

RSES SERVICE APPLICATION MANUAL

TABLE OF CONTENTS

REVISED OCTOBER 2024

This Table of Contents lists the complete contents of the RSES Service Application Manuals (SAM) issued to date. SAM is no longer available in print form—however, SAM is available exclusively to RSES members online. SAM has been reorganized into 25 main categories with subcategories to make finding the information simpler.

Section 1 Refrigeration

- 620-05 Principles of Refrigeration—Part 1
- 620-06 Principles of Refrigeration—Part 2
- 620-67 Principles of Refrigeration—Part 3
- 620-07 Principles of Refrigeration—Part 4

Section 1A Lubrication

- 620-107 Oil in Refrigeration Systems

Section 1B Contaminants in Refrigeration Systems

- 620-15 Contaminating Gases in Refrigerating Systems
- 620-16C Desiccants and Driers
- 620-17A Methyl Alcohol in Refrigeration

Section 1C Foods and Their Preservation

- 620-23 Foods and Their Preservation
- 620-64 Apple Storage
- 620-75 Preservation of Citrus Fruits
- 620-106 Safe Food Handling

Section 1D Absorption Refrigeration

- 620-59 Service and Maintenance of Lithium Bromide Absorption Refrigeration Systems
- 620-90 Recreational Vehicle Absorption Refrigerators

Section 1E Ammonia Refrigeration

- 620-76 Automatic Fluid Flow Controls for Ammonia Refrigeration
- 620-88 One Hundred Years of Ammonia Refrigeration
- 620-89 Operation of Ammonia Refrigeration Systems

Section 1F Cabinet Construction and Repairs

- 620-62B Servicing Supermarket Refrigeration Equipment
- 650-016 DOE Better Buildings Alliance: Guide for the Retrofitting of Open Refrigerated Display Cases with Doors

Section 1G Store and Market Fixtures

- 620-63 Refrigeration of Fresh Meats
- 620-77 Energy Conservation for Super-market Servicemen
- 620-96 Floral Refrigeration

Section 1H Soda Fountain and Ice Cream Cabinets

- 630-02 Soda Fountain Refrigeration and Carbonators
- 630-04 Servicing Ice Cream and Milk Shake Dispensing Freezers

Section 1I Two and Three Stages

- 620-80 Operation of a Three-Stage Cascade Refrigerating System
- 620-57 Two-and Three-Stage Refrigeration Systems
- 620-58A Cascade Refrigerant
- 620-100 Mixed-Refrigeration Autocascade Systems

Section 1J Beverage Cooling

- 630-07A Principles and Characteristics of Beer Dispensing
- 630-08A Bulk Milk Cooling
- 630-89 Water Coolers

- 630-151 Servicing Frozen Beverage Equipment

Section 1K Household Refrigerators

- 630-66 Household Refrigerator Defrost Controls
- 630-122 Servicing Domestic Refrigerators

Section 1L Selecting Refrigeration Equipment

- 630-12 Food Store Air-Cooled Condensing Unit Room Design
- 630-13 Blower Evaporator Selection

Section 1M Piping

- 630-33 Refrigerant Piping
- 630-34 Oil Migration in R-12 and R-22 Systems
- 650-015 Seismic Bracing for HVACR Systems

Section 1N Insulation

- 620-105 Installing Refrigeration Piping Insulation
- 620-104 Thermal Insulation

Section 1P Defrosting

- 620-49A Defrosting Methods

Section 2 Refrigerants

- 620-10 Characteristics of Refrigerants
- 620-11 Mixed Refrigerants
- 620-79 Refrigerant-503 Low-Temperature Refrigerant
- 620-93 Flammability and Explosive Hazards of R-22
- 620-94 Moving to Alternative Refrigerants
- 620-95B Refrigerant Designations: Update
- 620-102 Moving to Alternative Refrigerants: Update
- 620-108 Refrigerant 410A
- 620-111 Temperature-Pressure Values of Common Refrigerants at Saturation
- 620-113 Understanding Refrigerant Tables
- 620-114 Plotting the A/C Cycle on a Pressure-Enthalpy (Mollier) Diagram
- 620-115 Using the PT Chart as a Service Tool
- 620-116 Working with Flammable Refrigerant Systems
- 620-117 What Technicians Need to Know about Phasing Out HCFC Refrigerants
- 620-99 Technology Without Fluorocarbons: What's Available?
- 650-001 Refrigerant Update for 2010 and Beyond

Section 2A Refrigeration Charts and Their Use

- 620-28 Pressure-Enthalpy Charts and Their Use
- 620-70 Some Relationships in Refrigeration Calculations

Section 2B Refrigerant Cylinders

- 620-52B Refrigerant Cylinders

Section 2C Vacuum Pumps

- 630-46B Evacuation of a Refrigeration System
- 630-158 Deep Vacuum: Its Principle and Application

Section 3 Moisture in Air

- 620-19 Moisture in Air
- 620-20 The Psychrometric Calculator
- 620-22 Humidification

RSES SERVICE APPLICATION MANUAL

TABLE OF CONTENTS

REVISED OCTOBER 2024

This Table of Contents lists the complete contents of the RSES Service Application Manuals (SAM) issued to date. SAM is no longer available in print form—however, SAM is available exclusively to RSES members online. SAM has been reorganized into 25 main categories with subcategories to make finding the information simpler.

