

"Sizing Low and High Compression Stages of Reciprocating Compressor
for Optimum Vapor Injection Performance in Economized Cycle"

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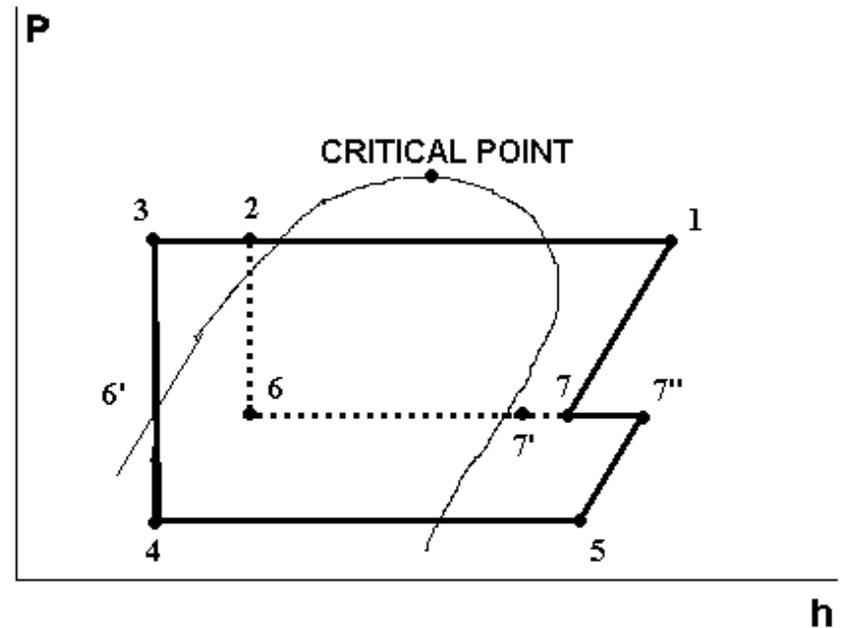
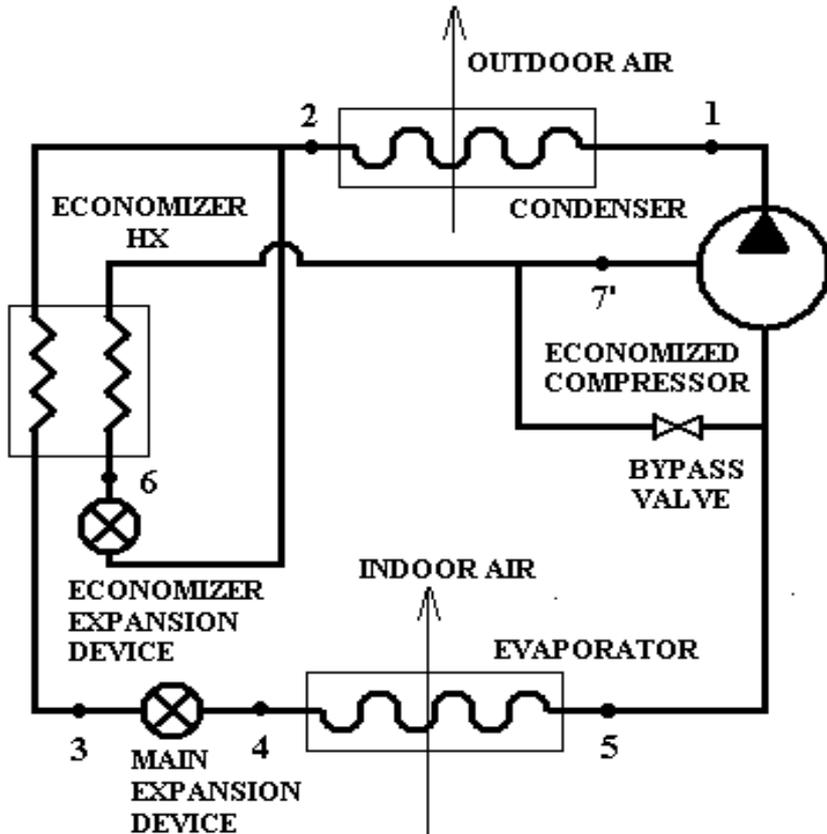
Presentation Outline

