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Practical Control of Indoor Air Problems Aug 29 2020

REFRIGERATION AND AIR CONDITIONING May 06 2021 This textbook provides a concise, systematic treatment of essential theories and practical aspects of refrigeration and air-conditioning systems. It is designed for students pursuing courses in mechanical engineering both at diploma and degree level with a view to equipping them with a fundamental background necessary to understand the latest methodologies used for the design of refrigeration and air-conditioning systems. After reviewing the physical principles, the text focuses on the refrigeration cycles commonly used in air-conditioning applications in tropical climates. The subject of psychrometry for analysing the various thermodynamic processes in air conditioning is particularly dealt with in considerable detail. The practical design problems require comprehensive use of tables and charts prepared by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). This text incorporates such tables and charts so that the students are exposed to solving real-life design problems with the help of ASHRAE Tables. Finally, the book highlights the features, characteristics and selection criteria of hardware including the control equipment. It also provides the readers with the big picture in respect of the latest developments such as thermal storage air conditioning, desiccant cooling, chilled ceiling cooling, Indoor Air Quality (IAQ) and thermal comfort. Besides the students, the book would be immensely useful to practising engineers as a ready reference.

An Overview of Indoor Air Quality Oct 11 2021 This thesis is designed to introduce beginning and experienced heating, ventilation and air conditioning (HVAC) engineers to common indoor air quality (IAQ) problems and solutions. The bulk of the work is a literature review of common pollutants, pollutant sources, HVAC equipment and systems, and remediation techniques. Pollutants covered include fungi, bacteria, dust mites, viruses, biofilms, microbiological volatile organic compounds (MVOC's), volatile organic compounds (VOC's), carbon dioxide, ozone, and radon. The HVAC systems covered are ventilation, direct expansion (DX), desiccant dehumidification, and system filters. The remediation techniques discussed are proper hygiene and maintenance, increased ventilation, humidity control, and proper selection of building materials.

Indoor Air Quality Case Studies Reference Guide Dec 01 2020 This text examines good and bad experiences in indoor air quality management. It contains case studies complete with commentaries that offer you a basis for making sound decisions relative to indoor air quality in your day-to-day work in building design, construction and operation.

Indoor Air Quality Model Program Sep 22 2022

Indoor Air Quality Solutions for Stationary Engineers Jul 08 2021 Indoor Air Quality Solutions for Stationary Engineers provides an overview of IAQ problems, instruments and testing procedures, and how to maintain IAQ in institutional and commercial facilities. Required safety practices, environmental protection, and common building stationary engineering applications are emphasized throughout, with references to ANSI, EPA, and ASHRAE standards.The textbook includes informative, full-color illustrations that enhance the content. Also included are review questions, scenarios based on chapter content, and procedures for using various test instruments.

Building Materials, Health and Indoor Air Quality Oct 31 2020 The impact of building materials and construction methods on the health and wellbeing of occupants is often underestimated. This book is an essential guide to understanding and avoiding hazardous materials and poor air quality in buildings. The author covers a range of issues beginning with an explanation of how buildings work and how this influences the health of occupants and users. The text covers: Ventilation, air conditioning and indoor air quality Damp and mould Asthma and respiratory problems Cancer and endocrine disorders Radiation and radon Hazardous building materials used in construction Indoor air quality and emissions Ecological alternatives and approaches and remedies for ‘sick’ buildings The book also guides the reader through the confusing world of regulations, EU and international guidelines and certifications, and provides a critical analysis of different theories of healthy buildings and philosophies. Written in a clear and accessible style, this book provides indispensable advice and information to anyone wishing to better understand healthy buildings and materials. It is essential reading for architects, surveyors, public health professionals, facilities managers and environmentalists.

