



BITZER NATURAL REFRIGERANT TRAINING PROGRAMS

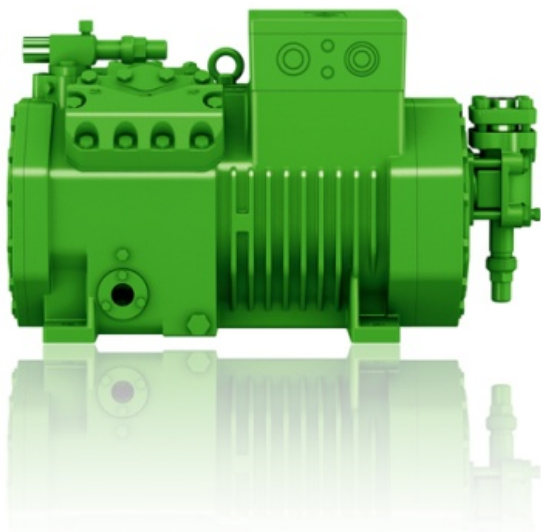
Joe Sanchez

BITZER US, INC

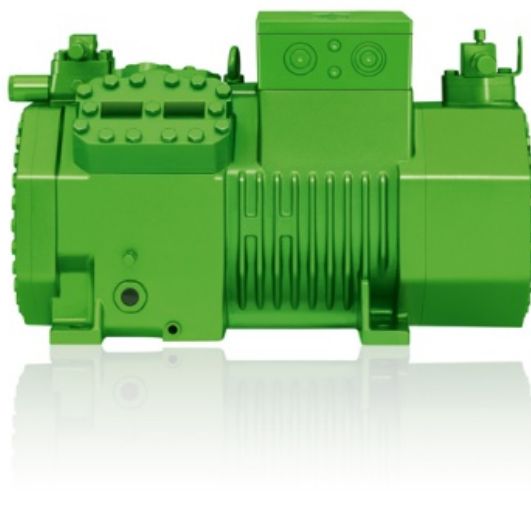
6/25/2015



Technologies – Carbon Dioxide



Compressor for CO₂
Subcritical Applications
(Max 760 psi
& 1450 psi)

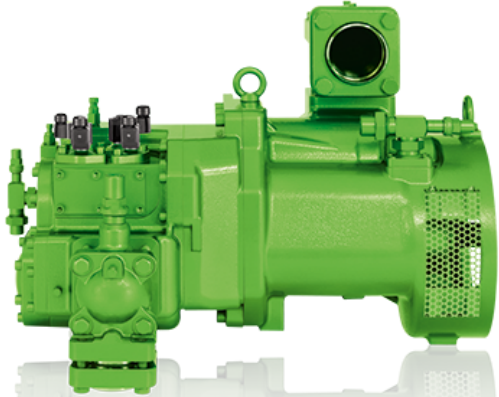


Compressor for CO₂
Transcritical Applications
(Pressure of 2320 psi)

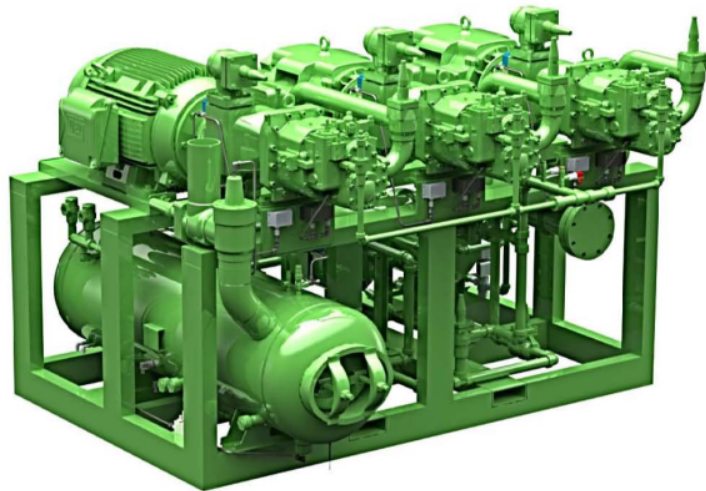


Pressure Vessels for CO₂
Transcritical Applications
(Pressures of 1300 psi)

Technologies – Ammonia



NH₃ Open Drive
Screw & Recip
Compressors



NH₃ Compressor
Packs and Oil
Separators



Applications

As a Component Manufacturer, BITZER is exposed to a WIDE variety of Applications:

/ Commercial, Industrial, Process, Transport, Container, Marine

/ Air Condition, Refrigeration, Chillers, Freezer, Ultra Low Temp, Heat Pump

And Technologies

/ Carbon Dioxide

- Booster System, Secondary, Cascade, Liquid Recirculation

/ Ammonia

- Liquid Recirculation, Cascade, Low Charge

Global Training



Germany – CO₂ Training Lab

- 130 “Official” Training sessions and counting
- Average class sizes around 8
- 2 Day classes (CO₂, NH₃, HC)
- Brand new training lab opening this year

Other CO₂ Training Labs:

- Brazil – Over 1000 trained since 2008
- Australia



With Classroom or “Roadshow” trainings in nearly every subsidiary (~40)

USA Training – Oakwood, GA

“Hands-On” Setup

Most Compressors are set up to be disassembled



Classroom Setting

- Class size of up to 20
- Over 500 trained on CO₂ and NH₃



Topics

CO₂ Training

/ Why CO₂

/ Thermodynamics

/ Safety Aspects

/ Compressors

/ Lubricant Issues

/ Subcritical Systems

/ Transcritical Systems

/ Start Up & Commissioning

/ Software

/ Compressor Hands-On Disassembly and Reassembly

- A fundamental understanding is helpful (necessity?)

/ PH (Mollier) diagrams

/ System overviews

- Repetition is key for understanding

→ Important for us to work in conjunction with project partners

Topics

NH₃ Training

/ Intro to NH₃ Compressors

/ Compressor Features

/ Couplings and Housings

/ Oil Management

/ Common Failures and Prevention

/ VFD Operation

/ Software

/ Past Experiences

/ Compressor Hands-On Disassembly and Reassembly

- Fundamental understanding is usually established

- Allows focus to be on screw compressors

(more complex than piston compressors)

Assessment on Natural Refrigerant Training

NH₃

/ IIAR & RETA have established the gold standard

- Course outlines, tests, videos, etc.

/ Industry Need:

- Low charge systems will require some adaptation
- If commercial use increases, more adaption required

CO₂

/ Already, IIAR & RETA are adapting for industrial use

/ OEMs required to train on systems

/ Industry Need:

- CO₂ dedicated certification?
- Application based trainings

Assessment on Natural Refrigerant Training

Flammable Refrigerants

- / Need for more dedicated certifications?
 - Charge size
 - Application based
- / Establishment of better training and education may pave the way for larger systems

Summary

Appeal and Tailor to a wide variety of attendees

- / Designers / Engineers
- / Technicians
- / Sales
- / End users

Goals

- / Education (of course)
- / Gather information from customers and end users
- / Spread new technology and application of natural refrigerants to ensure its success!



THE HEART OF FRESHNESS