Basics of Economized Cycle

Compressor Design for Economized Operation

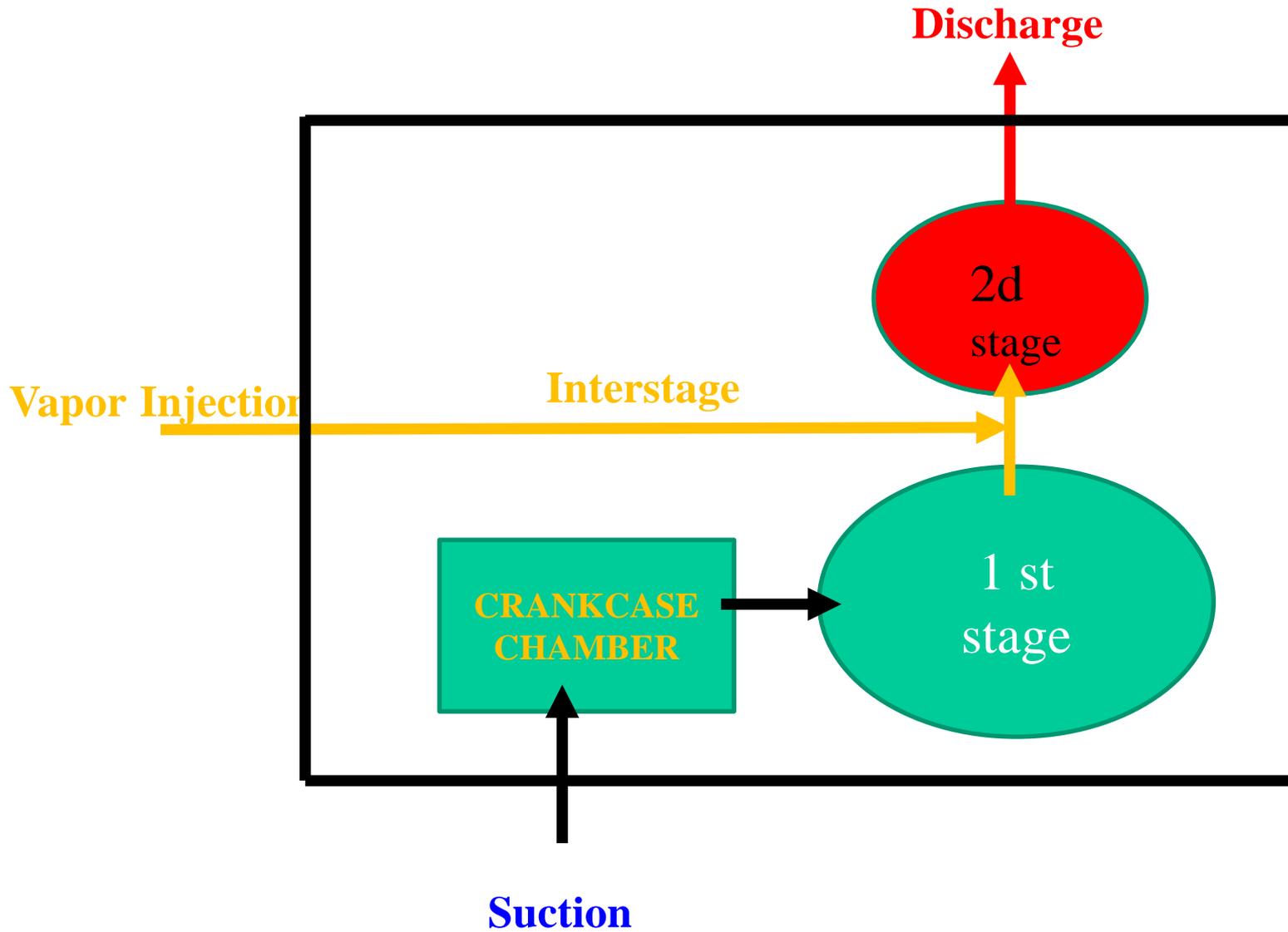
1st vs 2d stage Displacement for Optimum Operation

