
Experimental Investigation Of Refrigerant Charge

First International Conference, SmartTech-IC 2019, Quito, Ecuador, December 2-4, 2019, Proceedings

Handbook of Frozen Food Processing and Packaging

Breakthroughs in Research and Practice

Intelligent Building Control Systems

Volume 2: HVAC&R Component and Energy System

Low-Temperature Technologies and Applications

Fundamentals

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Modeling the Effects of Refrigerant Charging on Air Conditioner Performance

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Two-Phase Flow in Refrigeration Systems

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Investigation Of
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SIMPSON MARTINEZ

First International Conference, SmartTech-IC 2019, Quito, Ecuador, December 2-4, 2019, Proceedings

Amer Inst of Aeronautics &

The book includes the best articles presented by researchers, academicians and industrial experts at the International Conference on “Innovative Design and Development Practices in Aerospace and Automotive Engineering (I-DAD 2018)”. The book discusses new concept in designs, and analysis and manufacturing technologies for improved performance through specific and/or multi-functional design aspects to optimise the system size, weight-to-strength ratio, fuel efficiency and operational capability. Other aspects of the conference address the ways and means of numerical analysis, simulation and additive manufacturing to accelerate the product development cycles. Describing innovative methods, the book provides valuable reference material for educational and research organizations, as well as industry, wanting to undertake challenging projects of design engineering and product development.

Handbook of Frozen Food Processing and Packaging IGI Global

Thermal Management of Electric Vehicle Battery Systems provides a thorough examination of various conventional and

cutting edge electric vehicle (EV) battery thermal management systems (including phase change material) that are currently used in the industry as well as being proposed for future EV batteries. It covers how to select the right thermal management design, configuration and parameters for the users’ battery chemistry, applications and operating conditions, and provides guidance on the setup, instrumentation and operation of their thermal management systems (TMS) in the most efficient and effective manner. This book provides the reader with the necessary information to develop a capable battery TMS that can keep the cells operating within the ideal operating temperature ranges and uniformities, while minimizing the associated energy consumption, cost and environmental impact. The procedures used are explained step-by-step, and generic and widely used parameters are utilized as much as possible to enable the reader to incorporate the conducted analyses to the systems they are working on. Also included are comprehensive thermodynamic modelling and analyses of TMSs as well as databanks of component costs and environmental impacts, which can be useful for providing new ideas on improving vehicle designs. Key features: Discusses traditional and cutting edge technologies as well as research directions Covers thermal management systems and their selection for different vehicles and applications Includes case studies and

practical examples from the industry Covers thermodynamic analyses and assessment methods, including those based on energy and exergy, as well as exergoeconomic, exergoenvironmental and enviroeconomic techniques Accompanied by a website hosting codes, models, and economic and environmental databases as well as various related information Thermal Management of Electric Vehicle Battery Systems is a unique book on electric vehicle thermal management systems for researchers and practitioners in industry, and is also a suitable textbook for senior-level undergraduate and graduate courses.

Breakthroughs in Research and Practice Institute of Electrical & Electronics Engineers(IEEE)

The aim of the two-set series is to present a very detailed and up-to-date reference for researchers and practicing engineers in the fields of mechanical, refrigeration, chemical, nuclear and electronics engineering on the important topic of two-phase heat transfer and two-phase flow. The scope of the first set of 4 volumes presents the fundamentals of the two-phase flows and heat transfer mechanisms, and describes in detail the most important prediction methods, while the scope of the second set of 4 volumes presents numerous special topics and numerous applications, also including numerical simulation methods. Practicing engineers will find extensive coverage to applications involving: multi-microchannel evaporator cold plates for electronics cooling, boiling on enhanced tubes and tube bundles, flow pattern based methods for predicting boiling and condensation inside horizontal tubes, pressure drop methods for singularities (U-bends and contractions), boiling in multiport tubes,

and boiling and condensation in plate heat exchangers. All of these chapters include the latest methods for predicting not only local heat transfer coefficients but also pressure drops. Professors and students will find this 'Encyclopedia of Two-Phase Heat Transfer and Flow' particularly exciting, as it contains authored books and thorough state-of-the-art reviews on many basic and special topics, such as numerical modeling of two-phase heat transfer and adiabatic bubbly and slug flows, the unified annular flow boiling model, flow pattern maps, condensation and boiling theories, new emerging topics, etc.

