

HVAC Service Technicians Training Center

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Advanced Refrigeration Systems (R-1)

This course explains component and operating differences from high temperature systems. Hands-on exercises cover walk-in boxes, freezer cases, meat display cases, etc.

COURSE OUTLINE

- Week 1: Refrigeration saturation, subcooling, superheat, defrost, oil.
Week 2: Refrigeration: Temperature and pressure controls, setting, operation pressures, coil, T.D.
Week 3: Identify components, suction line accommodators, T.X. valves, oil separators.
Week 4: Hold back valves or crankcase pressure reg. page 271
Sporlan handouts 90-10. page 277
Week 5: Pressure limiting T.X. valves when, why.
Hot gas defrost. Electric defrost time clock. Defrost termolators and fan control. Kramer thermostats.
Week 6: Heat & charger recap controls and settings, 3-way valves.
Sporlan June 2001 Bulletin 30-20
Week 7: Recap controls and components, piping, etc.
Go over midterm handouts.
Week 8: Give out midterm grades, go over the project and explain what each student did incorrectly.
Week 9: PDF, start up refrigeration units. Check and test unit pump down and look for controls and identify different components.
Show how to set controls pressure type and adjustment of E.P.R. valve.
Week 10: Go over control adjustments and settings. C.P.R. E.P.R. Back into shop start up and test icemaker.
Week 11: Work on dual temp. refrigerators, adjusting E.P.R. valves and C.P.R. valves. Made bare tube evap coil for reach in box. Install controls cond unit T.X. valve dryer lig eye. Start up and test.
Week 12: Go over all work for review of final exam.
Week 13: Final Exam

DAY 1

SUBJECT: Commercial Refrigeration and Air Conditioning
GOAL: For student to understand refrigeration, saturation, subcooling, superheat, and different types of defrost.

OBJECTIVES:

1. Show students different types of refrigeration system based on hi-temp
2. Explain saturation temp and show how to determine same.
3. Explain subcooling and show how to get subcooling temps.
4. Explain superheat and show how to get superheat reading.
5. Explain and show different types of defrost systems.
6. Explain oils and how piping can trap oil with low velocities in coils.

SUBJECTS CONTENTS:

Advanced refrigeration applications binders

METHODS/TECHNIQUES:

1. Refrigeration & Air Conditioning Tech – Whitman & Johnson 4th Edition
2. Sporlan CAT: 2003
3. Classroom handouts and overheads based on Whitman & Johnson 4th Edition. Carrier training vendors.

RESOURCES: Refrigeration binders for Term 5

Whitman & Johnson 4th Edition
Carrier videos

EVALUATION: Written Quiz Based on Day Course

HOMEWORK: Read unit #1 in Refrigeration Binder and answer questions

DAY 2

SUBJECT: Commercial Refrigeration and Air Conditioning

GOAL: For student to understand temperature and pressure controls, setting controls and pressure at which they cut in & cut out.
Coil T.D.

OBJECTIVES:

1. Show students different types of refrigeration controls
2. Explain pressure controls, thermostat controls
3. How to set controls (Penn) or (Ranco)
4. Explain coil to box temp T.D.

SUBJECTS CONTENTS:

Advanced refrigeration applications binder – section 2

METHODS/TECHNIQUES:

1. Take into shop to show controls as per P.D.F.
2. Refrigeration & Air Conditioning Tech – Whitman & Johnson 4th Edition
3. Ranco Controls Booklet
4. Penn Controls Booklet

EVALUATION: Written Quiz Based on Day Overview and Shop
Questions and Answers

HOMEWORK: Read unit #2 in Refrigeration Binder

DAY 3

SUBJECT: Commercial Refrigeration and Air Conditioning

GOAL: Identify ass components, suction line accumulators, T-X valves, oil separators.

