

Experimental Investigation Of Refrigerant Charge

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EPA-R5 - 1973

Proceedings of the 8th International Symposium on Heating, Ventilation and Air Conditioning - Angui Li
2013-09-24

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.

Thermal Management of Electric Vehicle Battery Systems - Ibrahim Dincer 2017-01-03

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.

Defrosting for Air Source Heat Pump - Mengjie Song
2019-05-16

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 Socioeconomic Environmental Studies Series - 1973

IEA Annex 26 - 2003

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.

Solar Energy - Himanshu Tyagi 2019-10-14

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.

Advances in Manufacturing Technology and Management - Ranganath M. Singari 2022-12-12

This book presents the select peer-reviewed proceeding of the International Conference on Advanced Production and Industrial Engineering (ICAPIE) – 2021 held at Delhi Technological University. It covers recent trends in various fields of mechanical engineering. The broad range of topics and issues covered include mechanical system engineering, materials engineering, micro-machining, renewable energy, industrial engineering and additive manufacturing. This book will be useful for students, researchers and professionals working in the area of mechanical and allied engineering discipline.

Tribology in Environmental Design 2003 - Mark Hadfield 2003-10-24

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

Transcritical CO₂ Heat Pump - Xin-rong Zhang 2021-02-17
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

Recent Advances in Fluid Dynamics - Jyotirmay Banerjee 2022-09-24

This book presents select proceedings of the International Conference on Advances in Fluid Flow and Thermal Sciences (ICAFFTS 2021) and summarizes the modern research practices in fluid dynamics and fluid power. The content of the book involves advanced topics on turbulence, droplet deposition, oscillating flows, wave breaking, spray structure and its atomization and flow patterns in mini and micro channels. Technological concerns relevant to erosion of steam turbine blade due to droplets, influence of baffle cut and baffle pitch on flow regime, bubble formation and propagation in pool boiling, design optimization of flow regulating valves are included in the book. In addition, recent trends in small-scale hydropower plant and flow stability issues in nanofluids, solar water heating systems and closed-loop pulsating heat pipes are discussed. Special topics on airflow pattern in railway coach and vortex tube are also included. This book will be a reliable reference for academicians, researchers and professionals working in the areas of fluid dynamics and fluid power.

Recent Trends in Product Design and Intelligent Manufacturing Systems - B.B.V.L. Deepak 2022-10-05

This book presents select proceedings of the 3rd Innovative Product Design and Intelligent Manufacturing System (IPDIMS 2020), held at National Institute of Technology (NIT) Rourkela, 30–31 December 2021. This volume covers the latest research topics in design and manufacturing fields of engineering. Some of the themes covered include Industry 4.0, smart manufacturing, advanced robotics and CAD/CAM/CIM. This book will be useful for students, researchers and professionals in the disciplines of mechatronics, mechanical, manufacturing, production and industrial engineering, especially those working on improvements in manufacturing technologies and development of resilient infrastructure in industry.

Compressors and Their Systems - IMechE (Institution of Mechanical Engineers) 2003-11-07

This collection of papers from a prestigious IMechE conference looks at the latest innovations and techniques from experts in the field of rotating machinery from industry and academia. Reflecting latest developments in air, gas, refrigeration and related systems, these conference transactions will be of vital importance to all those equipment manufacturers, suppliers, users, and research organizations who wish to be well informed of developments and advances in this important field of engineering. Topics covered: Scroll Compressors Refrigeration Environmental Issues Screw Compressors Reciprocating Compressors Expanders Centrifugal Compressors Novel Designs Linear Compressors Numerical Modelling Operation and Maintenance
Cost Analysis of Water Pollution Control - Dennis P. Tihansky 1973

Experimental Investigation of Refrigerant Charge Minimisation of a Small Capacity Heat Pump - W. Primal D. Fernando 2007

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 tempera-ure 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 alterna-tive 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 con-ference papers and five journal papers of which two were published and three were submitted for publication.

Refrigeration Engineering - 1929

English abstracts from Kholodil'naia tekhnika.