Indoor Air Quality and HVAC Systems Nov 12 2021 Indoor Air Quality and HVAC Systems is a practical guide for understanding the relationship between the design, installation, operation, and maintenance of HVAC systems and achieving indoor air quality (IAQ). The book describes the individual components of HVAC systems and the role each plays in maintaining good indoor air quality. It also identifies the techniques available for evaluating the performance characteristics of ventilation systems (including the use of carbon dioxide monitors and sulfur hexafluoride tracer testing equipment). Other topics discussed include the determination of pathways of air movement through buildings and understanding pressure relationships, ventilation effectiveness, and efficiency. The book concludes with an overview of sources of air contaminants to be concerned about when performing an IAQ evaluation. Indoor Air Quality and HVAC Systems provides critical information for industrial hygienists, HVAC contractors and engineers, and building owners and managers.

The Performance of a Desiccant-Based Air Conditioner on a Florida School Mar 24 2020 Indoor air quality has become a major public health issue in recent years. ASHRAE standard 62-1989-which is an attempt to improve indoor air quality by increasing building ventilation rates-greatly increases the latent loads on many buildings. In more humid climates, the Sensible Heat Ratio (SHR) of a building's air conditioner (which is the fraction of total delivered cooling that is sensible) is too high to meet the existing latent loads. The implementation of ASHRAE 62-1989 will only exacerbate this problem.

HVAC System Mar 16 2022 In this book, various aspects of heating, ventilation, and air-conditioning (HVAC) systems are investigated. HVAC systems are milestones of building mechanical systems that provide thermal comfort for occupants accompanied with indoor air quality. HVAC systems can be classified into central and local systems according to multiple zones, location, and distribution. Primary HVAC equipment includes heating equipment, ventilation equipment, and cooling or air-conditioning equipment. Central HVAC systems are located away from buildings in a central equipment room and deliver the conditioned air by a delivery ductwork system. Central HVAC systems contain all-air, air-water, or all-water systems. Two systems should be considered as central such as heating and cooling panels and water-source heat pumps.

Indoor Air Quality Issues Jun 19 2022 This text examines problems such as microbial contamination, building design, ventilation systems and psychological effects. It uses a multi-disciplined approach in examining the causes and effects of the interactions between occupants and non-industrial environments. The text also provides the reader with a tool for diagnosing IAQ problems and effectively reducing them.

HVAC World Market Mar 04 2021 The future of HVAC systems is looking very promising. The market is expected to grow significantly in the next few years, due to the increasing demand for energy-efficient and environmentally-friendly products. HVAC manufacturers are constantly innovating and introducing new technologies that will help to improve the efficiency of these systems. This will help to reduce the overall cost of ownership, making them more affordable for consumers. In addition, the implementation of stricter energy codes and standards will drive the need for more efficient HVAC systems. This will create opportunities for manufacturers to develop new products that meet these requirements. The growing awareness of the importance of indoor air quality will also boost the demand for HVAC systems that can provide clean and healthy air. The HVAC system market is forecast to grow at a CAGR of over 6% during the period 2019-2024. The growing demand for energy-efficient and environment-friendly HVAC systems is expected to drive the market growth. The rising awareness of the importance of indoor air quality is another major factor driving the market growth. The growing construction industry, especially in the emerging economies, is another key factor driving the market growth. The rising demand for smart HVAC systems is expected to offer significant growth opportunities for the market players. The global heating, ventilation, and air conditioning (HVAC) market is predicted to grow to $358.1 billion by 2030, from $240.8 billion in 2019.

Identification and Quantification of Volatile Organic Compound Emissions from Buildings and Heating, Ventilating and Air Conditioning Systems Nov 19 2019

Building Air Quality Apr 17 2022 Provides the latest information about indoor air quality problems and how to prevent and correct them. Packed with valuable information on how to: develop an indoor air quality building profile; create an indoor air quality management plan; identify causes and solutions to problems as they occur, and identify appropriate control strategies. Special sections cover: air quality sampling; heating, ventilating, and air conditioning systems; mold and moisture problems, and much more. In looseleaf binder with tabbed dividers.