Intelligent Building Control Systems
Springer Nature

Proceedings of the 8th International Symposium on Heating, Ventilation and Air Conditioning is based on the 8th International Symposium of the same name (ISHVAC2013), which took place in Xi'an on October 19-21, 2013. The conference series was initiated at Tsinghua University in 1991 and has since become the premier international HVAC conference initiated in China, playing a significant part in the development of HVAC and indoor environmental research and industry around the world. This international conference provided an exclusive opportunity for policy-makers, designers, researchers, engineers and managers to share their experience. Considering the recent attention on building energy consumption and indoor environments, ISHVAC2013 provided a global platform for discussing recent research on and developments in different aspects of HVAC systems and components, with a focus on building energy consumption, energy efficiency and indoor environments. These categories span a broad range of topics, and the

proceedings provide readers with a good general overview of recent advances in different aspects of HVAC systems and related research. As such, they offer a unique resource for further research and a valuable source of information for those interested in the subject. The proceedings are intended for researchers, engineers and graduate students in the fields of Heating, Ventilation and Air Conditioning (HVAC), indoor environments, energy systems, and building information and management. Angui Li works at Xi'an University of Architecture and Technology, Yingxin Zhu works at Tsinghua University and Yuguo Li works at The University of Hong Kong.

Volume 2: HVAC&R Component and Energy System BoD - Books on Demand

Tribology in Environmental Design is an indispensable collection of chapters exploring the life cycle of all stages of tribological issues for product design. The contributors for this edition are from a wide range of disciplines and countries ensuring a comprehensive overview of Tribology in Environment Design. This well-renowned second international conference explores the role of tribology in the context of product design and how this influences environmental, as well as product life cycle, consequences. Topics covered include: Sustainable Design Life-oriented Products Life-cycle Assessment for Optimized Products Surface Engineering Lubricants Test Methods Advanced Materials Analytical Studies Low-Temperature Technologies and Applications CRC Press

This multi-disciplinary book presents the most recent advances in exergy, energy, and environmental issues. Volume 1 focuses on fundamentals in the field and covers current problems, future needs, and prospects in the area of energy and

environment from researchers worldwide. Based on selected lectures from the Seventh International Exergy, Energy and Environmental Symposium (IEEES7-2015) and complemented by further invited contributions, this comprehensive set of contributions promote the exchange of new ideas and techniques in energy conversion and conservation in order to exchange best practices in "energetic efficiency". Included are fundamental and historical coverage of the green transportation and sustainable mobility sectors, especially regarding the development of sustainable technologies for thermal comforts and green transportation vehicles. Furthermore, contributions on renewable and sustainable energy sources, strategies for energy production, and the carbon-free society constitute an important part of this book. Exergy for Better Environment and Sustainability, Volume 1 will appeal to researchers, students, and professionals within engineering and the renewable energy fields.

Fundamentals Springer Nature

Enormous quantities of heat are available in air, soil, water, exhaust air from buildings, and in waste water of any kind. However these heat sources are use-less for heating purposes since their temperatures are lower than the temperature required for heating. Heat pumps can be used to extract heat from these sources with a small expenditure of additional energy and up-grade and deliver the energy as useful heat for room heating. The heat pump cycle employs the well-known vapour compression cycle. The amount of heat delivered by a heat pump is equal to the amount of energy extracted from the heat source plus the heat equivalent to the compression work of the heat pump.

Heat pumps, of course, are being generally accepted as outstanding energy saving units due their coefficient of performance (COP). Heat pumps for house heating have been used extensively in many countries and are especially common in Sweden. The annual growth rate of heat pump usage in Sweden is the same as in rest of Europe. According to the Swedish heat pump association, between 1986 to August 2003, the number of installed heat pump units in Sweden was 332,309. The demand for heat pumps started to increase from the year 1995 and in the year 2002, approximately 40,000 heat pump units were installed. Among the many types available, single-family heat pumps providing heating capacity of about 5 kW are widely popular. The main drawbacks of heat pumps are the complexity of the systems, high cost, need of technical knowledge, safety hazards and environmental effects of certain refrigerants, etc. An efficient heat pump with small refrigerant charge would have less of some of these drawbacks and could be a competitive alternative to other heating processes. In this study, methods of refrigerant charge minimisation without reducing the performance of a small capacity (5 kW) heat pump have been investigated. Work has been focused on finding refrigerant charge distribution in different components of the heat pump, on finding out the solubility of refrigerant (pro-pane) with different compressor lubrications oils, on testing different types of compact heat exchangers, on constructing new minichannel heat exchangers and on finding correlations for calculating the heat transfer of minichannel heat exchangers. The results included in this thesis have been presented in four conference papers

and five journal papers of which two were published and three were submitted for publication.

