

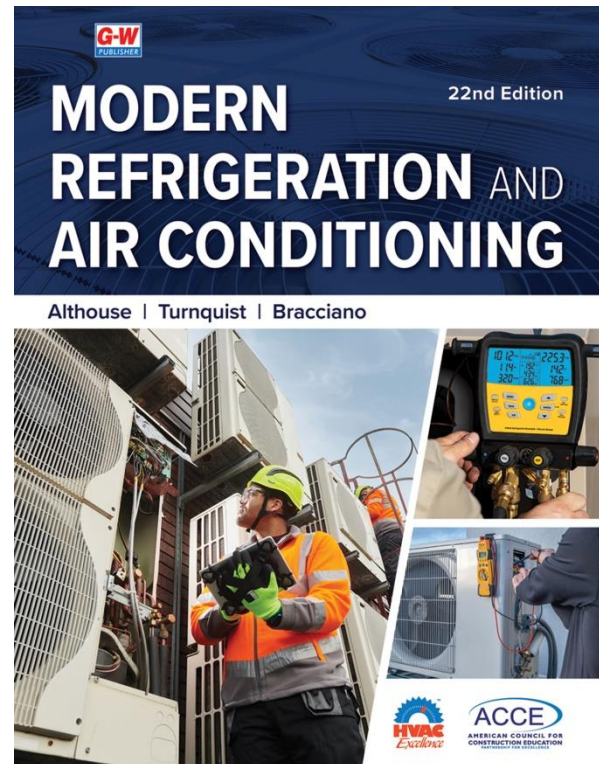


*Correlation of*  
**Modern Refrigeration and Air Conditioning**, by Althouse, Turnquist, Bracciano  
 (Goodheart-Willcox Publisher ©2025)  
 to  
**HVAC Excellence Competencies Task List: System Performance**

The following chart correlates the *Modern Refrigeration and Air Conditioning* textbook (©2025) to an area of the HVAC Excellence Competencies Task List.

The chart lists individual competency and task standards, and the corresponding chapter numbers from *Modern Refrigeration and Air Conditioning*.

For more information on HVAC Excellence and related certifications, please visit:  
[www.hvacexcellence.org](http://www.hvacexcellence.org).



Competency / Task	Textbook Chapters
<b>Students must have knowledge of and be able to demonstrate proficiency in airflow:</b>	
Demonstrate the ability to calculate the velocity of the air entering a return air filter grille using an anemometer	Chapter 28
Demonstrate the ability to calculate the velocity of the air leaving a supply grille using an anemometer	Chapter 28
Demonstrate the ability to determine adequate air flow for cooling system capacity	Chapters 28, 30
Demonstrate the ability to determine adequate air flow is for heating system capacity	Chapters 28, 30

**Correlation of *Modern Refrigeration and Air Conditioning, 22e* to  
HVAC Excellence Competencies Task List: System Performance—page 2**

Competency / Task	Textbook Chapters
Develop critical thinking skills including analysis, evaluation, calculations, and possible use of computer technology	Chapters 30, 31
Gain knowledge of factors which effect airflow such as velocity, square feet, static pressure, and blower horsepower	Chapters 28, 31
Identify different airflow measuring tools and understand their use	Chapters 4, 28
Learn the properties of air used to calculate the sensible heat factor	Chapters 6, 28
Understand how the sensible heat factor is calculated and used in the sensible heat formula	Chapter 28, 32
<b>Students must have knowledge of and be able to demonstrate proficiency in critical charging:</b>	
Calculate liquid and suction line sizes	Chapters 49, 52
Calculate system total refrigerant charge	Chapters 12, 48
Check indoor temperature split and determine net cooling capacity	Chapters 12, 25, 52
Explain and demonstrate how to charge blended refrigerants	Chapters 10, 12, 48
Explain and demonstrate how to properly evacuate and dehydrate a system	Chapter 12
Identify and demonstrate the use of manufacturer’s charging charts	Chapter 12, Appendices
Identify and demonstrate the use of subcooling charging method	Chapters 12, 48
Identify and demonstrate the use of system superheat charging method	Chapters 12, 48
Identify and demonstrate the use of weigh-in charging method	Chapters 11, 12
Identify the different leak detection methods	Chapter 11
Knowledge of preliminary required checks and troubleshooting for system charging	Chapters 12, 18, 23, 48
Describe the operation and use of a wireless probe set and smart diagnostic application	Chapters 11, 23
Understand the relationship of evaporator temperature split and indoor relative humidity	Chapters 25, 28
<b>Students must have knowledge of and be able to demonstrate proficiency in psychrometrics:</b>	