Find and Fix the Leaks Feb 03 2021

Indoor Air Quality and HVAC Systems Feb 27 2023 Indoor Air Quality and HVAC Systems is a practical guide for understanding the relationship between the design, installation, operation, and maintenance of HVAC systems and achieving indoor air quality (IAQ). The book describes the individual components of HVAC systems and the role each plays in maintaining good indoor air quality. It also identifies the techniques available for evaluating the performance characteristics of ventilation systems (including the use of carbon dioxide monitors and sulfur hexafluoride tracer testing equipment). Other topics discussed include the determination of pathways of air movement through buildings and understanding pressure relationships, ventilation effectiveness, and efficiency. The book concludes with an overview of sources of air contaminants to be concerned about when performing an IAQ evaluation. Indoor Air Quality and HVAC Systems provides critical information for industrial hygienists, HVAC contractors and engineers, and building owners and managers.

Indoor Air Quality and HVAC Systems Dec 25 2022 Indoor Air Quality and HVAC Systems is a practical guide for understanding the relationship between the design, installation, operation, and maintenance of HVAC systems and achieving indoor air quality (IAQ). The book describes the individual components of HVAC systems and the role each plays in maintaining good indoor air quality. It also identifies the techniques available for evaluating the performance characteristics of ventilation systems (including the use of carbon dioxide monitors and sulfur hexafluoride tracer testing equipment). Other topics discussed include the determination of pathways of air movement through buildings and understanding pressure relationships, ventilation effectiveness, and efficiency. The book concludes with an overview of sources of air contaminants to be concerned about when performing an IAQ evaluation. Indoor Air Quality and HVAC Systems provides critical information for industrial hygienists, HVAC contractors and engineers, and building owners and managers.

Improving Indoor Air Quality Through Design, Operation, and Maintenance Oct 23 2022 Beginning with specific guidelines for assessing and measuring indoor air contaminants, this hands-on reference details engineering, maintenance and operational procedures which may be applied to correct problems associated with "sick building syndrome," and generally to assure the safety and quality of

indoor air. Among the solutions examined are retrofitting of VAV systems with IAQ sensors, use of desiccants to remove air contaminants, and new ventilation efficiency techniques. Guidelines for optimizing operation and maintenance in terms of their impact on indoor air quality are also provided. The techniques presented are those which can provide for the quality of air in indoor environments while not sacrificing energy efficiency. While emphasizing practical IAQ solutions which can be readily implemented in new as well as in older buildings, the author has also included a number of state-of-the-art techniques and new methods for which testing has only recently been completed.

WHO Guidelines for Indoor Air Quality Sep 29 2020 This book presents WHO guidelines for the protection of public health from risks due to a number of chemicals commonly present in indoor air. The substances considered in this review, i.e. benzene, carbon monoxide, formaldehyde, naphthalene, nitrogen dioxide, polycyclic aromatic hydrocarbons (especially benzo[a]pyrene), radon, trichloroethylene and tetrachloroethylene, have indoor sources, are known in respect of their hazardousness to health and are often found indoors in concentrations of health concern. The guidelines are targeted at public health professionals involved in preventing health risks of environmental exposures, as well as specialists and authorities involved in the design and use of buildings, indoor materials and products. They provide a scientific basis for legally enforceable standards.

IAQ 94 Dec 13 2021

HVAC Systems Design Handbook, Fifth Edition Jan 14 2022 A complete, fully revised HVAC design reference Thoroughly updated with the latest codes, technologies, and practices, this all-in-one resource provides details, calculations, and specifications for designing efficient and effective residential, commercial, and industrial HVAC systems. HVAC Systems Design Handbook, Fifth Edition, features new information on energy conservation and computer usage for design and control, as well as the most recent International Code Council (ICC) Mechanical Code requirements. Detailed illustrations, tables, and essential HVAC equations are also included. This comprehensive guide contains everything you need to design, operate, and maintain peak-performing HVAC systems. Coverage includes: Load calculations Air- and fluid-handling systems Central plants Automatic controls Equipment for cooling, heating, and air handling Electrical features of HVAC systems Design documentation--drawings and specifications Construction through operation Technical report writing Engineering fundamentals-fluid mechanics, thermodynamics, heat transfer, psychrometrics, sound and vibration Indoor air quality (IAQ) Sustainable HVAC systems Smoke management

