

### Evaporator Condenser Ratings

An evaporator condenser rated at a condensing temperature of 100°F and a wet bulb temperature of 70°F will have rating factors under other conditions as follows:

Condenser Temp. °F	Entering Air Wet Bulb Temp. °F					
	55°	60°	65°	70°	75°	78°
90	0.98	0.88	0.75	0.58	0.32	0.43
95	1.00	1.00	0.91	0.80	0.67	0.59
100	1.02	1.02	1.11	1.00	0.87	0.79
105	1.05	1.05	1.31	1.20	1.08	1.00
110	1.15	1.02	1.52	1.41	1.29	1.22
115	1.39	1.35	1.75	1.65	1.54	1.47
120	2.20	2.33	2.60	2.98	3.31	3.75

### Compressor Capacity vs Refrigerant

Refrigerant Temp. °F	Heat Rejection Ratio (40)	Capacity % Based on:			
		50°F	40°F	30°F	20°F
50	1.36	100			
40	1.38	93	100		
30	1.41	89	93	100	
20	1.45	86	87	100	
10	1.50	85	84	90	
0	1.45	86	85	84	100
-10	1.53	78	84	80	78
-20	1.64	73	76	76	61
-30	1.77	65	68	67	47
-40	1.92	50	52	58	28

†† For sealed compressors.

The capacity of a typical compressor is reduced as the evaporating temperature is reduced because of increased specific volume (cu ft/lb) of the refrigerant and lower compressor volumetric efficiency. The average 1 hp compressor will have a capacity of nearly 12,000-btu/hr per ton, at 40°F refrigerant temperature, 100°F condensing temperature. A 10° rise/fall in condensing temperature will reduce/increase capacity about 6%.

### Proper System Charging

#### Subcooling Charging Method - TXV (Expansion Valve)

Subcooling is defined as: The temperature of a liquid refrigerant when it is cooled below its condensing temperature. Subcooling takes place in the condenser and is determined by subtracting the liquid line temperature (as read on a thermometer strapped on the liquid line) from the saturation temperature (gauge temperature - the temperature that corresponds to the pressure read on the high side of the gauge).

- Locate the unit required subcooling from the name plate or product literature. (Typically 8-12°F).
- Measure liquid line temperature - convert to pressure.
- Subtract the required subcooling (1) from the converted temperature (2). This is the required liquid line temperature.
- Measure the liquid line temperature. If the measured temperature does not equal the required liquid line temperature:
  - Add refrigerant to lower the temperature.
  - Remove refrigerant to raise the temperature.
  - Allow a tolerance of +/- 3°F.

#### Superheat Charging Chart - Cooling - Non TXV (Expansion Valve)

Superheat is defined as: The temperature of vapor refrigerant above its saturation point (evaporation) temperature. Superheat occurs in the evaporator and is determined by subtracting the saturation temperature (the temperature that corresponds to the pressure read on the low-side gauge) from the suction line temperature (as read on a thermometer strapped on the suction line).

### Cooling Tower Ratings

Temperatures °F			
Hot Water	Cold Water	Wet Bulb	Capacity Factor
90	60	70	0.85
92	62	70	1.00
95	65	70	1.24
98	68	72	0.74
92	62	72	0.88
95	65	72	1.12
98	68	74	1.00
95	65	76	0.88
98	68	78	0.75
98	68	80	0.63

Hot water - Cold Water = Range

Cold Water - Hot Water = Approach

The Capacity factor is a multiplier by which the capacity at any common assumed condition may be found if the rating at some other point is known. Factors are based on heat rejection ratio of 1.25 (15,000 btu/hr per ton) and gpm/ton flow rate.

Example: at 95-85-80, the capacity is 0.63/0.85 or 0.75 that of the rating of 90-80-70.

Capacity is reduced as the flow rate per ton is increased. If the refrigerant temperature is below 40°F, the heat rejection will be greater than 15,000 btu/hr per ton. Evaporation will cause increasing deposits of solids and fouling of the condenser tubes unless water is bled off. A bleed of 1% of the circulation rate will result in concentrations of twice the original solids (two concentrations), and 0.5% bleed will result in three concentrations.

