

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	1.16	1.05	1.08	1.00
110	1.10	1.02	1.15	1.11	1.19	1.12
115	1.09	1.05	1.15	1.15	1.24	1.17
120	1.20	1.13	1.03	1.09	1.21	1.15

Compressor Capacity vs Refrigerant

Refrigerant Temp. °F	Heat Rejection Ratio (40)	Capacity % Based on:			
		50°F	40°F	30°F	20°F
50	1.16	100			
40	1.18	93	100		
30	1.21	89	93	100	
20	1.25	86	87	100	
10	1.30	45	54	80	
0	1.45	38	43	64	100
-10	1.53	38	34	50	78
-20	1.64	23	26	38	61
-30	1.77	15	18	27	42
-40	1.92	10	12	18	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%.

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

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).

Required Superheat Condenser Entering Air - Dry Bulb

Indoor Air - Wet Bulb	°F															
	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130
50	9	7	6	5	4	3	2	1	0	0	0	0	0	0	0	0
52	12	10	8	6	5	4	3	2	1	0	0	0	0	0	0	0
54	14	12	10	7	6	5	4	3	2	1	0	0	0	0	0	0
56	17	15	12	10	8	6	5	4	3	2	1	0	0	0	0	0
58	19	18	15	13	10	8	6	5	4	3	2	1	0	0	0	0
60	22	20	18	16	13	10	8	6	5	4	3	2	1	0	0	0
62	25	24	21	19	15	12	10	8	6	5	4	3	2	1	0	0
64	29	27	24	21	18	15	13	10	8	6	5	4	3	2	1	0
66	32	30	27	24	21	18	15	13	10	8	6	5	4	3	2	1
68	35	33	30	27	24	21	19	16	14	12	10	8	6	5	4	3
70	37	35	33	30	28	25	22	20	18	15	13	11	9	8	6	5
72	40	38	36	33	31	28	26	24	22	20	17	15	13	11	9	8
74	42	40	38	36	34	31	30	27	25	23	21	19	17	15	13	11
76	45	43	41	39	37	35	33	31	29	27	25	23	21	19	17	15

- 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

RJ Shavelson



Hvac Quick Reference Guide:

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

The HVAC Pro's Playbook: A Handy Guide to Systems and Solutions Charles Nehme, The world of HVAC is a complex ever evolving field critical to modern comfort safety and energy efficiency This HVAC Handy Cookbook is designed as a practical and accessible reference guide distilling decades of industry knowledge into a single easy to use resource Whether you are an experienced professional a student or a facility manager this book serves as a quick reference tool for the most commonly encountered HVAC components maintenance tasks calculations and problem solving scenarios The goal is to provide concise actionable information that helps you maintain optimal performance in any built environment

HVAC/R Terminology Richard Wirtz, 2006-01-01 **HVAC Formulas and Equations** Builder's Book Inc., 2007-04-16 *Data Center HVAC Quick Guide: Cooling & Energy Efficiency, Toolkit* Charles Nehme, In the high stakes world of data centers the saying uptime is everything rings true But what ensures that critical uptime It s not just the servers and software it s the often overlooked and energy hungry HVAC systems that keep them from overheating As a professional who has spent three decades consulting on complex building systems around the globe I ve seen firsthand how a well designed and efficiently managed cooling system is the backbone of a reliable data center This book is a practical no nonsense guide designed to demystify data center cooling It cuts through the academic theory to provide you with a hands on toolkit for success We ll cover everything from the fundamental principles of airflow and heat transfer to practical real world strategies like hot cold aisle containment free cooling and rapid troubleshooting My goal is to equip you with the knowledge to not only maintain a stable environment but to also significantly improve energy efficiency and reduce operational costs This guide is your shortcut to mastering the essentials and building a resilient sustainable and cost effective data center

Quick Reference to Building & MEP Codes: Compliance Made Simple, Toolkit Charles Nehme, Navigating the complex world of building and MEP Mechanical Electrical and Plumbing codes can be daunting For professionals and students alike the sheer volume of information across various codes such as the International Building Code IBC International Mechanical Code IMC and National Electrical Code NEC can feel overwhelming The process of ensuring a project is compliant can be time consuming and prone to costly errors This book Quick Reference to Building MEP Codes

Compliance Made Simple Toolkit was created to be your essential guide and on the go resource. It is designed to cut through the jargon and provide clear concise summaries of the most critical codes and standards. We've organized the information into practical chapters complete with easy to read tables, flowcharts, checklists, and decision guides. Our goal is not to replace the official code books but to serve as a fast track tool that helps you quickly find the information you need, understand common pitfalls, and confidently ensure your projects meet compliance. Whether you're in the office, on site, or in the classroom, this toolkit is meant to simplify the complex and help you achieve compliance with confidence.

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 HVAC issues head-on, ensuring their systems run smoothly and efficiently all year round. This book is more than just a troubleshooting manual; it's a comprehensive reference for anyone committed to understanding and caring for their HVAC system. Get ready to turn the page and take control of your home's comfort and air quality.

HVAC Procedures and Forms Manual Herbert Wendes, 2002

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procedures for achieving thorough systematic and accurate problem solving troubleshooting and decision making in building systems management and contracting **Audel HVAC Pocket Reference** James E. Brumbaugh, 2005-08-19 Answers when you need them When you need to check specs confirm measurements or make a quick metric conversion on the job find the answers quickly and easily right in your pocket Your one stop reference for Conversion tables electrical formulas pipe thread standards and motor ampere ratings Fuel cost comparisons Offset calculations and valve details Gas and oil burner specifications Pipe performance data Weather and design factors affecting heating cooling calculations Troubleshooting guidelines **HVAC Procedures & Forms Manual, Second Edition** Wendes, 2020-12-22 Developed over the course of many years of on the job projects involving HVAC energy auditing testing balancing and cost estimating and refined through feedback from thousands of engineers and technicians who have used them the forms contained in this manual are concise comprehensive and optimally organized for easy reference Complete sets of forms are provided for all aspects of testing and balancing energy auditing indoor quality diagnosis and load calculations The first edition entitled HVAC Energy Audit Balancing Forms Manual compiled these time saving forms for the first time in a single reference This enhanced second edition adds a new chapter on technical management providing procedures for achieving thorough systematic and accurate problem solving troubleshooting and decision making in building systems management and contracting

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