Analysis and Design of Heating, Ventilating, and Air-Conditioning Systems, Second Edition Apr 05 2021 Analysis and Design of Heating, Ventilating, and Air-Conditioning Systems, Second Edition, provides a thorough and modern overview of HVAC for commercial and industrial buildings, emphasizing energy efficiency. This text combines coverage of heating and air conditioning systems design with detailed information on the latest controls technologies. It also addresses the art of HVAC design along with carefully explained scientific and technical content, reflecting the extensive experience of the authors. Modern HVAC topics are

addressed, including sustainability, IAQ, water treatment and risk management, vibration and noise mitigation, and maintainability from a practical point of view.

Market Analysis for Healthy Air HVAC Systems in California Sep 10 2021

Fundamentals of Mold Remediation May 26 2020 You will find a wide range of practice among mold remediation workers. There are multiple standards, guidelines and common practices that often conflict with each other. Fundamentals of Mold Remediation was written to synthesize this information and provide clear instruction on the current best practices. The book covers topics such as engineering controls, personal protective equipment, removal procedures, clearance testing, health effects, and more. The book was written by an internationally recognized expert who has trained thousands of mold professionals over the last two decades.

Indoor Air Quality - a Systems Approach 3rd Ed Jan 02 2021

Air Conditioning – Energy Consumption and Environmental Quality May 18 2022 Air Conditioning - Energy Consumption and Environmental Quality theme is the component of Encyclopedia of Energy Sciences, Engineering and Technology Resources in the global Encyclopedia of Life Support Systems (EOLSS), which is an integrated compendium of twenty one Encyclopedias. The book on Air Conditioning - Energy Consumption and Environmental Quality in the Encyclopedia of Energy Sciences, Engineering and Technology Resources considers the following topics on Systems and Equipment for Space Heating, Ventilation Systems, Air conditioning and Refrigeration and Cryogenic Systems. This volume is aimed at the following five major target audiences: University and College Students, Educators, Professional Practitioners, Research Personnel and Policy Analysts, Managers, and Decision Makers and NGOs.

Indoor Air Quality Jan 26 2023 Written in easy-to-understand, non-technical terms, this book can be both a ready reference and a training guide. Covering each type of indoor air hazard, the author explains the basics of proper ventilation and the relationship of the HVAC system to indoor air quality. He examines fundamental procedures for maintaining good air quality, including filtration, control of humidity and moisture, and duct cleaning. A full chapter is devoted to recent developments and procedures for controlling toxic mould. Case studies, an HVAC glossary and several helpful directories are also included. The guide provides a comprehensive account of indoor air quality hazards, their sources and appropriate solutions.

IAQ 95 Jul 28 2020 Indoor Air Quality, Oct. 22-24, 1995, Denver, Colorado

Six-Step HVAC Maintenance Recovery Dec 21 2019 With a degree in engineering, developing a step-by-step process for HVAC energy optimization, comfort improvement and indoor air quality, for existing schools and commercial buildings, came naturally for this HVAC service and building automation contractor. With 35 + years" experience in the industry, the author, Tom Olson, is convinced that over 75% of all HVAC maintenance requirements are simply keeping all system components clean, dry and lubricated. Further, no one is better capable of providing those services, at the lowest possible cost, than well-trained in-house personnel.