Bulletin de l'Institut international du froid
CRC Press

Consumer demand for a year-round supply of seasonal produce and ready-made meals remains the driving force behind innovation in frozen food technology. Now in its second edition, *Handbook of Frozen Food Processing and Packaging* explores the art and science of frozen foods and assembles essential data and references relied upon by scientists in univ

Fundamentals and Applications CRC Press

This book constitutes refereed proceedings of the First International Conference on Smart Technologies, Systems and Applications, held in Quito, Ecuador, in December 2019. The 27 full papers and 3 short papers presented were carefully reviewed and selected from 90 submissions. The papers of this volume are organized in topical sections on smart technologies; smart systems; smart trends and applications.

Modeling the Effects of Refrigerant Charging on Air Conditioner Performance Characteristics for Three Expansion Devices John Wiley & Sons

This book covers challenges and opportunities related to solar-energy based systems. It covers a wide variety of topics related to solar energy, including applications-based systems such as solar thermal systems that are focused on drying, desalination, space cooling, refrigeration, and processing; recent advances in solar cells (DSSC) and photovoltaics; technologies for storage of energy (both sensible heating as well as latent heating); and the design of concentrated solar receivers. The information is presented in the

context of the overall global energy utilization, and the role of solar energy has been highlighted. The contents of this book will be of interest to researchers, professionals, and policymakers alike.

1995 American Control Conference

Experimental Investigation of Refrigerant Charge Minimisation of a Small Capacity Heat Pump

Enormous quantities of heat are available in air, soil, water, exhaust air from buildings, and in waste water of any kind. However these heat sources are use-less for heating purposes since their temperatures are lower than the temperature required for heating. Heat pumps can be used to extract heat from these sources with a small expenditure of additional energy and up-grade and deliver the energy as useful heat for room heating. The heat pump cycle employs the well-known vapour compression cycle. The amount of heat delivered by a heat pump is equal to the amount of energy extracted from the heat source plus the heat equivalent to the compression work of the heat pump. Heat pumps, of course, are being generally accepted as outstanding energy saving units due their coefficient of performance (COP). Heat pumps for house heating have been used extensively in many countries and are especially common in Sweden. The annual growth rate of heat pump usage in Sweden is the same as in rest of Europe. According to the Swedish heat pump association, between 1986 to August 2003, the number of installed heat pump units in Sweden was 332,309. The demand for heat pumps started to increase from the year 1995 and in the year 2002, approximately 40,000 heat pump units were installed. Among the many types available, single-family heat pumps providing heating capacity of

about 5 kW are widely popular. The main drawbacks of heat pumps are the complexity of the systems, high cost, need of technical knowledge, safety hazards and environmental effects of certain refrigerants, etc. An efficient heat pump with small refrigerant charge would have less of some of these drawbacks and could be a competitive alternative to other heating processes. In this study, methods of refrigerant charge minimisation without reducing the performance of a small capacity (5 kW) heat pump have been investigated. Work has been focused on finding refrigerant charge distribution in different components of the heat pump, on finding out the solubility of refrigerant (pro-pane) with different compressor lubrications oils, on testing different types of compact heat exchangers, on constructing new minichannel heat exchangers and on finding correlations for calculating the heat transfer of minichannel heat exchangers. The results included in this thesis have been presented in four conference papers and five journal papers of which two were published and three were submitted for publication. Experimental Investigation of Upstream Individual Superheat Control on Two-pass Water-cooled Refrigeration System The impact of individual upstream superheat control on a two-pass water-cooled refrigeration system has been studied. Previous research has verified that the loss of cooling capacity and coefficient of performance (COP) of the system due to non-uniform superheat can be recovered by applying upstream individual superheat control. This thesis presents the analysis of upstream individual superheat control. The experiment apparatus consisted of a two-pass water-cooled refrigeration system composed of

a 2040 watts scroll type compressor, a water-cooled coaxial type condenser and two water-cooled coaxial type evaporators. R410A was selected as refrigerant. The design phase was based on refrigeration cycle of thermodynamics. AUTOCAD and Pro/Engineering 4.0 were used in order to do the simulation. Agilent 34980A was used as data acquisition hardware and Agilent BenchLink Data Logger Pro was used as data acquisition software. Engineering Equation Solver (EES) was used to do all the calculations, including the superheat, subcooling, enthalpy, cooling capacity and coefficient of performance (COP). Three different conditions were considered in this thesis. Condition I: without control. Condition II: with control. Condition III : minimum stable superheat (MSS) phenomenon. In condition I, no control was applied and non-uniform superheat was observed. In condition II, upstream individual superheat control was applied, and the superheats in two evaporating circuits were observed almost evenly distributed. In condition III, close the control valve on the corresponding circuit of 98%, and observed the sudden change of superheat. Results showed that there exist significant benefits of system cooling capacity and coefficient of performance (COP) by using upstream individual superheat control method. In Condition I, the cooling capacity was found to be 7.671kw and the COP was 3.715. In Condition II, the cooling capacity was found to be 8.138kw and the COP was 3.955. By applied the upstream individual superheat control method, the cooling capacity increased about 5.739% and the COP increased about 6.068%. Furthermore, the minimum stable superheat (MSS) phenomenon was examined. Close one