Section 3A Psychrometric Chart

- 630-16 The Psychrometric Chart and Its Use
- 650-002 Practical Applications of Psychrometrics

Section 4 Electricity

- 620-24A Electric Currents and Circuits
- 620-69 Inside Wiring Circuits
- 620-25 Single-Phase versus Three-Phase Service for Residential Air Conditioning

Section 4A Wiring Diagrams

- 630-140-1 Understanding Electrical Schematics Part 1
- 630-141 Understanding Electrical Schematics Part 2

Section 5 System Components

Section 5A Compressors

- 620-29A Compressor Design, Application and General Service—Part 1
- 620-30A Compressor Design, Application and General Service—Part 2
- 620-31 Compressor Shaft Seals

Section 5B Condensers

- 620-32A Condensers
- 650-019 Coaxial, Tube-In-Tube, Water-Cooled Condensers

Section 5C Closed-Circuit Condensers

- 620-33 Closed-Circuit Cooling with Evaporative Water Coolers
- 620-84 Closed-Circuit Dry Coolers

Section 5D Evaporators

- 620-38 Commercial Refrigeration Unit Coolers
- 620-39 Air Heating and Cooling Coils

Section 5E Refrigerant Flow Controls

- 620-40A Thermostatic Expansion Valves—Part 1
- 620-74A Thermostatic Expansion Valves—Part 2
- 620-41 Automatic System Capacity Controls
- 620-42 The Capillary Tube and Its Application to Small Refrigerating Systems
- 620-43 Servicing Cap Tube Systems
- 620-97 Pressure Regulators for Refrigeration, Air Conditioning, and Heat Pump Systems
- 620-98 Capillary Tubes: Theory and Practice
- 620-101 Solenoid Valves for Refrigeration, Air Conditioning, and Heat Pump Systems
- 620-118 Electric Valves for Refrigerant Control

Section 6 Motors

Section 6A Electric Motors

- 620-35A Electric Motors
- 620-36 Electric Motors Troubleshooting—Repair Shop Test
- 620-37 Terminal Markings and Internal Wiring Diagrams
- 620-46A Motor Capacitors
- 620-78 How to Specify Fractional-Horse Power Motors
- 620-103 Adjustable-Speed Drives

- 620-109 AC Electric Motor Troubleshooting Tips
- 620-110 Determining Whether High Voltage Surge (HVS) Damage Has Caused Compressor Failure
- 650-003 Electronically Commutated Motors—Part 1
- 650-004 Electronically Commutated Motors—Part 2
- 650-005 Electronically Commutated Motors—Part 3
- 650-006 Electronically Commutated Motors—Part 4

Section 6B Motor-Starting Equipment

- 620-44A Motor Protectors

Section 6C Motor Wiring Diagrams

- 630-57A Motor Wiring Diagrams

Section 7 Controls

Section 7A Electrical Controls

- 620-45A Low-Voltage Thermostats
- 620-47 Lube Oil Protection Controls—Function and Application

Section 7B Pneumatic Controls

- 620-48 Pneumatic Temperature Control Systems
- 620-83 Pneumatic Controls—Preventive Maintenance and Troubleshooting

Section 7C Electronic Controls

- 620-50 Basic Electronics
- 620-51 Solid-State Components and Circuits
- 620-81 Theory, Application, and Diagnostic Testing of Solid-State Devices
- 620-112 Introduction to DDC Systems

Section 8 Air Conditioning

Section 8A Air Conditioning—General

- 630-14 Air Conditioning—General
- 630-124 Desiccant Systems—Part 1
- 630-125 Components of Desiccant Systems—Part 2
- 630-126 Maintaining Desiccant Systems—Part 3

Section 8B Room and Store Coolers

- 630-15A Room Air Conditioners
- 630-130 Ductless Split Cooling Systems

Section 8C Selecting Air Conditioning Equipment

- 630-26 Air Conditioning—Selecting the Equipment
- 630-27 Computer Room Environmental Control: Part 1
- 630-59 Computer Room Environmental Control: Part 2