Encyclopedia Of Two-phase Heat Transfer And Flow Ii: Special Topics And Applications (A 4-volume Set) - Thome John R 2015-08-26

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.

Handbook of Research on Advances and Applications in Refrigeration Systems and Technologies - Gaspar, Pedro Dinis 2015-08-28

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.

Vapor Compression Heat Pumps with Refrigerant Mixtures - Reinhard Radermacher 2005-06-23

Amidst tightening requirements for eliminating CFC's, HCFC's, halons, and HFC's from use in air conditioning and heat pumps, the search began for replacements that are environmentally benign, non-flammable, and similar to the banned refrigerants in system-level behavior. Refrigerant mixtures are increasingly used as working fluids because they demo

Modeling the Effects of Refrigerant Charging on Air Conditioner Performance Characteristics for Three Expansion Devices - Mohsen Farzad 1990

Intersociety Energy Conversion Engineering Conference - 1994

Numerical Heat Transfer and Fluid Flow - D. Srinivasacharya 2018-12-13

This book comprises selected papers from the International Conference on Numerical Heat Transfer and Fluid Flow (NHTFF 2018), and presents the latest developments in computational methods in heat and mass transfer. It also discusses numerical methods such as finite element, finite difference, and finite volume applied to fluid flow problems. Providing a good balance between computational methods and analytical results applied to a wide variety of problems in heat transfer, transport and fluid mechanics, the book is a valuable resource for students and researchers working in the field of heat transfer and fluid dynamics.

Experimental Investigation of Upstream Individual Superheat Control on Two-pass Water-cooled Refrigeration System - Yitong Gao 2011

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.

Proceedings of the 2nd Energy Security and Chemical Engineering Congress - Nasrul Hadi Johari 2022-09-21
This book presents selected articles presented at the 2nd Energy Security and Chemical Engineering Congress (ESChE 2021). This collection of proceedings presents the key challenges and trends related to mechanical as well as materials engineering and technology in setting the stage for promoting the sustainable technological solution for the better world. The book discusses recent explorations and findings with regard to mechanical and materials, specifically the thermal engineering and renewable energy areas that are very relevant toward the establishment of sustainable technological solutions. This book benefits academic researchers and industrial practitioners in the field of renewable energy and material engineering for energy applications.

Variable Refrigerant Flow Systems - Napoleon Enteria 2023-01-31

This book compiles the latest research, development, and application of VRF systems with contributions from various experts who pioneered and contributed to the development of the VRF system. This book presents the fundamental issues related to the real application and behaviour of the VRF system based on the long-term monitoring of the installed system. With our experience of pandemic which COVID-19 is an airborne, the spread of the virus is very fast. With this, the heating, ventilating and air-conditioning (HVAC) system is a major player in the maintenance and control of indoor environment to minimize the spread of the virus. As the variable refrigerant flow (VRF) system is a versatile HVAC system in which it can operate at different conditions, the application of the VRF system is very important to control the indoor environmental conditions. Thus, the publication of this book is

important with the present situation and the future possible situation which the control of indoor spaces is very important. With this, this book will serve as a reference for building designer, contractors, building regulators and students.

Energy Research Abstracts - 1994-10

Intelligent Building Control Systems - John T. Wen 2017-12-04

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.

Agri-Food Supply Chain Management: Breakthroughs in Research and Practice - Management Association, Information Resources 2016-09-27

The development of a sustainable agricultural system is a critical concern for any nation in modern society. By implementing proper supply chain processes, available natural resources and food can be better utilized. *Agri-Food Supply Chain Management: Breakthroughs in Research and Practice* is a compendium of emerging perspectives on the development of an effective agricultural value chain and the optimization of supply chain management within the agriculture and food sectors. Highlighting theoretical frameworks, real-world applications, and future outlooks, this book is a primary reference source for professionals, students, practitioners, and managers actively involved in agricultural development.

Proceedings of the ... Intersociety Energy Conversion Engineering Conference - 1997

Ammonia Refrigeration Technology - 2009

Topics include the design of modern ammonia systems and technological innovation, improving energy efficiency, various applications, technical guidelines and safety regulations. By using more ammonia refrigeration, we are employing environmentally friendly technology.

