HRA248 Light Commercial Refrigeration Systems

I. CATALOG DESCRIPTION

Prerequisite: HRA216 and HRA225
5 semester hours credit

Light Commercial Refrigeration Systems studies the theory, application, installation, and servicing of light commercial refrigeration systems such as display cases, walk-in coolers and freezers, and ice cube makers. (S)

II. COURSE GENERAL OBJECTIVES

A. Identify common terms in refrigeration
B. Identify components of a refrigeration system
C. Describe different methods used in low ambient cooling
D. Installing and maintenance on water cooling towers
E. Identify the different types of evaporator defrosting
F. Installation and servicing commercial ice makers
G. Installation servicing and adjusting the different types of refrigerant controls
H. Installation and adjusting pressure motor controls
I. Installation of temperature motor controls
J. Identify components of refrigeration piping
K. Evacuate a refrigeration system
L. Change a refrigeration system

III. COURSE OUTLINE

A. Commercial Systems (Unit I)
B. Commercial Ice Makers (Unit II)
C. Evaporator Defrosting (Unit III)
D. Refrigerant Controls (Unit IV)
E. Motor Controls (Unit V)
F. Refrigerant Lines (Unit VI)

IV. UNIT OBJECTIVES

A. Commercial Systems (Unit I)

Upon completion of this unit the student should be able to:

1. Identify components of complete mechanical mechanism.
2. Identify commercial hermetic units.
3. Identify outdoor air cooled condensing unit.
4. Explain low ambient cooling.
5. Explain operation of the limiter valve.
6. Explain methods used in maintaining head pressure in low ambient temperatures.
7. Install high pressure switch on refrigeration system.
8. Wire control to operate condenser fan.
9. Adjust pressure control to operate condenser fan to maintain proper head pressure.
10. Install limitizer and check valve on refrigeration system.
11. Identify general types of commercial compressors.
12. Disassemble a serviceable hermetic compressor. (Copeland)
13. Reassemble serviceable hermetic compressor. (Copeland)
14. Replace valves and valve plate on a serviceable hermetic compressor.
15. Explain electric unloading mechanism.
16. Explain oil pressure unloading mechanism.
17. Identify air cooled condensers.
18. Identify the different styles of water cooled condensers.
19. Install air-cooled condensing unit.
20. Identify and explain cooling towers.
21. Explain evaporative condensers.
22. Identify and explain the function of the liquid receiver.
23. Identify and explain the function of the liquid receiver.
24. Explain frosting evaporators.
25. Explain defrosting evaporators.
27. Identify forced circulation evaporators.
28. Identify liquid cooling evaporator.
29. Install forced air evaporator.
30. Adjust control on immersed evaporator.

B. Commercial Ice Makers (Unit II)

Upon completion of this unit the student should be able to:

1. Identify ice maker mechanisms.
2. Identify different types of commercial ice makers.
3. Identify controls of a commercial ice maker.
4. Explain types of maintenance on a commercial ice maker.
5. Construct an electrical schematic diagram of a commercial ice maker.
6. Describe the necessary factors required in locating an ice maker.
7. Install a commercial ice maker.
8. Troubleshoot an ice maker on a no ice complaint.
10. Charge ice maker with correct refrigerant charge.
11. Adjust ice cube size control.
12. Check bin control for proper operation.

C. Evaporator Defrosting (Unit III)

Upon completion of this unit the student should be able to:

1. Identify the different types of evaporator defrost systems.
   a. Hot gas defrost system
   b. Non-freezing solution defrost system
   c. Water defrost system
   d. Water defrost system
   e. Electric heater defrost system
   f. Reverse cycle defrost system
   g. Warm air defrosting
2. Explain application of each type defrost system.
3. Draw an electrical schematic diagram of a hot gas defrost system using a defrost timer.
4. Wire timer control for electric defrost.
5. Set defrost time on defrost cycle.
6. Troubleshoot electric defrost system.
7. Wire timer control and solenoid valve for hot gas defrost system.

D. Refrigerant Controls (Unit IV)

Upon completion of this unit the student should be able to:

1. Identify thermostatic expansion valve.
2. Describe operation of the thermostatic expansion valve.
3. Explain external and internal equalizer valves.
4. Explain superheat in relationship to thermostatic expansion valve.
5. Explain "MSS".
6. Install thermostatic expansion valve.
7. Adjust super heat on bench.
8. Adjust super heat with valve in the system.
9. Replace TEV without losing refrigerant charge.
10. Disassemble TEV.
11. Assemble TEV.
12. Identify automatic expansion valve.
13. Describe operation of the automatic expansion valve.
15. Adjust an automatic expansion valve.
16. Identify high side float refrigerant control.
17. Describe operation of the high side float control.
18. Identify low side float refrigerant control.
19. Describe operation of the low side float control.
20. Identify capillary tube refrigerant control.
21. Describe operation of the capillary tube.
22. Install a capillary tube on a refrigeration system.
23. Identify a heat exchanger used on refrigeration lines.
24. Explain the function of a heat exchanger.
25. Install a heat exchanger on a refrigeration system.

E. Motor Controls (Unit V)

Upon completion of this unit the student should know:

1. Identify different types of motor controls.
2. Explain the application of each type.
3. Identify safety motor controls.
4. Explain the operation of the different safety motor controls.
5. Describe motor starter.
6. Identify and explain ice maker controls.
7. Identify and explain vending machine controls.
8. Describe a defrost timer.
9. Install a low pressure motor control.
10. Set the proper cut-in and cut-out for a given application.
11. Install a thermostatic motor control.
12. Set control to proper setting for a given application.
13. Install a high pressure cut-out motor safety control.
15. Install oil pressure safety control.
16. Adjust control for proper setting for a given application.
17. Install a motor starter.
18. Install a defrost timer on an electric defrost system.
19. Install a defrost timer on a hot gas defrost system.

F. Refrigerant Lines (Unit VI)

1. Identify vibration absorbers.
2. Identify a muffler.
3. Identify and describe the purpose of a sight glass.
4. Explain the function of a moisture indicator.
5. Identify liquid line filter drier.
6. Identify suction line filter drier.
7. Install refrigeration lines from condensing unit to evaporator.
8. Install vibration absorber on refrigeration lines.
9. Install sight glass with moisture.
10. Install liquid line filter drier.
11. Install suction line filter.
12. Practice safety.
13. Follow national and local codes.
14. Evacuate system.
15. Charge a refrigeration system with R-12.

V. METHOD(S) OF INSTRUCTION

VI. REQUIRED TEXTBOOK(S)


VII. REQUIRED MATERIALS (STUDENT)

A. Refrigeration Gauge Manifold Set
B. Volt Ohm Meter
C. Amprobe
D. Small Hand Tools (Used in Previous Class)

VIII. SUPPLEMENTAL REFERENCES

None
IX. METHOD OF EVALUATION

A. Distribution of the final grade:
   1. 45% - Written (classroom)
   2. 45% - Performance (lab)
   3. 10% - Attitude and attendance

B. Assignment of final letter grades:
   1. A = 92 to 100
   2. B = 83 to 91
   3. C = 70 to 82
   4. D = 60 to 69
   5. F = Below 60