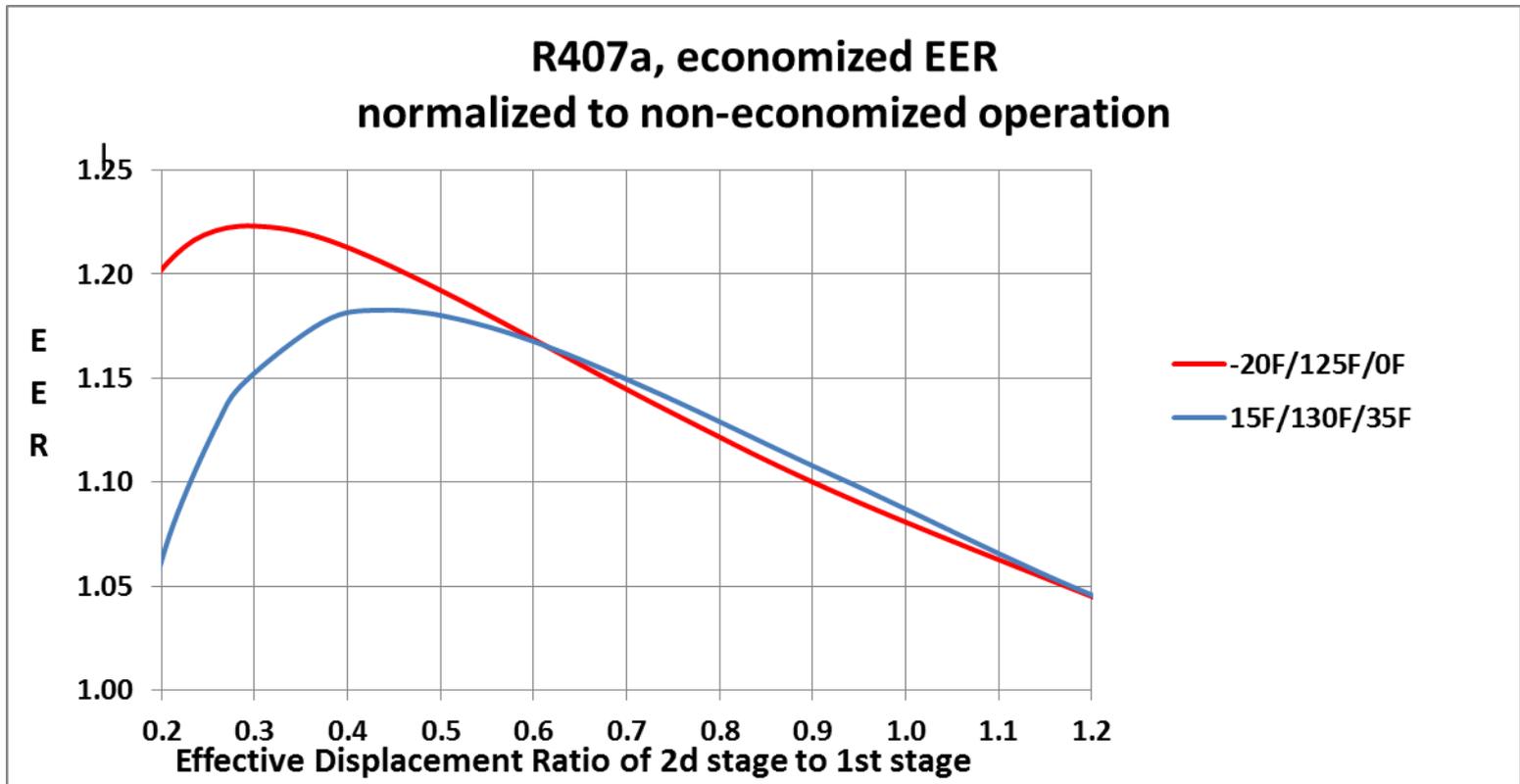
Vapor Injection (Economized) Cycle



$$\dot{m}_{evap} \cdot \delta h_{sc-2-3} = \dot{m}_{ec_average} \cdot \delta h_{ec-7'-6}$$