### Horsepower Per Ton

At 100°F condensing temperature vapor enters the compressor at 65°F

Refrig. Temp. °F	40	20	0	-20	-40
Practical Avg.	0.87	1.20	1.70	2.40	3.20

Required Superheat Condenser Entering Air - Dry Bulb												
Indoor Air - Wet Bulb	°F	55	60	65	70	75	80	85	90	95	100	105
	50	9	7	6	5	4	3	2	2	2	2	2
	52	12	10	8	6	5	4	3	2	2	2	2
	54	14	12	10	7	6	5	4	3	2	2	2
	56	17	15	12	10	8	6	5	4	3	2	2
	58	20	18	15	13	9	7	6	5	4	3	2
	60	23	21	19	16	12	9	8	6	5	4	3
	62	26	24	21	19	15	12	9	7	6	5	4
	64	29	27	24	21	18	15	12	9	8	6	5
	66	32	30	27	24	21	18	15	12	10	8	6
	68	35	33	30	27	24	21	19	16	14	12	9
	70	37	35	33	30	28	25	22	20	18	15	13
	72	40	38	36	33	31	28	26	24	22	20	17
	74	42	40	38	36	34	31	30	27	25	23	22
	76	45	43	41	39	37	35	33	31	29	27	26

- Measure the outdoor air (dry bulb) temperature, and indoor wet bulb temperature.
- Find the required superheat from the chart.
- Measure the suction line pressure - convert pressure to temperature.
- Add the required superheat (2) to the converted temperature (3). This is the required suction line temperature.
- Measure the suction line temperature. If the suction line temperature does not equal the required suction line temperature (4):
  - Add refrigerant to lower the suction line temperature.
  - Remove refrigerant to raise the suction line temperature.
  - Allow a tolerance of +/- 3°F.

# Hvac Quick Reference Guide

**Charles Nehme**



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**HVAC/R Terminology: A Quick Reference Guide** Richard Wirz, 2009-04-01 This one of a kind HVAC R technical reference guide incorporates all the HVAC R technical terms used in the industry today and is an indispensable resource for professionals dealing with electricity controls refrigeration cycle heating psychometrics boilers heat pumps heat transfer load calculations and more Covers the entire industry providing the most comprehensive collection of HVAC R terms available in one concise location For those just starting in and seasoned veterans of the HVAC R industry The 71 pages of appendices include common industry association abbreviations business computer and medical terminology area of circles color codes for resistors CFM tables decibel ratings hazardous time exposure of common noises duct sizing conversion charts and much much more

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**HVAC Formulas and Equations** Builder's Book Inc., 2007-04-16      ***The Complete Guide to HVAC Troubleshooting: A Homeowners Manual*** Tim David, 2023-12-29 The Complete Guide to HVAC Troubleshooting is a definitive resource for homeowners and aspiring technicians alike offering in depth insights and practical advice on diagnosing and resolving a wide range of heating ventilation and air conditioning issues This book serves as an indispensable tool for anyone looking to understand maintain and repair their HVAC systems efficiently and effectively Structured to cater to both beginners and those with more technical experience the guide begins by introducing the fundamentals of HVAC systems It outlines the core components how they operate and the common types of HVAC systems found in homes and buildings This foundational knowledge sets the stage for more complex topics ensuring all readers are up to speed Central to the book is a comprehensive troubleshooting section detailing step by step methods to diagnose common and not so common problems From strange noises and inconsistent temperatures to complete system failures the guide provides clear concise instructions to identify issues and implement solutions It covers a range of scenarios including quick fixes that can be handled without professional help and more complex problems requiring expert intervention The guide goes beyond simple fixes delving into the nitty gritty of HVAC maintenance performance optimization and longevity It discusses preventive measures routine maintenance schedules and the signs that indicate a need for repair or replacement Additionally the book offers valuable tips on selecting the right tools safety precautions and understanding when to call in a professional With *The Complete Guide to HVAC Troubleshooting* readers will gain the confidence to tackle various

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*HVAC Repair Secrets* Tim David,2023-11-01 HVAC Repair Secrets will examine practical aspects such as routine maintenance diagnosing problems effectively managing thermostats and various repair techniques By the end of this book you will possess the confidence and expertise to become a proficient HVAC enthusiast ensuring your system stays in top shape

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Index of USACERL Publications, October 1984 - September 1992, 1992 **Contractor's Index to the 1997 Uniform Building Code, Vol. 1** Jack M. Hageman,1998

