

# HVAC Air / Refrigerant Diagnostic Quick Sheet



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Fixed Metering	Suction Pressure	Head Pressure	Super Heat	Subcool	Comp. Amps	ΔT
Low Charge	↓	↓	↑	↓	↓	↓
Over Charge	↑	↑	↓	↑	↑	↓
Low Indoor Airflow/Low R/R Temp	↓	↓	↓	↓	↓	↑
Dirty Condenser	↑	↑	↓	↓	↑	↓
Liquid Line Restriction*	↓	↓	↑	↑	↓	↓
Oversized Piston	↑	↓	↓	↓	↓	None
High R/R Temp	↑	↑	↑	↓	↑	↓

TXV System	Suction Pressure	Head Pressure	Super Heat	Subcool	Comp. Amps	ΔT
Liquid Line Restriction*	↓	↓	↑	↑	↓	↓
Overfeed / Loose Bulb Bulb Insulated	↑	↓	↓	↓	↓	↓
Low Charge - Slightly	None	↓	None	↓	↓	None
Over Charge - Slightly	None	↑	None	↑	↑	None
Low Indoor Airflow/Low R/R Temp	↓	↓	↓	↓	↓	↑

\*Restrictor effect on head pressure varies with the wet bulb of the condenser. Lower wetbulb generally increases the amount of restriction to charge is correct. Restrictions may also high head and subcooling, or no subcool with very small condenser or air restricted flow over evaporator in addition to the restriction. In general, restrictions are in the liquid line and affect it in the head and subcooling of the line.

WB	Enthalpy
40	15.20
41	15.25
42	15.31
43	15.38
44	15.45
45	15.52
46	15.60
47	15.68
48	15.77
49	15.86
50	15.96
51	16.06
52	16.17
53	16.28
54	16.40
55	16.52
56	16.65
57	16.78
58	16.92
59	17.06
60	17.21
61	17.36
62	17.52
63	17.68
64	17.85
65	18.02
66	18.20
67	18.38
68	18.57
69	18.76
70	18.96
71	19.16
72	19.37
73	19.58
74	19.80
75	20.02
76	20.25
77	20.48
78	20.72
79	20.96
80	21.21

### Electric Heat

$$CFM = \frac{\text{Volts} \times \text{Amps} \times 3.412}{\Delta T \times 1.08}$$

### OR Furnace

$$CFM = \frac{BTU/\text{hour} \times \text{Measured} \Delta T}{\Delta T \times 1.08}$$

- 400 CFM per ton of cooling (Nominal)
- 12,000 BTU per ton of cooling
- BTU sensible Output = CFM x TD x 1.08
- 1 Watt = 3.412 BTU/h
- 1 Kilowatt = 3,412 BTU/h
- 746 Watts = 1 Horsepower

### Checking a Gas Meter

$$\text{Input} = \frac{3600 \times \text{Smallest dial size}}{\text{Ccu Ft} \times \# \text{ of seconds for one revolution}}$$

### Testing Capacitors Under Load

$$\frac{2652 \times (\text{steps of the meter winding})}{1} \text{ (Volts across the capacitor)}$$

- Total Heat = (R1 - R2) x 4.5 x CFM
- R1 = Return air wet bulb (converted to enthalpy)
- R2 = Supply air wet bulb (converted to enthalpy)

### Estimated Evaporator TD

- AC at 400 CFM/Ton = 20°
- Refrigeration Walk in 10°
- Refrigeration Reach in 20°

### Gas Appliance Draft Pressure

Natural Gas 0.5" w.c. / LP = 0.75"

### CTDA

- Estimated Condensing Temp Over Ambient
- 6-9 SEER = 30°
- 10-12 SEER = 20°
- 13-15 SEER = 20°
- 16+ SEER = 10°

