Refrigerant Update

2010 and Beyond

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Agenda

• Recap
• Current Situation
• Considering the Future
Governing Documents and Regulations

• ANSI/ASHRAE 34-2001
• EPA SNAP Listing
• Montreal Protocol
• Section 605 of the Clean Air Act Jan. 21, 2003
• Montreal Protocol Meeting 19- September 2007
• EPA Rule Changes December 2008- Awaiting the Final Rule
Recap
(Problem/Solution Cycle)

• Increasing need for refrigeration in expanding use in Food, Medical, Manufacturing(Process), and Comfort HVAC applications
Specification Criteria

• Boiling Point between -50 and 0 C, to absorb heat at 0 and reject at 40
• Non-Flammable
• Non-Toxic
• Non-Corrosive
• Economical
• Capacity
• Serviceability
Recap
(Problem/Solution Cycle)

• Increasing need for refrigeration in expanding use in Food, Medical, Manufacturing(Process), and Comfort HVAC applications
  — CFC Solution
Recap

• 1974 Rowland and Molina- Middle Stratosphere CFC’s breakdown by UV radiation releasing Chlorine atoms. Proposed that chlorine was breaking down Ozone.
• Highly disputed. Congress funded research.
• 1976 US National Academy of Sciences confirms the credibility of the ozone depletion hypothesis.
• 1985 British Antarctica Survey- Ozone hole discovered over Antarctica
• Vienna Convention
  – 1989 Montreal Protocol- substitutes must be found and ozone depleting substances must be phased out
Recap

• United States Clean Air Act Amendments of 1990 contain provisions for implementing the Montreal Protocol and establishes explicit authority for the U.S. Environmental Protection Agency to regulate ozone depleting chemicals.
• Industry slow to adopt and adapt to changes.
• CFC production banned. HCFC set for phase out.
Current Situation

• CFC’s- no production. Service use only through reclamation.

• HCFC’s- Developed Countries (Article 2): Accelerated* Phase Out Schedule
  – 2004  35% reduction from baseline
  – 2010* 75% reduction from baseline
  – 2015  90% reduction from baseline
  – 2020* Stop production with 0.5% of baseline for service only until 2030
  – 2030  No production or importing of HCFC’s

*September 2007 Rules Change
Current Situation

• Proposed rule changes under review
  – 2010 Allocation Rule
    • Reductions per existing Montreal Protocol
    • Production and import for servicing equipment produced prior to January 1, 2010
    • Change to include consumption and production allowances for HCFC-123, -124, -225ca, and -225cb currently not part of the allocation rule.
Current Situation

– 2010 Pre-Charge Appliances Rule
  • Ban the sale or distribution of pre-charged systems and components manufactured on or after January 1, 2010.
  • Includes HCFC-22, HCFC-142b, and any blend containing these components.
  • Includes imported products.
  • Allowance made for servicing.
  • Some confusion with regard to field installed systems.
  • Special provision for systems charged with reclaimed refrigerant.
  • Publication of Final Rule still pending.

See
Current Situation

- HCFC phase out estimated to create 2010 imbalance between supply and demand (DUPONT estimates 27.5 million pound shortfall)

- Alternatives- HFC’s
  - HVAC
    - R410A
    - R407C
    - R423A
    - R134a
  - Refrigeration
    - R404A
    - R507
    - R134a
Current Situation

- Concerns about availability and fit
- Alternative Blends
  - Refer to SNAP Listing
  - Safety ratings
  - Base use for retrofit on fit, cost, availability, system operating characteristics, and complexity of the retrofit
  - No silver bullet
  - R438A, R407A,
- HFC’s not the final answer- GWP
Considering the Future

• Global Warming
• European Influence
• Government Intervention- EPA regulations, Carbon Taxes
• Technological Developments
• Special interests influence on Global Companies
• Proliferation of Refrigerant Cocktails
• Pushing the limits on safety- toxicity/flammability
Considering the Future

• European call for phase out of R134a
• Development of CO₂ systems and components
• HFO1234yf (hydrofluoroolefin 2,3,3,3,-tetrafluoroprop-1-ene)
• Equipment and system design
  – Self contained
  – Modular
  – Secondary Loop
  – Close coupled
  – Systems environments will change
  – Smart systems- self monitoring, automation
  – Safety monitoring
  – Radical Component changes
Questions