
AMERICA
ATMOsphere
Business Case for
Natural Refrigerants
June 12-14, 2018 – Long Beach

Raley's Journey to Natural Refrigerants

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June 12-14 Long Beach, Ca.

Our Journey!

2009 CO2 liquid overfeed Low Temp, Glycol for MT and AC with R-404a as primary.

2017 CO2 liquid overfeed Med Temp, Low Temp CO2 cascade, R-513a primary

March 2017 CARB announces 150 GWP limit on new store in 2022

Only choices we saw Iso-butane, Propane, Ammonia, and CO2

Iso-butane and Propane eliminated immediately

Choice became CO2 Trans-critical or Ammonia / CO2 liquid overfeed on Low Temp, Medium Temp and Air Conditioning

Raley's Ammonia over CO2 central system

1. Direct expansion ammonia
2. Direct Drive Carlyle 5H line compressors, two stage configuration
3. Liquid overfeed CO2 for both low temp, med temp & AC
4. Water cooled condensing and heat reclaim with plate heat exchangers
5. Low charge ammonia (120lbs) total charge for product and AC

Design Choices using “ S R E”

S Simple

R Reliable and Repeatable

E Efficient

Direct expansion ammonia cooling CO2 liquid overfeed more ”**Simple**” than trans-critical CO2

A. Same Carlyle Compressors
B. Same two stage configuration
C. Same oil equalizing system
D. Fixture temperature control by solenoid only
E. Control system same as current
F. Fewer high side controls and regulators
G. Ammonia support system already in place

In our opinion Ammonia over CO2 will be more “**Reliable**”

A. Lower operating pressures
B. No high side regulators
C. Low speed compressors
D. More standard industry parts
E. Proven reliable control system

“**Repeatable**” Goes to Trans-critical

Scalable from 5000 sq. ft. to 60,000 sq. ft.

Ammonia over CO2 appears to be more "**Efficient**" than Trans-critical

A. Our geographic area has hot summers and mild winters
B. Ammonia is twice as efficient as CO2
C. Open drive compressors using premium efficient motors
D. No motor heat through the compression cycle
E. Air conditioning on main system will operate when Trans-critical is least efficient
F. Our modelling suggests $38,000 more electric cost per year.
G. Heat reclaim potential about the same, as discharge temperatures are almost equal

Conclusion

A. We selected Ammonia over CO2 to explore, engineer, cost and install first
B. We have an ”open mind” on trans-critical
C. The design, engineering and costing of the NH3/CO2 system is complete and we are just waiting for the right store to install the first one
D. We also have designed, engineered and costed a trans-critical system on a similar store

Thank you

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Thank you very much!