# Hvac Troubleshooting Guide Refrigeration

**Eric Kleinert**



## **Hvac Troubleshooting Guide Refrigeration:**

HVAC Troubleshooting Guide Rex Miller, 2009-02-10 A Practical On the Job HVAC Guide Applicable to residential commercial and industrial jobs this essential handbook puts a wealth of real world information at your fingertips HVAC Troubleshooting Guide shows you how to read interpret and prepare schedules mechanical plans and electrical schematics This handy resource will aid you in your everyday tasks and keep you up to date with the latest facts figures and devices The book includes numerous illustrations tables and charts troubleshooting tips safety precautions resource directories and a glossary of terms HVAC Troubleshooting Guide helps you Identify and safely use tools and equipment both new and old Use heat pumps and hot air furnaces Calculate ventilation requirements Work with refrigeration equipment and the new refrigerants Utilize control devices including solenoids and relays Operate select and repair electric motors Work with condensers compressors and evaporators Monitor the flow of refrigerant with valves tubing and filters Comply with the Section 608 refrigerant recycling rule Program thermostats Insulate with batts sheet tubing covers and foam Work with solid state controls Understand electrical and electronic symbols used in schematics

**Air conditioning and Refrigeration Repair Made Easy** Hooman Gohari, 2009-10-19 This comprehensive book has been developed to quickly train an average person for the vast commercial and residential refrigeration and air conditioning market within a short period of time It provides all the technical knowledge needed to start a successful refrigeration and air conditioning business anywhere in the world

**Air Conditioning and Refrigeration Troubleshooting Handbook** Billy C. Langley, 1980 A complete practical overview of the servicing and troubleshooting of cooling equipment Provides detailed explanations of the purpose of each cooling system component Covers the common problems encountered during troubleshooting Troubleshooting charts provide readers with practical information and are a handy reference Numerous writing diagrams illustrate the book Suggested procedures for repairs are listed

**Air Conditioning Maintenance and Troubleshooting: A Comprehensive Guide to Efficient and Safe HVAC Care** Charles Nehme, The importance of air conditioning in our daily lives cannot be overstated From the comfort of our homes to the productivity of our workplaces air conditioning systems play a critical role in maintaining an optimal environment However like all mechanical systems air conditioners require regular maintenance and occasional troubleshooting to function efficiently and prolong their lifespan This book Air Conditioning Maintenance and Troubleshooting Guide aims to serve as a comprehensive resource for homeowners technicians and HVAC professionals alike Whether you are a novice looking to understand the basics of your home air conditioning system or a seasoned technician seeking advanced troubleshooting tips this guide is designed to meet your needs Why This Guide Air conditioning systems are complex and involve various components including compressors evaporators condensers and various electrical parts Proper maintenance can prevent many common issues and save on costly repairs This guide covers the essential aspects of air conditioning maintenance providing step by step instructions and detailed explanations to ensure your system runs

smoothly Key Features Comprehensive Maintenance Tips Learn about the routine tasks necessary to keep your air conditioning system in top condition from cleaning filters to checking refrigerant levels Troubleshooting Techniques Diagnose and resolve common problems with clear practical solutions This section includes troubleshooting flowcharts and checklists to simplify the process Safety Precautions Understand the safety measures you need to take while working with air conditioning systems to prevent accidents and injuries Technical Insights Gain deeper knowledge of the components and workings of different types of air conditioning systems including central air conditioners split systems and window units Environmental Considerations Learn about the environmental impact of air conditioning systems and how to adopt practices that are both efficient and eco friendly Who Should Read This Book Homeowners Equip yourself with the knowledge to maintain your home air conditioning system identify problems early and possibly avoid expensive service calls HVAC Students Use this guide as a supplementary resource to enhance your understanding of air conditioning systems and prepare for a career in HVAC maintenance and repair Professional Technicians Update your skills with the latest maintenance and troubleshooting techniques and use this book as a quick reference on the job Acknowledgments This book would not have been possible without the valuable input and feedback from HVAC professionals and industry experts who have generously shared their knowledge and experience I am also grateful to the publishers and technical reviewers whose efforts have ensured the accuracy and clarity of this guide Conclusion Maintaining and troubleshooting air conditioning systems can seem daunting but with the right knowledge and tools it becomes manageable and rewarding This guide is intended to empower you with the confidence and skills necessary to keep your air conditioning system running efficiently and reliably Thank you for choosing this guide I hope it serves as a valuable resource and enhances your understanding and enjoyment of air conditioning maintenance and troubleshooting

