



Correlation of
Modern Refrigeration and Air Conditioning, by Althouse, Turnquist, Bracciano
(Goodheart-Willcox Publisher ©2021)
to
AHRI Curriculum Guide: X. Refrigerant System Components

The following chart correlates the *Modern Refrigeration and Air Conditioning* textbook (©2021) to a section of the Curriculum Guide developed by Air-Conditioning, Heating, and Refrigeration Institute (AHRI) and used for PAHRA accreditation.

The chart lists the Curriculum Guide’s knowledge and task competency objectives and the corresponding chapter numbers from *Modern Refrigeration and Air Conditioning*.

For more information on the Partnership for Air-Conditioning, Heating, Refrigeration Accreditation (PAHRA) and related accreditation, please visit: www.pahrahvacr.org



X.A. Metering Devices	
Knowledge	Textbook Chapter(s)
1. Define types of metering devices:	
a. capillary tubes	Chapters 6, 21, 40
b. thermal expansion valve	Chapters 6, 21, 22, 23, 40, 49
c. automatic expansion valve	Chapters 6, 21
d. low side float	Chapters 6, 21
e. high side float	Chapters 6, 21
f. hand expansion valve	Chapters 6, 21
g. restrictor orifices	Chapters 6, 21, 40
h. electronic expansion valve	Chapters 6, 21, 22, 23, 49
i. solid-state expansion valve	Chapters 6, 21, 22, 23
2. Evaluate system performance when using different types of flow control devices.	Chapters 6, 21, 22, 31, 32, 33, 53, 54, 55

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X.A. Metering Devices (continued)	
Knowledge	Textbook Chapter(s)
3. Explain how to size expansion valves.	Chapters 6, 21, 22, 50, 51, 52
4. Explain how to size a thermal expansion valve.	Chapters 6, 21, 22, 50, 51, 52
5. Explain how to size an automatic expansion valve.	Chapters 6, 21, 22, 50, 51, 52
Tasks	Textbook Chapter(s)
1. Adjust and size metering devices when and where appropriate.	Chapters 21, 22, 50, 51, 52, 53, 54, 55
2. Check and adjust superheat and/or subcooling to manufacturers' specifications.	Chapters 21, 22, 50, 51, 52, 53, 54, 55
3. Install capillary tube.	Chapters 7, 8, 10, 11, 21, 50, 51, 52
X.B. Evaporators	
Knowledge	Textbook Chapter(s)
1. Explain capacities of refrigerant lines.	
a. bare-tube	Chapter 22, 49, 51
b. finned (internal and external)	Chapter 22, 49, 51
c. plate	Chapter 22, 51
d. unit coolers	Chapter 22, 51
e. chillers	Chapters 33, 34, 51
2. Determine the mean effective temperature difference (METD).	Chapter 51
Tasks	Textbook Chapter(s)
1. Adjust for proper coil air flow.	Chapters 22, 29, 30, 37, 50, 51
2. Check coil performance.	Chapters 22, 29, 30, 37, 50, 51
3. Select and size evaporator based on compressor capacities.	Chapters 22, 29, 30, 37, 50, 51
X.C. Compressors	
Knowledge	Textbook Chapter(s)
1. Identify types of compressors:	
a. hermetic	Chapter 19
b. semi-hermetic	Chapter 19
c. open type	Chapter 19
2. Identify methods of compression:	
a. centrifugal	Chapter 19
b. rotary	Chapter 19

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X.C. Compressors (continued)	
Knowledge	Textbook Chapter(s)
c. screw	Chapter 19
d. scroll	Chapter 19
e. reciprocating	Chapters 6, 19
3. Explain the methods of compression.	Chapters 6, 19
4. Explain methods of capacity control:	
a. cylinder unloading	Chapters 19, 33
b. multiple compressors	Chapters 19, 47, 49
c. hot gas bypass	Chapters 19, 22, 23, 49
d. variable speed compressors	Chapters 15, 19, 31, 32, 33, 46, 49
Tasks	Textbook Chapter(s)
1. Select the compressor based on cooling load.	Chapters 19, 37, 50, 51
2. Determine the system balance based on the selected components.	Chapters 19, 37, 50, 51
X.D. Condensers	
Knowledge	Textbook Chapter(s)
1. Define the types of condensers:	
a. air-cooled	Chapters 6, 22
b. water-cooled	Chapters 6, 22, 33
c. evaporative-cooled	Chapters 6, 22, 33
2. Determine proper air and water flow.	Chapters 22, 27, 32, 33, 51, 52, 53, 54, 55
3. Describe maintenance of a condenser and a cooling tower.	Chapters 22, 26, 32, 33, 53, 54, 55
4. Explain the operation and performance of a condenser.	Chapters 6, 22, 32, 33, 53, 54, 55
5. Explain the terms <i>range</i> and <i>approach</i> related to cooling towers.	Chapters 16, 17, 33, 55
6. Explain the purpose of heat reclaim.	Chapter 22
Tasks	Textbook Chapter(s)
1. Adjust the airflow for proper temperature difference.	Chapters 22, 27, 50, 51, 54
2. Adjust water flow for proper gallons per minute (GPM) and temperature difference.	Chapters 22, 33, 50, 51, 54
3. Size a cooling tower.	
4. Select and size an air-cooled condenser.	Chapters 27, 37, 50, 51

