



ATMO sphere

Business Case for
Natural Refrigerants

04/09/2018 – Singapore



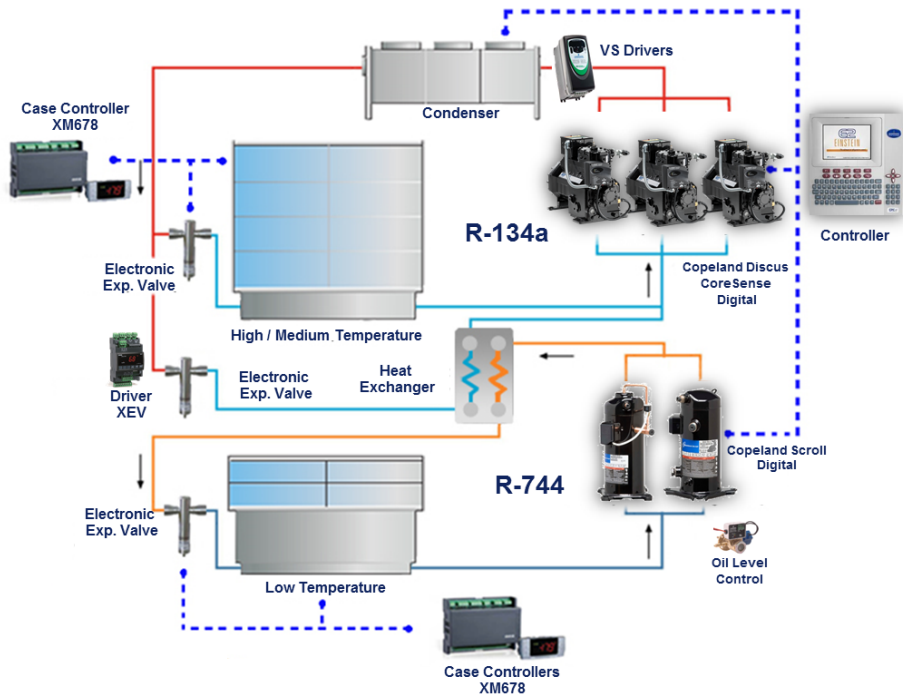


Emerson's natural refrigerant-based
solutions for developing markets

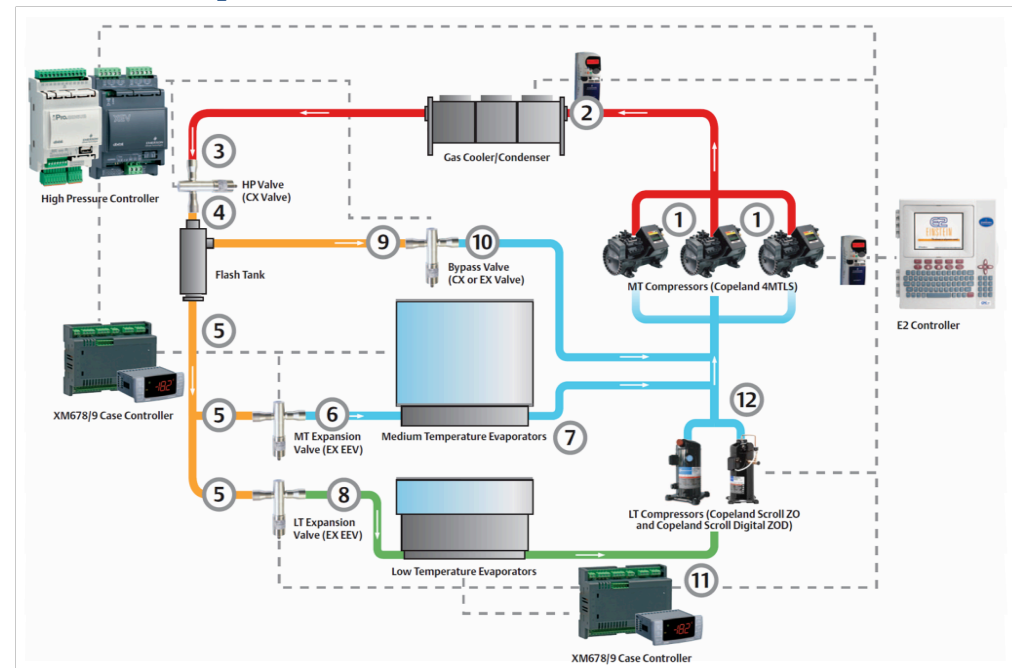
Sep 2018

Emerson CO₂ Solutions

Cascade System Architecture: R134a / Subcritical CO₂

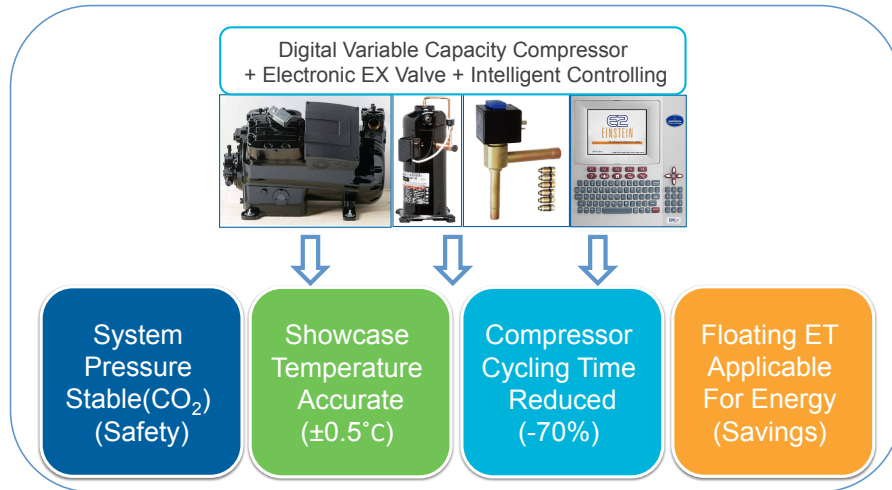


Transcritical CO₂ System Architecture



User Value & Global Footprint

Value to User



Global Footprint



R290 Variable Speed

Test in Air-to-Water Heat Pump in China

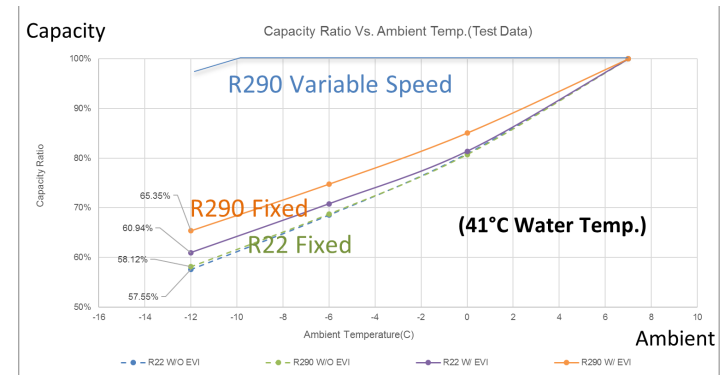
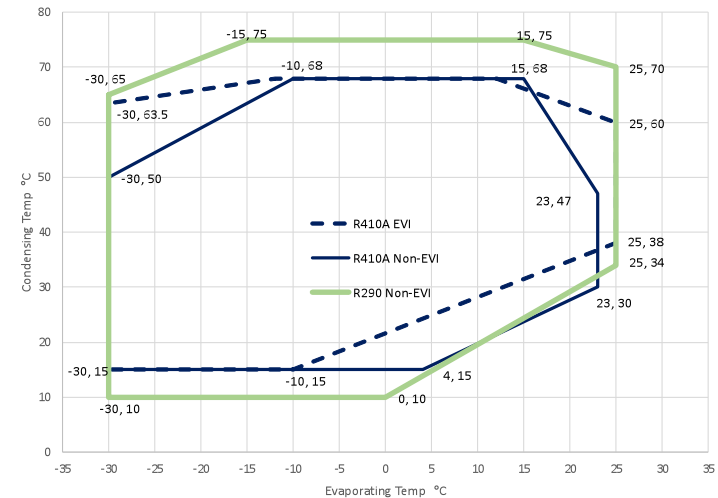


R290 As Potential Alternative for R22 & R410A

- Lower GWP
- Lower Discharge Temperature
- Wider Operating Envelope, 10°C+ Higher CT Limit Than R410A
- 38% (1.5kg) of R22 Refrigerant Charge
- Higher Annual Efficiency
- Less Capacity Drop at Low Evaporating Temperatures, e.g MT Application

Further Study in 2019

- Additional 33% (1.0kg) Less Refrigerant Charge with system improvement
- Target Further 3.3% Annual Base Efficiency Improvement



NH₃ Project – Efficient Ice Plant In Thailand

1) Tube Ice Station

Example:

Existing Requirement = Produce 40 tons of ice at 10 hrs operation

	Brand	(Tons/day)	Model	Qty	Total Motor (hp)