Section 8D Evaporative Cooling

- 630-106 Evaporative Air Cooling
- 650-013 Because Temperature Matters: Maintaining Cooling Towers

Section 8E Cooling Towers and Evaporative Condensers

- 620-34 Location, Installation, Maintenance, and Service of Cooling Towers and Evaporative Condensers

RSES SERVICE APPLICATION MANUAL

TABLE OF CONTENTS

REVISED OCTOBER 2024

Section 9 Ice Makers

- 630-05 Automatic Ice Cube Machines
- 630-06 Automatic Ice Flake Machines

Section 10 Heat Loads

- 630-144 Estimating the Refrigeration Heat Load—Part 1
- 630-145 Estimating the Refrigeration Heat Load—Part 2

Section 11 Airflow

Section 11A Ducts and Grilles

- 630-18 Duct System Design
- 630-19 Duct Insulation Design
- 630-20 Grilles and Registers
- 630-21 Low-Velocity Air Duct Design
- 630-64 What You Should Know About Flexible Ducts
- 630-86 Fire Dampers—Part 1
- 630-87 Fire Dampers—Part 2
- 630-104 Air Flow Measurement
- 630-137 Variable Air Volume Systems—Part 1: Types of Terminals
- 630-138 Variable Air Volume Systems—Part 2: Types of Controls
- 630-139 Variable Air Volume Systems—Part 3: Troubleshooting
- 630-146 Glass Fiber Air Transmission Systems: Cleaning Fibrous Glass or Lined Sheet Metal Ducts
- 630-148 Duct System Design Considerations—Part 1
- 630-149 Duct System Design Considerations—Part 2
- 630-150 The Equal Friction Method of Duct Sizing
- 650-014 Life Safety Damper Installation and Maintenance

Section 11B Centrifugal Blowers and Fans

- 630-132 Fans and Blowers—Part 1
- 630-133 Fans and Blowers—Part 2

Section 11C Air Filters

- 630-23 Air Filters
- 630-72 The Electrostatic Method of Air Cleaning, Theory and Fundamentals—Part 1
- 630-73 The Electrostatic Method of Air Cleaning, Theory and Fundamentals—Part 2
- 630-88 Clean Room Systems
- 630-156 The Principles of Air Flow, Air Pressure and Air Filtration
- 630-157 HEPA, ULPA, and Super ULPA Filters

Section 12 Residential Heating and Cooling Systems

- 630-28 Residential Heating and Cooling Systems
- 630-29 Recent Advances in Hydronic Heating and Cooling
- 630-30A Residential and Commercial Light Oil Burners—Part 1
- 630-74 Residential and Commercial Light Oil Burners—Part 2
- 630-31 Residential and Light Commercial Gas-Fired Heating Equipment
- 630-58 Efficiency Testing—Gas: Residential and Small Commercial Heating Unit

- 630-81 Installation, Maintenance, and Service of Recreational Vehicle Furnaces
- 630-92 Residential Gas Furnace Heat Exchanger Testing
- 630-94 Condensing Gas Furnaces
- 630-108 Combination Gas Controls
- 630-129 Radiant Panel Heating Systems
- 630-131 Gas Heating Venting Tables
- 630-152 Venting of Category IV Appliances
- 630-153 Residential Electronic Ignition Systems
- 630-159 Induced-Draft Heat Exchanger Inspection Procedure
- 650-008 Radiant Heating—Part 1
- 650-009 Radiant Heating—Part 2
- 650-010 Radiant Heating—Part 3
- 650-011 Radiant Heating—Part 4

Section 13 Mathematics, Tables and Charts

Section 13A Miscellaneous Tables

- 630-55 Summer Climatic Data
- 630-56A International Design Temperature and Voltage Characteristics

Section 13B Mathematics and Conversion Tables

- 620-02A Mathematics for the Service Engineer
- 620-03A Basic Algebra for the Service Engineer
- 620-82 ASHRAE SI (Metric) Guide
- 620-119 Trade Math

Section 14 Business Administration

- 630-67 Service Technician's Liability, Legal and Moral
- 630-75 Operating a Small Business Enterprise—Introduction
- 630-77 Operating a Small Business Enterprise—Section II: Choice of Form for Conducting a Business
- 630-79 Operating a Small Business Enterprise—Section III: Buy-Out Agreements
- 630-114 A Model Hazard Communication Program for Contractors
- 630-117 Recommended HVACR Employee Job Descriptions
- 630-154 Small Business Start-Ups—Part 1
- 630-155 Small Business Start-Ups—Part 2
- 630-160 Small Business Start-Ups—Part 3

