

Correlation of
Modern Refrigeration and Air Conditioning, by Althouse, Turnquist, Bracciano
(Goodheart-Willcox Publisher ©2021)
to
AHRI Curriculum Guide: IV. Tools and Equipment

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



IV.A. Hand Tools and Accessories	
Knowledge	Textbook Chapter(s)
1. Identify basic tools:	
a. adjustable wrenches	Chapter 7
b. Allen (hex) wrenches	Chapter 7
c. crimpers	Chapters 7, 8
d. diagonal cutting pliers (dikes)	Chapter 7
e. flare nut wrenches	Chapter 7
f. general-use pliers	Chapter 7
g. hack saw	Chapter 7
h. hand saw	Chapter 7
i. lineman pliers (sidecutters)	Chapter 7
j. nutdrivers	Chapter 7
k. open & box end wrenches	Chapter 7

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IV.A. Hand Tools and Accessories (continued)	
Knowledge	Textbook Chapter(s)
l. pipe wrenches	Chapter 7
m. pulley & gear pullers	Chapter 17
n. punches	Chapter 7
o. scratch awl	Chapter 7
p. sheet metal snips	Chapters 7, 29
q. socket wrenches	Chapter 7
r. torque wrenches	Chapter 7
s. various hammers	Chapter 7
t. various screwdrivers	Chapter 7
u. wire strippers	Chapter 13
v. tape measure	Chapter 7
w. solder gun	Chapters 7, 18
x. Schrader valve	Chapters 10, 11
2. Identify power tools:	
a. general-purpose drills	Chapter 7
b. hammer drill	Chapter 7
c. power screwdriver	Chapter 7
d. reciprocating saws	Chapter 7
e. screwgun	Chapter 7
3. Identify fasteners:	
a. bolts	Chapter 7
b. conduit, pipe, and cable clamps	Chapters 7, 8, 13, 31, 32, 33, 41, 42, 52
c. masonry anchors	Chapter 7
d. nails	Chapter 7
e. screws	Chapter 7
f. various electrical connectors	Chapters 7, 13, 18
g. pop rivets	Chapter 29
4. Identify pipe and tubing tools:	
a. benders	Chapters 7, 8
b. flaring tools	Chapter 8
c. pipe cutters, reamers, and threaders	Chapter 8
d. pipe vises	Chapter 8

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IV.A. Hand Tools and Accessories (continued)	
Knowledge	Textbook Chapter(s)
e. swaging tools	Chapter 8
f. tubing cutters and reamers	Chapter 8
5. Describe lubrication methods using different types of circuits:	
a. grease guns	Chapter 18
b. oilers	Chapters 18, 33
c. sprays	Chapters 3, 18, 33
Tasks	Textbook Chapter(s)
1. Show the proper use of a pipe cutter.	Chapter 8
2. Show the proper use of a threader.	Chapter 8
3. Demonstrate how to make a flared tubing joint.	Chapter 8
IV.B. Electrical Testing Devices/Meters	
Knowledge	Textbook Chapter(s)
1. Define <i>amps, volts, ohms, and watts</i> .	Chapters 12, 13
2. Measure AC current with a clamp-on meter.	Chapter 17
Tasks	Textbook Chapter(s)
1. Measure voltage with digital and analog voltmeters.	Chapter 17
2. Measure AC current with a clamp-on ammeter.	Chapter 17
3. Measure resistance with an ohmmeter.	Chapter 17
4. Check winding insulation with a megohmmeter.	Chapter 17
5. Check voltage with a voltage tester.	Chapter 17
6. Use a continuity tester to determine whether an open circuit or dead short exists.	Chapter 17
7. Use a capacitance meter to measure capacitance of run and start capacitors.	Chapter 18
8. Calculate capacitance.	Chapter 18
9. Wire and measure resistance of different types of circuits:	
a. series	Chapters 12, 17
b. parallel	Chapters 12, 17
c. unequal	Chapters 12, 17
d. series-parallel	Chapters 12, 17