**Correlation of *Modern Refrigeration and Air Conditioning, 22e* to  
HVAC Excellence Competencies Task List: System Performance—page 3**

Competency / Task	Textbook Chapters
Calculate mixed air problems infiltration and ventilation	Chapter 28
Define and use the process triangle, sensible heat, latent heat and total heat formulas	Chapters 6, 28, 51
Define psychrometric fundamentals	Chapter 28
Demonstrate the ability to plot any two basic points on the psychrometric chart and evaluate the data	Chapters 22, 28
Develop critical thinking skills including analysis, evaluation, calculations, and the use of computer technology	Chapters 28, 51
Explain sensible heat ratio	Chapter 28
Explain the water vapor cycle in the earth's atmosphere	Chapter 28
Identify what property each line on a psychrometric chart represents	Chapters 6, 28
Understand standard air volume and density	Chapters 28, 30, 34
Understand the comfort zone and the effect different temperatures and relative humidity has on human comfort	Chapters 25, 28
Understand the eight processes of air conditioning and how to plot each	Chapters 22, 28
Understand how the sensible heat factor is calculated and used in the sensible heat formula	Chapters 28, 51
Understand the thermodynamics of air and water vapor	Chapters 6, 28, 51
<b>Students must have knowledge of and be able to demonstrate proficiency in combustion:</b>	
Calculate orifice deration based on elevation	Chapters 9, 33
Define and explain temperature rise and the temperature rise testing procedure	Chapters 7, 17
Define and explain the different methods of calculating cfm of airflow based on temperature rise	Chapters 28, 30
Define basic combustion and gain knowledge of fuels used in the process	Chapter 33
Describe and explain manifold gas pressure testing and adjustment to verify and achieve manufacturer's maximum rated efficiency	Chapter 33
Describe and identify the combustion testing procedure, probe insertion depth, probe hole locations and hole sealing methods	Chapter 34
Explain the benefit of timing a gas meter to calculate the total Btu input to the appliance	—

**Correlation of *Modern Refrigeration and Air Conditioning, 22e* to  
HVAC Excellence Competencies Task List: System Performance—page 4**

Competency / Task	Textbook Chapters
Explain the efficiency difference between mid and high efficiency furnaces	Chapter 33
Increase student knowledge of draft, and the interactions of draft and combustion	Chapters 33, 34
<b>Students must have knowledge of and be able to demonstrate proficiency in electrification:</b>	
Understand and utilize the stoichiometric chart to analyze the combustion process, to improve efficiency and optimize performance	Chapter 33
Describe the differences between high efficiency and standard efficiency air conditioning and heat pump systems	Chapter 40
Evaluate and calculate the operating cost savings of different heating and cooling systems	Chapters 26, 40
Explain differences in operation and comfort between heat pumps and fossil fuel heating systems	Chapters 39, 40
Describing low temperature or cold climate heat pump performance at different outdoor temperatures	Chapter 36
Describe dual fuel heat pump systems	Chapter 36
Explain different approaches for sizing heat pumps: sizing for cooling, partial heating, full heating	Chapters 36, 37
Explain how different climates and outdoor temperature levels affect the approach for sizing heat pumps	Chapters 36, 37
Identify and evaluate suitable heat pump equipment choices for a specified location	Chapters 36, 37
Determine if ductwork is properly insulated to prevent condensation if replacing a ducted fossil fuel heating system with a ducted heat pump	Chapters 30, 40
Understand how customer's goals and limitations can affect HVAC equipment selection	Chapters 3, 40
Assessing an electrical panel to determine if the building's electrical capacity can account for a heat pump's load	Chapters 18, 28, 36