Section 15 Safety and First Aid

- 630-52 Safety and First Aid for the Refrigeration Service Engineer—Part 1
- 630-53 Fire Extinguishers and Their Use
- 630-78 Health and Safety Guidelines—Part 1
- 630-97 Asbestos
- 630-100 Radon
- 630-111 Removal and Disposal of Capacitors Containing PCBs
- 630-116 Refrigeration and Air Conditioning Trade Safety for Construction, Service, and Maintenance Workers
- 630-118 Fall Protection in Construction
- 630-119 Recommended Safety Practices for Users and Installers of Industrial and Commercial Fans
- 630-120 Heat-Protective Clothing
- 630-121 How to Prepare for Workplace Emergencies

RSES SERVICE APPLICATION MANUAL

TABLE OF CONTENTS

REVISED OCTOBER 2024

630-134	Portable Fire Extinguishers and Their Use		
630-142	ABCs of Electrical Measurement Safety		
Section 16 Standards			
630-49B	Standard Procedure for Replacement of Components in a Sealed Refrigerant System (Compressor Failure and Replacement)		
630-51C	Electrical Codes, National and Local		
630-96	Overcurrent Protection and the National Electrical Code		
630-99	Code of Good Practice for the Reduction of Emissions of CFCs R-11 and R-12 in Refrigeration and Air Conditioning Applications		
630-110	U.S. EPA Regulations		
630-113	Guide for the Field Conversion/Retrofit of Products to Change to an Alternative Refrigerant—Using UL 2170-2172		
630-147	Who Sets the Rules for Electrical Testing and Safety?		
Section 17 Air and Water Treatment			
Section 17A Air Treatment			
630-25	Application of Ozone		
630-135	Fundamentals of Indoor Air Quality		
630-136	Anthrax in Heating, Ventilating and Air Conditioning Duct Systems		
650-020	Indoor Air Quality for the HVAC Technician		
Section 17B Water Treatment			
630-107	Cooling Water Treatment		
Section 17C Solvents and Water Treatment			
630-40	Cleaning Materials and Cleaning Methods		
Section 18 Heat Pump Systems			
620-54	Basic Heat Pump Theory		
620-56A	Heat Pump Reversing Valve Application		
620-85	Heat Pump Controls—Part 1		
620-86A	Heat Pump Controls—Part 2		
620-87	How to Diagnose and Correct Reversing Valve Problems		
620-92	Installation and Service of Water-Source and Geothermal Heat Pumps		
Section 19 Chillers			
630-09	Liquid Chillers		
630-103	Chiller Maintenance		
Section 20 Boilers			
630-36	Basic Safety Controls for Hot Water and Low-Pressure Steam Boilers		
630-84	Modernization of Hydronic Systems—Part 1		
630-85	Modernization of Hydronic Systems—Part 2		
Section 21 Soldering, Brazing, and Welding			
630-41A	Soldering and Brazing Copper Tube		
630-42	Field Repair of Aluminum Refrigeration Coils		
Section 21A Tubing and Fittings			
630-35	Technical Reference Handbook—Tubing Tools		
Section 22 Service			
630-69	Safety Relief Devices for Refrigerant Pressure Vessels		
630-44	Bearing Failures and Their Causes		
630-45	Metal Fatigue in the Refrigeration Industry		
630-90	Seasonal Maintenance Checklists		
630-102	Retubing Refrigeration and Air Conditioning Heat Exchangers		
630-109	Refrigerant Leak Detection		
630-115	Examining Flood-Damaged Equipment		
630-127	Increasing Centrifugal Pump Reliability		
630-143	Leak Detection Devices and Methods		
630-32	Application Data, Heavy Oil Heating Systems		
650-012	Predictive Maintenance: Stop Valves		
650-017	The Basics of Pre-Season AC Maintenance		
Section 23 Specialized Heating and Cooling Equipment			
630-93	Vortex Tubes		
630-98	Aircraft Air Conditioning Systems		
630-101	Thermoelectric Refrigeration		
Section 24 Tools and Indicating and Recording Instruments			
630-47	The Use of Suction Pressure and Temperature Recorders		
630-48	Modern Recording Instruments—Their Use and Care		
630-76	Shaft Alignment		
630-123	Measuring Temperatures		
630-128	Powder-Actuated Fastening Systems		
Section 25 Energy Conservation			
630-80	Retrofits for Effective Energy Management—Why and How Buildings Use Energy—Part 1		
630-82	Retrofits for Effective Energy Management—One Approach to Energy Audits—Part 2		
630-83	Refrigerant-to-Water Heat Recovery Systems		
630-91	Air Curtains		
630-112	Energy Audit Mechanics: Predicting Energy Conservation Savings		