units. Additionally, the heat transfer capacity, heat transfer rate and low pressure drop of the WPHE have been compatible with a higher flow rate. Tower controllability has improved, along with a capacity increase of 5.3%.

Plant management has concluded that the WPHE stainless steel, design and welded construction



*This Tranter WPHE replaced a brazed aluminum HE with superior durability, high efficiency and easy retrofitting in Low Side Heater duty.*

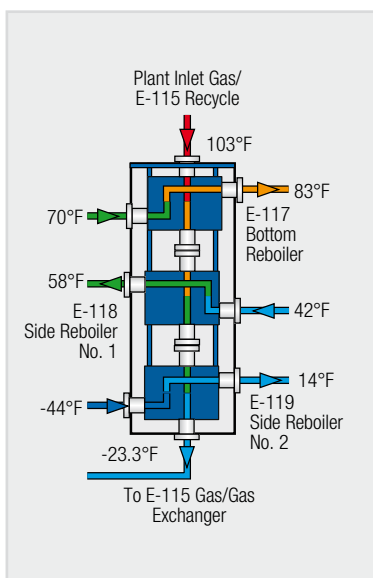


Simplified general process scheme of the Low Side Heater around the demethanizer column.

withstand thermal and hydraulic stresses better than the brazed aluminum HE. Their experience favors the suitability of the WPHE for demethanizer LSH duty.

### Typical WPHE Low Side Heater Performance

Channel	Hot (From Cooler To Cooler)		Cold (From Demethanizer To Demethanizer)	
	Inlet	Outlet	Inlet	Outlet
Line Size, in. (mm)	12 (305)	12 (305)	10 (254)	12 (305)
Connections, in. (mm)	10 (254)	10 (254)	8 (254)	8 (203)
Total Mass Flow, lb/hr (kg/hr)	170,918 (77,527)	170,918 (77,527)	115,246 (52,275)	115,246 (52,275)
Vapor	145,092 (65,812)	133,029 (60,341)	0	10,695 (4,851)
Liquid	0	37,889 (17,186)	115,246 (52,275)	104,551 (47,424)
Heat Exchanged, Btu/hr (W · hr)	3,973,100 (1,164,400)			
Transfer Rate, Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> · °C)	396 (2249)			



Example of additional combined heating duties that are possible within a three-in-one WPHE assembly.

### Performance, Brazed Aluminum vs. WPHE

	WPHE	Brazed Aluminum
Heat Exchanged, Btu/hr (W · hr)	3,973,100 (1,164,400)	3,000,000 (879,213)
Transfer Rate, Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> · °C)	396 (2249)	47.3 (269)



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