of the control valves on the corresponding circuit of 98%. Instead of getting superheat increased, it was found that the superheat of this circuit suddenly decreased. This phenomenon is referred as minimum stable superheat (MSS). The exact reasons that cause MSS haven't been found yet. But some reasonable factors that may affect MSS were presented. First, the suddenly change of heat transfer coefficient inside the evaporator. Second, different types of refrigerant may affect MSS. Handbook of Research on Advances and Applications in Refrigeration Systems and Technologies Readers of this book will be shown how, with the adoption of ubiquitous sensing, extensive data-gathering and forecasting, and building-embedded advanced actuation, intelligent building systems with the ability to respond to occupant preferences in a safe and energy-efficient manner are becoming a reality. The articles collected present a holistic perspective on the state of the art and current research directions in building automation, advanced sensing and control, including: model-based and model-free control design for temperature control; smart lighting systems; smart sensors and actuators (such as smart thermostats, lighting fixtures and HVAC equipment with embedded intelligence); and energy management, including consideration of grid connectivity and distributed intelligence. These articles are both educational for practitioners and graduate students interested in design and implementation, and foundational for researchers interested in understanding the state of the art and the challenges that must be overcome in realizing the potential benefits of smart building systems. This edited volume

also includes case studies from implementation of these algorithms/sensing strategies in to-scale building systems. These demonstrate the benefits and pitfalls of using smart sensing and control for enhanced occupant comfort and energy efficiency.

A Survey of Modern Building Control and Sensing Strategies

UNEP/Earthprint

This book discusses conventional as well as unconventional wood drying technologies. It covers fundamental thermophysical and energetic aspects and integrates two complex thermodynamic systems, conventional kilns and heat pumps, aimed at improving the energy performance of dryers and the final quality of dried lumber. It discusses advanced components, kiln energy requirements, modeling, and software and emphasizes dryer/heat pump optimum coupling, control, and energy efficiency. Problems are included in most chapters as practical, numerical examples for process and system/components calculation and design. The book presents promising advancements and R&D challenges and future requirements.

Handbook of Research on Advances and Applications in Refrigeration Systems and Technologies World Scientific

With increased concern about the impact of refrigerant leakage on global warming, a number of new supermarket refrigeration system configurations requiring significantly less refrigerant charge are being considered. In order to help promote the development of advanced systems and expand the knowledge base for energy-efficient supermarket technology, the International Energy Agency (IEA) established IEA Annex 26 (Advanced

Supermarket Refrigeration/Heat Recovery Systems) under the "IEA Implementing Agreement on Heat Pumping Technologies". Annex 26 focuses on demonstrating and documenting the energy saving and environmental benefits of advanced systems design for food refrigeration and space heating and cooling for supermarkets. Advanced in this context means systems that use less energy, require less refrigerant and produce lower refrigerant emissions. Stated another way, the goal is to identify supermarket refrigeration and HVAC technology options that reduce the total equivalent warming impact (TEWI) of supermarkets by reducing both system energy use (increasing efficiency) and reducing total refrigerant charge. The Annex has five participating countries: Canada, Denmark, Sweden, the United Kingdom, and the United States. The working program of the Annex has involved analytical and experimental investigation of several candidate system design approaches to determine their potential to reduce refrigerant usage and energy consumption. Advanced refrigeration system types investigated include the following: distributed compressor systems--small parallel compressor racks are located in close proximity to the food display cases they serve thus significantly shortening the connecting refrigerant line lengths; secondary loop systems--one or more central chillers are used to refrigerate a secondary coolant (e.g. brine, ice slurry, or CO₂) that is pumped to the food display cases on the sales floor; self-contained display cases--each food display case has its own refrigeration unit; low-charge direct expansion--similar to conventional multiplex refrigeration systems but with improved

controls to limit charge. Means to integrate store HVAC systems for space heating/cooling with the refrigeration system have been investigated as well. One approach is to use heat pumps to recover refrigeration waste heat and raise it to a sufficient level to provide for store heating needs. Another involves use of combined heating and power (CHP) or combined cooling, heating, and power (CCHP) systems to integrate the refrigeration, HVAC, and power services in stores. Other methods including direct recovery of refrigeration reject heat for space and water heating have also been examined.