OBJECTIVES: Show student how to identify different refrigeration components and understand their operation as it applied to the refrigeration system

1. Explain what it looks like and what it does.
Suction line accumulator
2. Explain what it looks like and what it does.
T.X. valves
3. Explain what it looks like and what it does.
Oil separator

SUBJECT CONTENTS:

Advanced refrigeration applications binder
Sporlan Booklet
Whitman & Johnson 4th Edition
Refrigeration Research Inc. Booklet

METHODS/TECHNIQUES:

1. Refrigeration & Air Conditioning Tech – Whitman & Johnson 4th Edition
2. Sporlan CAT
3. Refrigeration Research Inc.
4. Overlays – Whitman & Johnson 4th Edition

RESOURCES: Refrigeration binders for Term 6

Whitman & Johnson 4th Edition
Sporlan CAT
Refrigeration research Inc.
Overlays – Whitman & Johnson 4th Edition

EVALUATION: Written Quiz Based on Days Work

HOMEWORK: Read Chapter 3

Answer questions

DAY 4

SUBJECT: Commercial Refrigeration and Air Conditioning
GOAL: Identify and understand
Hold back valves
Crankcase pressure Reg. valves
OBJECTIVES: Show student and help them understand operation of:
1. Suction hold back valves
2. Crankcase pressure Reg. valves
SUBJECT CONTENTS: Advanced refrigeration applications binder – Section 4
METHODS/TECHNIQUES:
1. Take into shop and show suction hold back installed on unit and explain its functions
2. Take into shop and show crankcase pressure reg. installed on unit and explain its functions
RESOURCES: Sporlan Booklets
Whitman & Johnson 4th Edition: Handouts
EVALUATION: Written Quiz Based on Days Overview
Questions and Answers
HOMEWORK: Read Sporlan info sheets
Handouts

DAY 5

SUBJECT: Commercial Refrigeration and Air Conditioning
GOAL: Identify and understand
Pressure limiting T.X. valves and why they are used.
Hot gas defrost
Electric defrost
Time clocks
Defrost termination
Fan control
Kramer thermobank systems
OBJECTIVES: Show student and help them understand the operation of:
1. Pressure limiting T.X. valves and why they are used.
2. Hot gas defrost
3. Electric defrost
4. Time clocks
5. Defrost termination
6. Fan control
7. Kramer thermobank systems
SUBJECT CONTENTS: Advanced refrigeration binder – Section 5
Whitman & Johnson 4th Edition
Handouts
METHODS/TECHNIQUES:
1. Take into shop and show suction hold back installed on unit and explain its functions
2. Take into shop and show crankcase pressure reg. installed on unit and explain its functions
RESOURCES: Sporlan Booklets
Whitman & Johnson 4th Edition: Handouts
EVALUATION: Written Quiz Based on Days Overview
Questions and Answers
HOMEWORK: Read handouts

DAY 6

SUBJECT: Commercial Refrigeration and Air Conditioning
GOAL: Identify and understand operations of
Heat X
Go over control settings how and why
3-way valves

OBJECTIVES: Show student and help them understand the operation and installation of:
1. Suction line heat exchange's
2. Recap controls setting how & why
3. 3-way valves

SUBJECT CONTENTS:
Advanced refrigeration binder
Shop
Sporlan June 2001 Bulletin 30-20
Handouts
Whitman & Johnson 4th Edition

METHODS/TECHNIQUES:
1. Advanced Refrigeration Binder – Section 6
2. Whitman & Johnson 4th Edition
3. Handouts
4. Shop

EVALUATION: Written Quiz Based on Days Overview
Questions and Answers

HOMEWORK: Read chapter #6 and handouts

DAY 7

SUBJECT: Commercial Refrigeration and Air Conditioning
GOAL: Identify and understand operation of
Refrigeration piping
Line sizes
Pee traps
Inverted traps
go over all days for prep for midterm

OBJECTIVES: Show student and help them understand
1. Refrigeration pipe sizing and capacity
2. When to use pee traps for oil
3. When to use inverted traps
4. Efficiency based loss

SUBJECT CONTENTS:
1. Refrigeration pipe sizing charts
2. Shop
3. Whitman & Johnson piping and size charts
4. Handouts

METHODS/TECHNIQUES:
1. Advanced refrigeration binder section 7
2. Whitman & Johnson 4th Edition
3. Handouts
4. Shop
5. Overlays

EVALUATION: Written Quiz Based on Days Overview

HOMEWORK: Read handouts and chapter 7 in binder

DAY 8

SUBJECT: Commercial Refrigeration and Air Conditioning
GOAL: Midterm test

Test student on all items up to week #7 for feed back if the information that I was teaching they understood and could project the information on to paper.