A common sense index to help you quickly find what you need in Volume 1 of the UBC Topics are listed under names you use in construction Guaranteed to help you save time looking for what you need in the Code

*Federal Buildings Supplemental Survey 1993*, 1995 The Energy Information Administration EIA of the US Department of Energy DOE is mandated by

Congress to be the agency that collects analyzes and disseminates impartial comprehensive data about energy including the volume consumed its customers and the purposes for which it is used The Federal Buildings Supplemental Survey FBSS was conducted by EIA in conjunction with DOE s Office of Federal Energy Management Programs OFEMP to gain a better understanding of how Federal buildings use energy This report presents the data from 881 completed telephone interviews with Federal buildings in three Federal regions These buildings were systematically selected using OFEMP s specifications

therefore these data do not statistically represent all Federal buildings in the country The purpose of the FBSS was threefold 1 to understand the characteristics of Federal buildings and their energy use 2 to provide a baseline in these three Federal regions to measure future energy use in Federal buildings as required in EPCACT and 3 to compare building characteristics and energy use with the data collected in the CBECS [InfoWorld](#) ,1984-09-24 InfoWorld is targeted to Senior IT professionals Content is segmented into Channels and Topic Centers InfoWorld also celebrates people companies and projects **Heating, Cooling, Lighting** Norbert M. Lechner,Patricia Andrasik,2021-10-26 The essential guide to environmental control systems in building design For over 25 years Heating Cooling Lighting Sustainable Design Strategies Towards Net Zero Architecture has provided architects and design professionals the knowledge and tools required to design a sustainable built environment at the schematic design stage This Fifth Edition offers cutting edge research in the field of sustainable architecture and design and has been completely restructured based on net zero design strategies Reflecting the latest developments in codes standards and rating systems for energy efficiency Heating Cooling Lighting Sustainable Design Strategies Towards Net Zero Architecture includes three new chapters Retrofits Best practices for efficient energy optimization in existing buildings Integrated Design Strategies for synergizing passive and active design Design Tools How to utilize the best tools to benchmark a building s sustainability and net zero potential Heating Cooling Lighting Sustainable Design Strategies Towards Net Zero Architecture is a go to resource for practicing professionals and students in the fields of environmental systems technology or design environmental design systems construction technology and sustainability technology

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### **Table of Contents Hvac Quick Reference Guide**

1. Understanding the eBook Hvac Quick Reference Guide
  - The Rise of Digital Reading Hvac Quick Reference Guide
  - Advantages of eBooks Over Traditional Books
2. Identifying Hvac Quick Reference Guide
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Hvac Quick Reference Guide
  - User-Friendly Interface
4. Exploring eBook Recommendations from Hvac Quick Reference Guide
  - Personalized Recommendations
  - Hvac Quick Reference Guide User Reviews and Ratings

- Hvac Quick Reference Guide and Bestseller Lists
- 5. Accessing Hvac Quick Reference Guide Free and Paid eBooks
  - Hvac Quick Reference Guide Public Domain eBooks
  - Hvac Quick Reference Guide eBook Subscription Services
  - Hvac Quick Reference Guide Budget-Friendly Options
- 6. Navigating Hvac Quick Reference Guide eBook Formats
  - ePub, PDF, MOBI, and More
  - Hvac Quick Reference Guide Compatibility with Devices
  - Hvac Quick Reference Guide Enhanced eBook Features
- 7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Hvac Quick Reference Guide
  - Highlighting and Note-Taking Hvac Quick Reference Guide
  - Interactive Elements Hvac Quick Reference Guide
- 8. Staying Engaged with Hvac Quick Reference Guide
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Hvac Quick Reference Guide
- 9. Balancing eBooks and Physical Books Hvac Quick Reference Guide
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Hvac Quick Reference Guide
- 10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
- 11. Cultivating a Reading Routine Hvac Quick Reference Guide
  - Setting Reading Goals Hvac Quick Reference Guide
  - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Hvac Quick Reference Guide
  - Fact-Checking eBook Content of Hvac Quick Reference Guide
  - Distinguishing Credible Sources

13. Promoting Lifelong Learning
  - Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
14. Embracing eBook Trends
  - Integration of Multimedia Elements
  - Interactive and Gamified eBooks

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