Tribology in Environmental Design

2003 Springer Nature

Heat transfer enhancement has seen rapid development and widespread use in both conventional and emerging technologies. Improvement of heat transfer fluids requires a balance between experimental and numerical work in nanofluids and new refrigerants. Recognizing the uncertainties in development of new heat transfer fluids, *Advances in New Heat Transfer Fluids: From Numerical to Experimental Techniques* contains both theoretical and practical coverage.

Advanced Supermarket Refrigeration/Heat Recovery Systems IGI Global

Defrosting for Air Source Heat Pumps: Research, Analysis and Methods presents a detailed analysis of the methods, processes and problems relating to defrosting, a necessary requirement to maintain the performance of ASHP units. Readers will gain a deeper understanding of control strategies and system design optimization methods that improve the performance and reliability of units. The book discusses the most recent

experimental and numerical studies of reverse cycle defrosting and the most widely used defrosting method for ASHP. Techno-economic considerations are also presented, as is the outlook for the future. This book is a valuable resource for research students and academics of thermal energy and mechanical engineering, especially those focusing on defrosting for ASHP, heating, ventilation and energy efficiency, as well as engineers and professionals engaged in the development and management of heat pump machinery. Includes MATLAB codes that allow the reader to implement the knowledge they have acquired in their own simulations and projects. Discusses experimental and numerical studies to provide a well-rounded analysis of technologies, methods and available systems. Presents techno-economic considerations and a look to the future.

Experimental Investigation of Refrigerant Charge Minimisation of a Small Capacity Heat Pump CRC Press

A timely and comprehensive introduction to CO₂ heat pump theory and usage. A comprehensive introduction of CO₂ application in heat pump, authored by leading scientists in the field. CO₂ is a hot topic due to concerns over global warming and the 'greenhouse effect'. Its disposal and application has attracted considerable research and governmental interest. Explores the basic theories, devices, systems and cycles and real application designs for varying applications, ensuring comprehensive coverage of a current topic. CO₂ heat transfer has everyday applications including water heaters, air-conditioning systems, residential and commercial heating systems, and cooling systems. *Energy Research Abstracts* Springer

Science & Business Media

This book on low-temperature technology is a notable collection of different aspects of the technology and its application in varieties of research and practical engineering fields. It contains, sterilization and preservation techniques and their engineering and scientific characteristics. Ultra-low temperature refrigeration, the refrigerants, applications, and economic aspects are highlighted in this issue. The readers will find the low temperature, and vacuum systems for industrial applications. This book has given attention to global energy resources, conservation of energy, and alternative sources of energy for the application of low-temperature technologies.

Select Proceedings of NHTFF 2018

Springer

Two-Phase Flow in Refrigeration Systems presents recent developments from the authors' extensive research programs on two-phase flow in refrigeration systems. This book covers advanced mass and heat transfer and vapor compression refrigeration systems and shows how the performance of an automotive air-conditioning system is affected through results obtained experimentally and theoretically, specifically with consideration of two-phase flow and oil concentration. The book is ideal for university postgraduate students as a textbook, researchers and professors as an academic reference book, and by engineers and designers as handbook.

Transcritical CO₂ Heat Pump

Springer

This book presents select proceedings of the international conference on Innovations in Clean Energy Technologies (ICET 2020) and examines a range of durable, energy efficient and

next-generation smart green technologies for sustainable future by reflecting on the trends, advances and development taking place all across the globe. The topics covered include smart technologies based product, energy efficient systems, solar and wind energy, carbon sequestration, green transportation, green buildings, energy material, biomass energy, smart cities, hydro power, bio-energy and fuel cell. The book also discusses various performance attributes of these clean energy technologies and their workability and carbon footprint. The book will be a valuable reference for beginners, researchers and professionals interested in clean energy technologies. [Thermal Management of Electric Vehicle Battery Systems](#) Springer

In recent years, the sustainability and safety of perishable foods has become a major consumer concern, and refrigeration systems play an important role in the processing, distribution, and storage of such foods. To improve the efficiency of food preservation technologies, it is necessary to explore new technological and scientific advances both in materials and processes. The Handbook of Research on Advances and Applications in Refrigeration Systems and Technologies gathers state-of-the-art research related to thermal performance and energy-efficiency. Covering a diverse array of subjects—from the challenges of surface-area frost-formation on evaporators to the carbon footprint of refrigerant chemicals—this publication provides a broad insight into the optimization of cold-supply chains and serves as an essential reference text for undergraduate students, practicing engineers, researchers, educators, and policymakers.

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