**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.

*Chilling Solutions: An Essential Guide to Process Cooling* Charles Nehme, This book is a comprehensive guide that aims to provide a deep understanding of process cooling systems, their principles, applications, and the best practices for designing, implementing, and optimizing them. Process cooling plays a vital role in a wide range of industries, ensuring the efficient operation of equipment, maintaining product quality, and optimizing energy usage. As industries evolve and technologies advance, it becomes increasingly important for professionals in the field of process cooling to stay up to date with the latest standards, best practices, and emerging trends. This book is designed to meet the needs of engineers, technicians, facility managers, and anyone involved in the planning, operation, and maintenance of process cooling systems. It covers the fundamental concepts of heat transfer, thermal management, and the various components and technologies used in cooling systems. Additionally, it explores industry-specific applications such as food and beverage processing, pharmaceuticals, manufacturing, data centers, and HVAC. *Mastering Process Cooling* is structured to provide a holistic understanding of the subject matter. Starting from the basics, it gradually delves into advanced topics, ensuring that readers of all levels of expertise can benefit from its content. Each chapter is carefully organized, presenting concepts in a clear and concise manner, supported by practical examples, diagrams, and case studies. The book also emphasizes the importance of energy efficiency, sustainability, and the integration of renewable energy sources in process cooling. It addresses the challenges faced in implementing and maintaining efficient cooling systems and provides insights into troubleshooting and optimization techniques. Throughout this book, you will find valuable insights, practical guidelines, and real-world examples that showcase successful implementations. It encourages continuous learning, professional development, and adaptation to evolving industry standards. I invite you to embark on this journey of mastering process cooling. Whether you are a seasoned professional seeking to deepen your knowledge or a newcomer to the field, this book will serve as a valuable resource to enhance your understanding, improve your skills, and contribute to the success of your organization's cooling operations. Let us explore the fascinating world of process cooling together and unlock the key to achieving efficient, reliable, and sustainable cooling systems. Happy reading! Charles Nehme

**HVAC and Refrigeration Preventive Maintenance** Eric Kleinert, 2014-11-10  
Keep HVAC and refrigeration equipment running at peak performance. In this practical resource, a veteran service and repair professional with decades of hands-on experience walks you through the preventive maintenance process for residential and

commercial HVAC and refrigeration systems You'll learn how to inspect, adjust, clean, and test your products to ensure that they run efficiently and have a long service life. Ideal for experienced service technicians, entry-level technicians, business owners, maintenance engineers, and do-it-yourself homeowners, this highly visual manual is filled with detailed instructions and clear photos and diagrams. Useful icons throughout the book indicate the degree of difficulty for each procedure. Save money and time, improve indoor air quality, and get maximum use from HVAC and refrigeration machines with help from this step-by-step guide.

**HVAC and Refrigeration Preventive Maintenance** covers Safety practices, Tools needed for installation, repair, and preventive maintenance, Indoor air quality (IAQ) Test and balance, Principles of air conditioning and refrigeration, Basic electricity and electronics, Gas Oil Room air conditioners, Residential air conditioning and heating, Residential refrigeration appliances, Commercial air conditioning and heating, Water towers, Self-contained commercial refrigerators and freezers, Commercial ice machines, Troubleshooting, Where to get help.

**HVAC Quick Diagnostic Guide** Anthony Soriano, 2025-09-15. The HVAC Quick Diagnostic Guide is a practical handbook designed to help technicians, students, and homeowners quickly identify and solve common heating, ventilation, and air conditioning problems. Written in clear and simple language, it provides step-by-step methods, troubleshooting charts, and real-world examples to guide readers through the diagnostic process. This book emphasizes the most critical diagnostic tools in the field: Voltage checks to ensure proper power supply, transformer function, and safe electrical operation; Pressure readings to evaluate refrigerant charge, compressor health, and overall system balance; Delta T (temperature difference) measurements to quickly confirm whether a system is delivering proper cooling or heating performance. From understanding system pressures and airflow to recognizing electrical issues and refrigerant problems, this guide covers the essential knowledge needed to evaluate HVAC systems efficiently. It also explains the roles of key components such as compressors, condensers, evaporators, transformers, thermostats, and expansion devices, ensuring a complete understanding of the refrigeration cycle and system operation. Compact and easy to reference in the field, this book serves as both a learning tool for beginners and a quick refresher for experienced professionals. Whether you are preparing for a career in HVAC or already working in the trade, this guide will help you save time, increase accuracy, and boost confidence when diagnosing HVAC systems.