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X.E. Accessories	
Knowledge	Textbook Chapter(s)
1. Define the types of condensers:	
a. accumulators	Chapters 6, 20
b. crankcase heaters	Chapters 19, 20, 54
c. crankcase pressure regulating valves	Chapters 20, 23
d. defrost timers	Chapters 22, 24
e. driers/filters	Chapters 6, 23, 25, 52, 55
f. evaporator pressure regulating valves	Chapters 22, 23, 54
g. head pressure controls	Chapters 22, 23, 53, 54
h. heat exchangers	Chapters 22, 24, 38, 39, 41, 42, 46
i. hot gas bypass	Chapters 22, 23, 24, 49, 50, 51, 54
j. low pressure controls	Chapters 16, 53
k. low ambient controls	Chapter 22, 23, 53
l. mufflers	Chapter 19
m. oil separators	Chapter 20
n. receivers	Chapters 6, 11, 51, 53, 54, 55
o. solenoid valves	Chapters 14, 23, 24, 39, 40, 41, 42, 47, 49, 52, 54, 55
p. suction filters	Chapters 6, 23, 53, 54
q. unloaders	Chapters 19, 33
r. vibration eliminators	Chapters 20, 52
s. check valves	Chapters 8, 23, 40, 49, 54
t. water regulating valve	Chapters 33, 55
u. liquid sight valve-refrigerant and oil	Chapters 11, 23, 52, 53, 54
v. relief valve	Chapters 10, 11, 23, 39
2. Determine appropriate accessories for systems application.	Chapters 19, 20, 22, 23, 32, 33, 37, 49, 50, 51, 52
3. Explain the operation of the above-listed accessories (Item #1).	Chapters 6, 8, 10, 11, 14, 19, 20, 22, 23, 24, 25, 33, 38, 39, 40, 41, 42, 46, 47, 49, 50, 51, 52, 53, 54
Tasks	Textbook Chapter(s)
1. Replace a drier/filter.	Chapters 6, 7, 8, 9, 10, 11, 23, 25, 52, 53, 54, 55
2. Adjust a crankcase pressure regulating valve.	Chapters 7, 9, 10, 11, 19, 20, 52, 54, 55

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X.F. Access Valves	
Knowledge	Textbook Chapter(s)
1. Identify front and back seat valves in the:	
a. Operation and use of the suction and discharge service valves that service the compressor.	Chapters 10, 11, 23, 25, 53, 54, 55
b. Application and operation of the king valve at the outlet of the receiver.	Chapters 10, 11, 23, 25, 53, 54, 55
c. Application and operation of the queen valve where present, near the receiver.	Chapters 10, 11, 23, 25, 53, 54, 55
d. Small system high side and low side service ports.	Chapters 10, 11, 23, 25, 53, 54, 55
e. Front seating and Schrader valves, OEM and field installed.	Chapters 10, 11, 23, 25, 26, 53, 54, 55
Tasks	Textbook Chapter(s)
1. Identify Schrader Type OEM and field installed in the :	
a. Installation and use of clamp on valves	Chapters 10, 11, 25, 26
b. Installation and use of solder (in) or (on) stem valves	Chapters 7, 8, 10, 11, 25, 26
c. Use of A/C front seating/Schrader OEM service valves.	Chapters 7, 8, 10, 11, 25, 26, 53, 54, 55
d. Use of quick disconnects with Schrader-based valves.	Chapters 7, 8, 10, 11, 25, 26, 53, 54, 55