However, the author"s experience is that most buildings are accomplishing less than 50% of all necessary services. The purpose of this book is to help in-house personnel, and their managers, better operate their facilities. The building block system suggested to optimize HVAC energy consumption, comfort and indoor air quality, is a simple six-step process:1. Fix what"s brokenIt"s impossible to provide the desired efficiency, comfort and indoor air quality with broken or damaged equipment. If it"s broken, it should be on a priority list for repair or replacement. This book will help you better understand what to look for and why the repairs are important.2. Clean what"s dirtyDirt and debris are your HVAC system"s biggest enemies. It causes premature equipment failure, inefficiencies, and indoor air quality related problems. Tom grew up in a family restaurant. His dad wouldn"t go to be until the kitchen was clean. So, when he joined the HVAC industry, the filth that he found was shocking! How can these systems possibly operate efficiently with all that dirt? Well, they can"t. This book spends a great deal of time talking about getting, and keeping, HVAC systems clean, including specific recommendations on air filters.3. Change methods of operations made possible, because the equipment is no longer broken and dirtyBuilding maintenance staff will be more productive, and efficient, when given the knowledge, and the time, to operate a facility free of broken and dirty equipment. Often times, however, they"ve never had an opportunity to operate a building free of such deficiencies. Methods of how to cover up for such deficiencies frequently just get passed from generation to generation. This book will help break that chain of events. 4. Temperature control system revisionsEnergy efficiency, comfort improvement and indoor air quality are not mutually exclusive terms. It is not necessary to sacrifice one to have the other two. Current, antiquated control sequences are often the root cause of preventing success in these areas. It is important to utilize proven, modern control sequences to eliminate simultaneous cooling and heating, including simultaneous atmospheric cooling and heating. If your mixed air temps are always 55•F, or 60•F, you"re providing costly, uncomfortable sequences of operation. ASHRAE has discouraged it since 1975! It"s time to stop. This book can help.5. Install new technology hardwareIn the hands of the right technician, there are few control sequences that pneumatic temperature control systems can"t accomplish. The problem is, those technicians are few and far between. It is frequently in your best, long-term interest to replace defective equipment, instead of investing in repairs of old, antiquated equipment. This applies to more than just pneumatic controls. Old boilers are another example of old equipment that have outlived their effectiveness. In many instances, there are new, unique and often low-cost equipment solutions. This book will share many ideas with you.6. Implement preventive maintenance routines Preventative maintenance is an area that should be incorporated throughout the six-step process. A good schedule of preventative maintenance is one of the most important factors in managing time and financial resources. Again, this book will help your in-house maintenance personnel become more self-sufficient.

Indoor Air Quality and Heating, Ventilation & Air Conditioning Systems in Office Buildings Apr 24 2020 This dissertation, "Indoor Air Quality and Heating, Ventilation & Air Conditioning Systems in Office Buildings" by Wai-yip, Leung, ???, was obtained from The University of Hong Kong (Pokfulam, Hong Kong) and is being sold pursuant to Creative Commons: Attribution 3.0 Hong

Kong License. The content of this dissertation has not been altered in any way. We have altered the formatting in order to facilitate the ease of printing and reading of the dissertation. All rights not granted by the above license are retained by the author. DOI: 10.5353/th_b3125378 Subjects: Indoor air pollution - China - Hong Kong Office buildings - Heating and ventilation - China - Hong Kong

Heating, Ventilating, and Air Conditioning Feb 15 2022 HEATING, VENTILATING, AND AIR CONDITIONING Completely revised with the latest HVAC design practices! Based on the most recent standards from ASHRAE, this Sixth Edition provides complete and up-to-date coverage of all aspects of heating, ventilation, and air conditioning. You'll find the latest load calculation procedures, indoor air quality procedures, and issues related to ozone depletion. Throughout the text, numerous worked examples clearly show you how to apply the concepts in realistic scenarios. In addition, several computer programs (several new to this edition) help you understand key concepts and allow you to simulate various scenarios, such as psychometrics and air quality, load calculations, piping system design, duct system design, and cooling coil simulation. Additionally, the load calculation program has been revised and updated. These computer programs are available at the book's website: www.wiley.com/college/mcquiston Key Features of the Sixth Edition Additional new worked examples in the text and on the accompanying software. Chapters 6-9 have been extensively revised for clarity and ease of use. Chapter 8, The Cooling Load, now includes two approaches: the heat balance method, as recommended by ASHRAE, and the simpler RTS method. Both approaches include computer applications to aid in calculations. Provides complete, authoritative treatment of all aspects of HVAC, based on current ASHRAE standards. Numerous worked examples and homework problems provide realistic scenarios to apply concepts.