Existing	Competition	80	XXX	2	500
Proposal	VILTER	100	4516XL	1	300

Electricity cost saving

$$\begin{aligned}
 &= \text{hp} \times 0.746\text{kw} \times 360 \text{ days} \times 10\text{hr per day} \times 2.4 \text{ THB} \\
 &= 200 \times 0.746\text{kw} \times 360 \text{ days} \times 10\text{hr per day} \times 2.4 \text{ THB} \\
 &= \mathbf{1,289,088 \text{ THB/year}}
 \end{aligned}$$

Overhaul cost saving

$$\begin{aligned}
 &\text{Existing overhaul @ 10,000 hr} = 200,000 \text{ THB per unit} \\
 &= 200,000 \text{ THB} \times 2 \text{ units} = 400,000 \text{ THB @ 2.7 yr} \\
 &= \mathbf{148,148 \text{ THB per year}}
 \end{aligned}$$

But No Overhaul cost for Vilter.

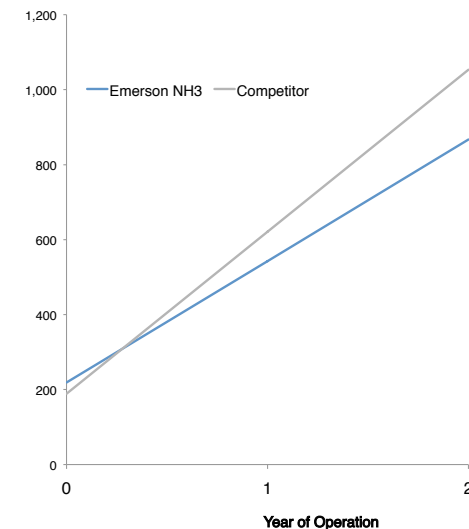
$$\text{Total Saving per year} = 1,289,088 + 148,148 = \mathbf{1,437,236 \text{ THB}}$$

2) Block Ice Station Case Study ;

Plant size: 2,400 Blocks @ 200kg/Block 65", **300,000** THB Saving With 0.3 Years on ROI

High Efficient Vilter™ Screw

Lifecycle Cost (\$K)
(Initial + Electricity)



Emerson's Unique Support in Southeast

❖ <i>Education & Training</i>	
❖ <i>Optimum Design On Specific Application</i>	
❖ <i>Data Monitoring & Analysis</i>	
❖ <i>Industry Communication</i>	



Thank you for listening!