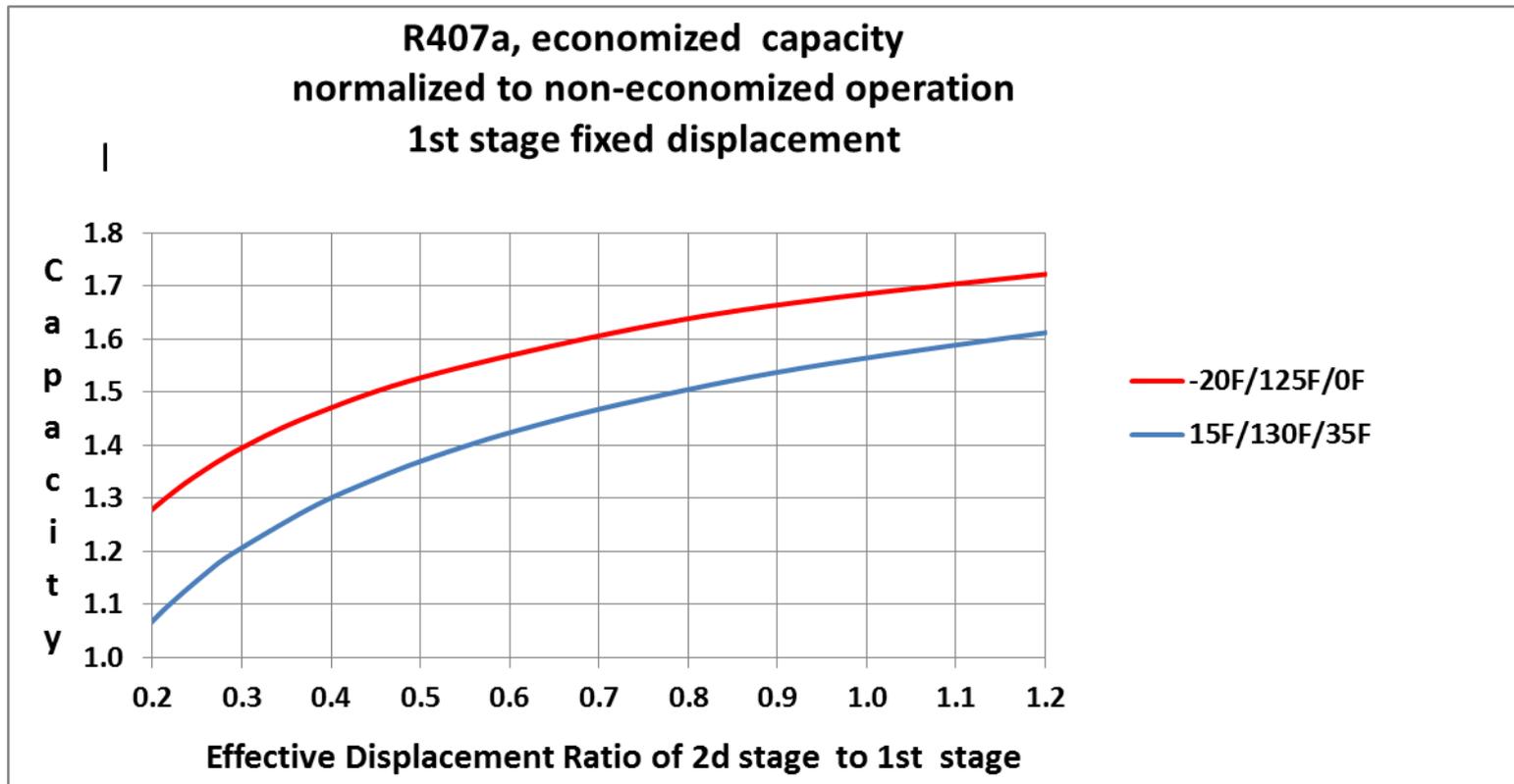
Two Stage Reciprocating Compressor Flow Schematic for Economized Operation





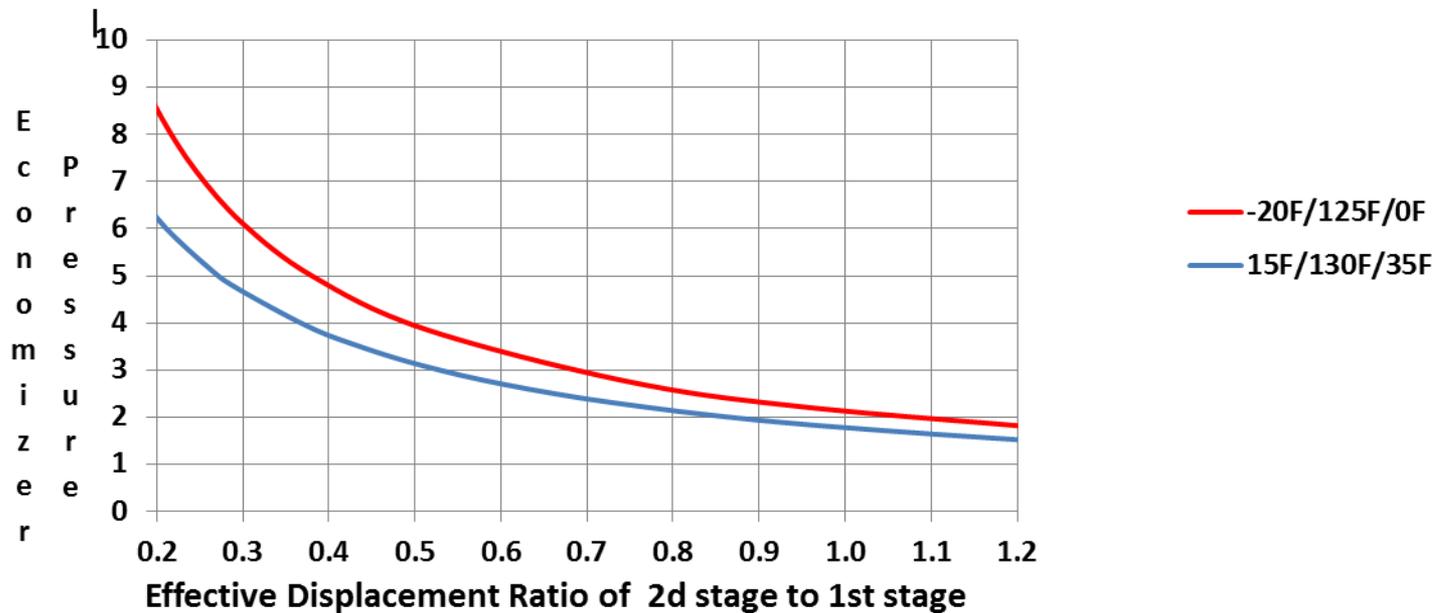
Each operating condition has optimum stage ratio