Ventilation and Acceptable Indoor Air Quality in Low-rise Residential Buildings Aug 21 2022

The Inside Story Jul 20 2022

Management of Indoor Air Quality Oct 19 2019 Due to changes in lifestyle, people spend more time indoors. This refers not only to the time spent at home and at office premises, but also in shopping malls, recreation centers and transport vehicles. Concentrations of many pollutants are higher indoors than they are outdoors. Consequently, the indoor environment has a bigger impact on human health, well being and effectiveness. Indoor Environment Engineering is a relatively new scientific discipline with an interdisciplinary character, using knowledge from chemistry, biology, medicine and engineering. Since the early 1990s, the number of studies in this area has grown significantly from research on indoor air parameters, new emerging pollutants in indoor air, energy saving systems of heating, to studies on ventilation and air-conditioning in buildings. Even though much progress has been made since then, a number of questions still remains open: How can indoor air quality be measured? What are reliable, time- and cost-efficient methods? How can indoor air quality be improved, investing as little energy as possible? How to minimize secondary pollution caused by air supply systems? Which type of pollutants should research focus on? In what way are we exposed to new pollutants (plasticizers, flame

retardants, pesticides)? What is their impact on our health? Management of Indoor Air Quality is a collection of 14 peer reviewed papers in Indoor Environment Engineering addressing the above issues. It includes research on HVAC impact on aerosol levels, new ventilation systems as well as air quality problems in new environments. The volume is intended for scientists, engineers, post-graduate and graduate students interested in the area of indoor environment.

HVAC and Refrigeration Preventive Maintenance Nov 24 2022 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

Sick Buildings Aug 09 2021 This book is a comprehensive examination of the phenomenon of poor indoor air quality (IAQ) characterized as sick or problem buildings. Significant emphasis is given to defining the nature of the problem, the various potential causal and risk factors, problem building diagnostic protocols and contaminant measurements, and the mitigation of IAQ problems, including case histories. The book features a discussion on the potential causal factors studied extensively in Europe and recognized in North America as well.

Indoor Air Quality Jun 26 2020 This Special Issue aims to make a concrete technical contribution to the solution of the various problems related to indoor air pollution. In 11 papers, international scientists report the last findings in this field from different points of view including topics such as the IAQ legislation, the role of IAQ in schools, hospitals and (micro)environments in general, the performance of an olfactometer system or the impact of an indoor malodor, BTEX measures in a Fire Station, and a chemical characterization of e-cigarette (e-cig) refill liquids (e-liq). It seems appropriate to encourage the development of reference values or specific action values in order to better manage particularly problematic situations in these environments. In the absence of national references to be used for a comparison, it is possible to use those reported in the legislation of other European countries or, by ad hoc working groups or by analogy, to use other standards such as those relating to ambient air.

Understanding Indoor Air Quality Jan 22 2020 Understanding Indoor Air Quality presents a comprehensive examination of indoor air pollution that addresses the scope, origins, social context, and human health consequences of this emerging public health issue. Topics including the history, social context, and point sources of pollutants and their subsequent consequences are discussed. New and practical approaches for the diagnosis of indoor air quality problems are also addressed. The book's extensive coverage of indoor air pollution makes it essential for physicians, nurses, industrial hygienists, safety professionals, building owners and managers, office managers and workers, as well as others concerned with this problem.

Indoor Air Quality Feb 21 2020

Proceedings of the 8th International Symposium on Heating, Ventilation and Air ConditioningJun 07 2021 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.