Global Warming - Bharat Raj Singh 2012-09-19

Global Warming has become perhaps the most complicated issue being faced by world leaders. Thus, it requires field of attention for many modern societies, power and energy engineers, academicians, researchers and stakeholders. The so-called consensus in the past century anthropogenically induced Global Warming, has recently been disputed by rising number of climate change panelists. Whatever the uncertainties of climate models are, mankind has to strive towards reduction in the amount of greenhouse gases emitted into the atmosphere in order to preserve natural resources and living organisms by introducing new advances on alternative fuels and other related technologies. This book presents the state-of-the-science fundamentals on

the origin of Global Warming and other related technologies that can be implemented to reduce human impact as well as to present novel policies that world leader should adopt. In this book, chapters received from various authors are placed in three sub-sections in a sequential and easy manner so as to strive an appropriate balance between breadth and depth of coverage of various topics.

Toward a Philosophy of Planning - Raymond Harrison Wilson 1973

Scientific and Technical Aerospace Reports - 1995

Experimental Evaluation of Heat Transfer Impacts of Tube Pitch on Highly Enhanced Surface Tube Bundle - Evraam Gorgy 2011

The current research presents the experimental investigation of the effect of tube pitch on enhanced tube bundles' performance. The typical application of this research is flooded refrigerant evaporators. Boosting evaporator's performance through optimizing tube spacing reduces cost and energy consumption. R-134a with the enhanced tube Turbo BII-HP and R-123 with Turbo BII-LP were used in this study. Three tube pitches were tested P/D 1.167, P/D 1.33, and P/D 1.5. Each tube bundle includes 20 tubes (19.05 mm outer diameter and 1 m long each) constructed in four passes. The test facility's design allows controlling three variables, heat flux, mass flux, and inlet quality. The type of analysis used is local to one location in the bundle. This was accomplished by measuring the water temperature drop in the four passes. The water-side pressure drop is included in the data analysis. A new method called the EBHT (Enthalpy Based Heat Transfer) was introduced, which uses the water-side pressure drop in performing the heat transfer analysis. The input variables ranges are: 15-55 kg/m².s for mass flux, 5-60 kW/m² for heat flux, and 10-70% for inlet quality. The effect of local heat flux, local quality, and mass flux on the local heat transfer coefficient was investigated. The comparison between the bundle performance and single tube performance was included in the results of each tube bundle. The smallest tube pitch has the lowest performance in both refrigerants, with a significantly lower performance in the case of R-134a. However, the two bigger tube pitches have very similar performance at low heat flux. Moreover, the largest tube pitch performance approaches that of the single tube at medium and high heat fluxes. For the R-123 study, the smallest tube bundle experienced quick decrease in performance at high qualities, exhibiting tube enhancement dry-out at certain flow rates and high qualities. The flow pattern effect was demonstrated by the dry-out phenomena. At medium and high heat fluxes, as the tube pitch increases, the performance approaches that of the single tube. All tube bundles experience quick decrease in performance at high qualities. Evidently, P/D 1.33 is the optimum tube pitch for the studied refrigerants and enhanced tubes combinations.

Low-Temperature Technologies and Applications - Md Salim Newaz Kazi 2022-03-30

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.

Solar Energy Update - 1984

Advances in New Heat Transfer Fluids - Alina Adriana Minea 2017-03-16

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.

Handbook of Frozen Food Processing and Packaging - Da-Wen Sun 2016-04-19

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

Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee 2002 - United Nations Environment Programme 2003-09

The 2002 assessment report, produced under the Montreal Protocol on ozone depleting substances, finds that technical progress has been made by the refrigeration, air conditioning and heat pump industry to comply with requirements to phase out CFCs and in several applications, HCFCs as well. However, there is still a significant amount of installed refrigeration equipment still using CFCs and HCFCs, and so service demand remains high and is best minimised by preventive service, containment, retrofit, recovery and recycling. Industrial Heat Pump-Assisted Wood Drying - Vasile Minea 2018-08-06

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.