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IV.C. Refrigeration: Servicing and Testing Equipment	
Tasks	Textbook Chapter(s)
1. Measure pressures with the refrigeration gauge manifold.	Chapter 10
2. Evacuate systems with a two-stage vacuum pump.	Chapter 11
3. Measure vacuums with a thermistor vacuum gauge.	Chapter 10
4. Measure temperatures with electronic thermometers.	Chapter 10
5. Measure temperatures with bimetal, thermocouple, or glass stem thermometers.	Chapter 7
6. Charge a system with a charging cylinder.	Chapter 11
7. Charge a system with an electronic charging scale.	Chapter 11
8. Check for leaks with an electronic leak detector and halide torch.	Chapter 11
9. Use nitrogen with trace of R-22 for leak detection.	Chapters 11, 52
10. Compare readings to manufacturers' specifications.	Chapters 11, 53, 54, 55
11. Determine refrigerant amount and type.	Chapters 10, 11
12. Charge a system to manufacturers' specifications.	Chapters 11, 52
IV.D. Heating: Servicing and Testing Equipment	
Tasks	Textbook Chapter(s)
1. Measure chimney draft with a gauge:	
a. Measure draft over fire	Chapter 42
b. Measure draft at the chimney breaching	Chapter 42
2. Perform an efficiency test on an oil-gas burner:	
a. smoke test	Chapter 42
b. CO ₂ test	Chapter 42
c. O ₂ test	Chapter 42
d. check draft	Chapter 42
e. check stack temperature	Chapter 42
3. Determine effectiveness of an oil pump using:	
a. vacuum gauge	Chapter 42
b. pressure gauge	Chapter 42
4. Determine relative humidity using a sling psychrometer:	
a. Find the relative humidity and dew point using a psychrometric chart	Chapter 27

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IV.D. Heating: Servicing and Testing Equipment (continued)	
Tasks	Textbook Chapter(s)
5. Measure gas pressure with the following equipment:	
a. U-tube manometer	Chapters 7, 41
b. pressure gauge	Chapters 7, 41
6. Calculate proper size of chimney for both 80 and 90+ furnaces.	Chapter 41
7. Determine what to do with an “orphaned” water heater.	
8. Check wall thermostat and anticipator:	
a. cooling system (fan on-automatic)	Chapters 16, 18, 36
b. heating system (fan on-automatic)	Chapters 16, 18, 36
9. Check electronic pilot system.	Chapters 16, 18, 41
10. Check and adjust blower system.	Chapters 7, 16, 18, 29, 30, 38, 42
11. Check and adjust fan control.	Chapters 16, 18, 29, 30, 38
12. Check limit and safety controls.	Chapters 7, 16, 18, 38, 39, 40, 41, 42, 43
IV.E. Airflow: Measuring and Testing Equipment	
Tasks	Textbook Chapter(s)
1. Determine air velocity within a duct via:	
a. pitot tube	Chapters 7, 27, 29, 30
b. inclined manometer	Chapters 7, 27, 29, 30
c. electronic manometer	Chapters 7, 27, 29, 30
d. U-tube manometer	Chapters 7, 27, 29, 30
2. Determine air velocity at grilles and diffusers via:	
a. deflecting vane anemometer	Chapters 7, 27, 29, 30
b. velometer	Chapters 7, 27, 29, 30
c. hot wire anemometer	Chapters 7, 27, 29, 30
d. pitot tube	Chapters 7, 27, 29, 30
e. rotating vane anemometer	Chapters 7, 27, 29, 30
3. Measure pressure drop with a magnehelic gauge.	Chapters 7, 27, 29, 30
4. Determine cubic feet per minute (CFM).	Chapters 27, 29, 30, 37
5. Use manufacturers’ airflow data sheet.	Chapter 29
6. Solve problems using friction loss chart.	Chapters 29, 30