*Refrigerant Charging and Service Procedures for Air Conditioning* Craig Migliaccio, 2019-04-24. This Ebook is dedicated to those who are eager to learn the HVAC/R Trade and Refrigerant Charging Troubleshooting Practices. In this book, you will find Step-by-Step Procedures for preparing an air conditioning and heat pump system for refrigerant, reading the manifold gauge set, measuring the refrigerant's charge level, and troubleshooting problems with the system's refrigerant flow. This book differs from others as it gives key insights into each procedure along with tool use from a technician's perspective in language that the technician can understand. This book explains the refrigeration cycle of air conditioners and heat pumps, refrigerant properties, heat transfer, the components included in the system, the roles of each component, airflow requirements, and common problems. Procedures Included: Pump

Down Vacuum and Standing Vacuum Test Recovery and Recovery Bottle Use Refrigerant Manifold Gauge Set and Hose Connections Service Valve Positions and Port Access Preparation of the System for Refrigerant Refrigerant Charging and Recovery on an Active System Troubleshooting the Refrigerant Charge and System Operation *Handbook of Air Conditioning and Refrigeration* Shan K. Wang,2000-11-07 A broad range of disciplines energy conservation and air quality issues construction and design and the manufacture of temperature sensitive products and materials is covered in this comprehensive handbook Provide essential up to date HVAC data codes standards and guidelines all conveniently located in one volume A definitive reference source on the design selection and operation of A C and refrigeration systems

Occupational Outlook Handbook ,2006 Describes 250 occupations which cover approximately 107 million jobs

**Subject Guide to Books in Print** ,2001 HVAC and Refrigeration Preventive Maintenance Eric Kleinert,2014-11-12 Keep HVAC and refrigeration equipment running at peak performance In this practical resource a veteran service and repair professional with decades of hands on experience walks you through the preventive maintenance process for residential and commercial HVAC and refrigeration systems You ll learn how to inspect adjust clean and test your products to ensure that they run efficiently and have a long service life Ideal for experienced service technicians entry level technicians business owners maintenance engineers and do it yourself homeowners this highly visual manual is filled with detailed instructions and clear photos and diagrams Useful icons throughout the book indicate the degree of difficulty for each procedure Save money and time improve indoor air quality and get maximum use from HVAC and refrigeration machines with help from this step by step guide HVAC and Refrigeration Preventive Maintenance covers Safety practices Tools needed for installation repair and preventive maintenance Indoor air quality IAQ Test and balance Principles of air conditioning and refrigeration Basic electricity and electronics Gas Oil Room air conditioners Residential air conditioning and heating Residential refrigeration appliances Commercial air conditioning and heating Water towers Self contained commercial refrigerators and freezers Commercial ice machines Troubleshooting Where to get help **ASHRAE Handbook** ,2007 Bulletin de L'Institut International Du Froid ,2009 Heating, Cooling, and Ventilating ,1987 **HVAC Licensing Study Guide, Second Edition** Rex Miller,Mark R. Miller,2012-10-04 This fully updated study guide helps readers pass the HVAC licensing exam and serves as an on the job reference after the exam *Domestic Engineering* ,1975 *Subject Guide to Children's Books in Print 1997* Bowker Editorial Staff,R R Bowker Publishing,1996-09 **Thomas Regional Industrial Buying Guide** ,2003

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apr 11 2023 1 start off with a regular a4 sheet of paper regular printer paper you may use any color you like depending on the sculpture you will be making 2 starting with the paper with the shorter side on the bottom fold the paper in half 3 fold in

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