SUBJECT CONTENTS:

All subject information up to week #7

METHODS/TECHNIQUES:

Written test – 50 questions

Also piping layout, size, traps and multi evaps

EVALUATION:

Graded test based on 2 points per question and that is 50% of their mark. The other 50% of their mark came from the piping layout project.

HOMEWORK: Read Chapter #8 in binder

DAY 9

SUBJECT: Commercial Refrigeration and Air Conditioning

GOAL: PDF's

1. Start up refrigeration units in shop
2. Pump down units in shop
3. Identify different components

OBJECTIVES:

PDF's

Hands-on in shop

SUBJECT CONTENTS:

1. Start up refrigeration trainer in shop
2. Determine what gas is in system
3. Close king valves and pump system down
4. make list on different components in system

METHODS/TECHNIQUES:

1. Training refrigeration units in shop
2. Whitman & Johnson 4th Edition
3. Handouts
4. Tools

RESOURCES: Sporlan Booklets

Whitman & Johnson 4th Edition: Handouts

HOMEWORK: Review what was completed in shop

DAY 10

SUBJECT: Commercial Refrigeration and Air Conditioning

GOAL: PDF's

1. To adjust and set pressure controls
2. To adjust and set E.P.R. valves
3. To adjust and set C.P. R. valves

OBJECTIVES:

PDF's

Hands-on in shop

For student to adjust & set different types of controls and understand the control and how it works.

SUBJECT CONTENTS:

1. Start up refrigeration trainer in shop
2. Adjust controls based on temperature required
3. Adjust controls based on pressure required

METHODS/TECHNIQUES:

1. In shop (work on refrigeration training) set controls based on handouts.

EVALUATION:

Students were elected based on the tools being used and the setting that were set based on handouts.

HOMEWORK: Read Chapter 10 in Binder.

DAY 11

SUBJECT: Commercial Refrigeration and Air Conditioning

GOAL: PDF's

Work on and understand

1. Dual temp refrigeration boxes
2. Adjusting E.P.R. valves
3. Adjusting C.P.R. valves
4. Fabrication of bare tube coil
5. Pull vacuum test and start up

OBJECTIVES: PDF's
Hands-on in shop
For student to understand dual temp refrigeration boxes and control setting.
Adjustment of E.P.R. valves and C.P.R. valves fabricating of base tube coil for box temp.

METHODS/TECHNIQUES:

1. In shop refrigeration dual temp boxes and fabrication of bare tube coil and making connections to new air-cooled conditioning unit.

EVALUATION: Do student understand dual temp boxes
Do student understand adjusting of C.P.R. & E.P.R.
Design and build evap coil, sizing and box temp.

HOMEWORK: Read Chapter 11 in Binder and bare tube coil handouts.

DAY 12

SUBJECT: Commercial Refrigeration and Air Conditioning
GOAL: Does students understand all items covered in term #6 binder and hands-on workshop.

OBJECTIVES: To go over all time covered in work binder for term #6 and P.D.F. that where performed.

SUBJECT CONTENTS:

1. Start up refrigeration trainer in shop
2. Adjust controls based on temperature required
3. Adjust controls based on pressure required

METHODS/TECHNIQUES:

1. In shop
2. Whitman & Johnson 4th Edition
3. All handouts & overheads

EVALUATION: Recap all items covered to date asking question regarding different controls, pressure, settings, and shop work.

HOMEWORK: Study for Final Exam
Handouts, Whitman & Johnson 4th Edition, Refrigeration section temp & pressure charts and E.P.A. runs on recovery, reclaim, recycle.

DAY 13

SUBJECT: Commercial Refrigeration and Air Conditioning
GOAL: Did student understand all items, tools, controls, pressures, dual temp, piping, oils, covered in term #6.

OBJECTIVES: To go over items for Final Exam

SUBJECT CONTENTS:

1. Start up refrigeration trainer in shop
2. Adjust controls based on temperature required
3. Adjust controls based on pressure required

METHODS/TECHNIQUES:

1. Writing final exam

EVALUATION: Grading exams based on writing and P.D. F. including shop work (P.D.F.), homework, and class participation.

HOMEWORK: None