Higher pressure ratio operation benefits more from economized cycle



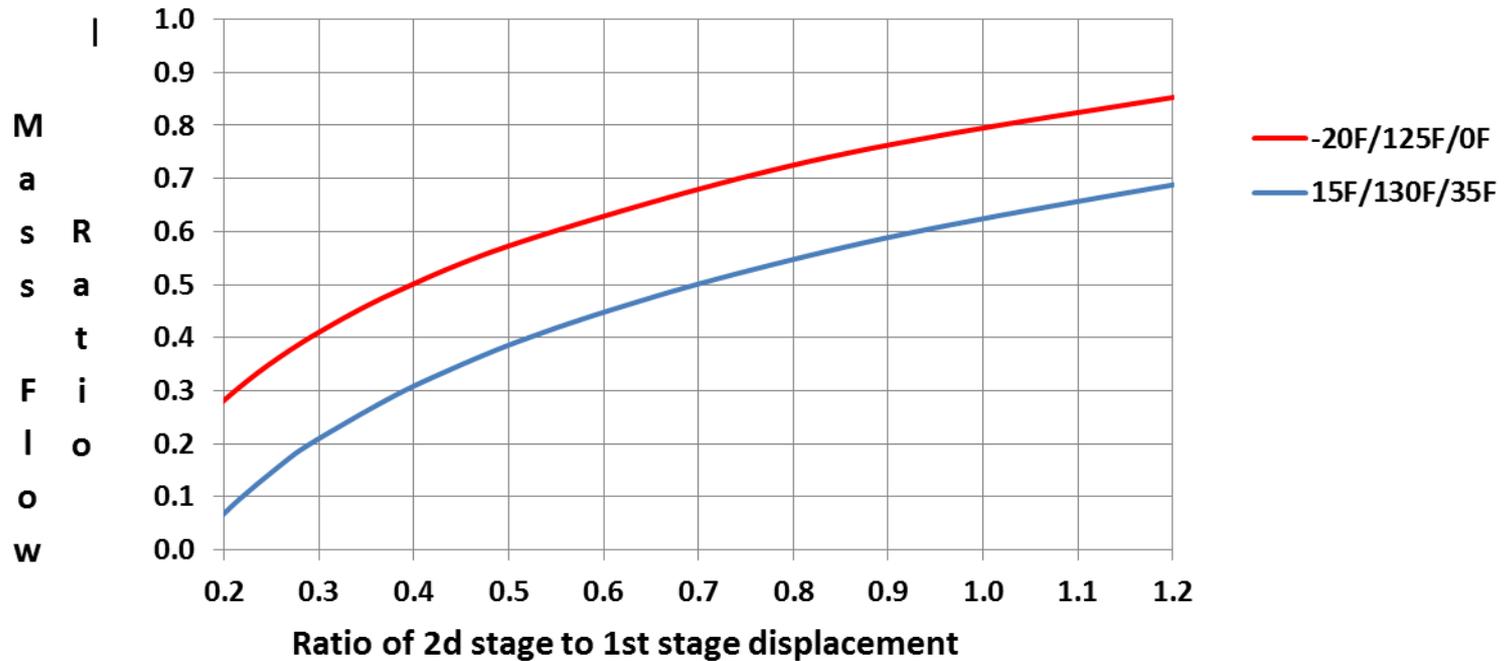
Increase in 2d stage displacement always results in increased capacity
 Higher pressure ratio operation benefits more from economized cycle

R407a, Economizer Pressure Normalized to Suction Pressure



Increase in 2d stage displacement reduces interstage pressure

R407a, ratio of mass flow vapor injection vs suction



Increase in 2d stage displacement increases vapor injection mass flow rate

Conclusion

Use of economizer (HE or flash tank) increases system capacity and efficiency

Proper selection of 1st vs 2d stage displacement achieves best performance

High lift operation benefits most from economized operation

Questions?