Human Thermal Environments The Effects Of Hot Moderate And Cold Environments On Human Health Comfort And Performance Author Ken Parsons Feb 2003

This book provides an up-to-date, accessible, and comprehensive coverage of human cold stress from principles and theory to practical application. It defines cold stress and how people respond to it. It describes how to assess a cold environment to predict when discomfort, wind-chill, hypothermia, shivering, frostbite, and other consequences will occur. It also advises on what to do to prevent unacceptable outcomes, including determination and selection of clothing to preserve comfort and health. The book will be of interest to practitioners and students and anyone involved with fields such as textiles, clothing, and industrial hygiene.

Thousands of people continue to die from heat. Heat illnesses and advice for preventing heat casualties at work, during heatwaves, sport and the effects of global warming are described. A new perspective on thermoregulation integrates physiological and psychophysical regulated variables. Heat stress indices, the WBGT and the SWreq are presented. It is time to understand and routinely use computer simulations of people in hot conditions. How to understand how a model can be constructed is also described. This book provides an accessible, concise and comprehensive coverage into how people respond to heat and how to predict and avoid heat causalities. A practical productivity model, and Burn thresholds, complete the book which begins with up to date knowledge on measurement of heat stress, heat strain, metabolic rate and the thermal properties and influences of clothing. Features Provides methods and regulations through international standards Illustrates the WBGT and analytical heat stress indices and how to construct a thermal model Discusses the role of clothing on heat stress and thermal strain Presents a new model for predicting productivity in the heat Offers a new method of human thermoregulation Considers heat illness and prevention during heatwaves and in global warming

Providing detailed analysis of the thermal comfort assessment of clothing as the basis for developing standards, this book discusses the thermal protective role of clothing as a way of modelling heat transfer from the body, general thermal regulation of humans, and the importance of globally accepted test methods and standards to improve quality. New materials and discoveries in the study of thermal comfort necessitate the need for standard improvements and update. The development of international standards and the unification of testing methods is of crucial significance to ensure cost reduction and health protection. The book promotes instruments, methods, implementation of unified specifications, and the definition of standards so that a clear quality management system can be established, for both production systems and testing methods. It discusses standards in ergonomics of the thermal environment, clothing thermal characteristics, and subjective assessment of thermal comfort, which allows for systematic control of the measuring methods and the services and final products that are distributed on the global market. This book is aimed at industry professionals, researchers, and advanced students working in textile and clothing engineering, comfort testing, and ergonomics.

Biometeorology continues to grow as a discipline. It is increasingly recognised for its importance in providing science of relevance to society and well being of the environment. This book is the first in a new book series on Biometeorology. The purpose of the new series is to communicate the interdisciplinary philosophy and science of biometeorology to as wide an audience as possible, introduce scientists and

policy makers to the societal relevance of and recent developments in its s- fields and demonstrate how a biometeorological approach can provide insights to the understanding and possible solution of cross-cutting environmental issues. One such cross-cutting environmental issue is climate change. While the literature on the science of climate change, climate change mitigation and the impacts of climate change is voluminous, that on adaptation to climate change is meagre in comparison. The purpose of this book is to partly redress this imbalance by providing insights from a biometeorological perspective. The book acknowledges that society has a long history of adapting to the impacts associated with climatic variability and change but makes the point that climate change poses a real threat to already strained coping systems. Therefore there is a need to realign human use systems with changing climate conditions.

Environmental Ergonomics addresses the problems of maintaining human comfort, activity and health in stressful environments. Its subject areas include thermal environments, illumination, noise and hypo- and hyperbaric environments. The book concentrates fundamentally on the way the thermal environment has affected human comfort, health and performance from the age of cave-dwellings to our age of skyscrapers.

This book contains only papers selected from the 10th ICEE held in Japan 23-27 September 2002. The ICEE has been held biannually since 1982, and has firmly established itself as the world’s most distinguished conference in its field, offering the ideal forum for research scientists, medical doctors, engineers, administrators, technicians, healthcare professionals and students to share their work and ideas.

Selected papers from the 10th International Conference on Environmental Ergonomics held in Japan, 23-27 September 2002. They have been revised and peer-reviewed. Papers included in this text have been widely recognised as the catalyst for the recent advances witnessed in Environmental Ergonomics in Asia. They strike a balance between academia and industries' views on environmental ergonomics. Add this volume to your copy of the Elsevier Ergonomics Book Series.

Human Thermal EnvironmentsThe Effects of Hot, Moderate, and Cold Environments on Human Health, Comfort, and Performance, Third EditionCRC Press

Urban Climates is the first full synthesis of modern scientific and applied research on urban climates. The book begins with an outline of what constitutes an urban ecosystem. It develops a comprehensive terminology for the subject using scale and surface classification as key constructs. It explains the physical principles governing the creation of distinct urban climates, such as airflow around buildings, the heat island, precipitation modification and air pollution, and it then illustrates how this knowledge can be applied to moderate the undesirable consequences of urban development and help create more sustainable and resilient cities. With urban climate science now a fully-fledged field, this timely book fulfills the need to bring together the disparate parts of climate research on cities into a coherent framework. It is an ideal resource for students and researchers in fields such as climatology, urban hydrology, air quality, environmental engineering and urban design.

This thesis presents a series of studies into the responses of people to outdoor thermal conditions experienced over all seasons in the United Kingdom. The aim was to investigate practical methods for predicting human responses to outside weather conditions, which would be useful in predicting effects on human comfort and health. The studies involved both laboratory experiments and field trials. One particular aspect of outside conditions, not usually investigated in laboratory studies, is the contribution of solar radiation. Single subject and thermal manikin studies were used to determine the contribution of solar radiation to human response. In addition to this, a total of 168 subjects responses were recorded during trials at the Loughborough University weather

station compound. (latitude 52.47N and longitude 01.11W). The trials were distributed between July 2007 and October 2008. This provided a comprehensive data-base for the evaluation of thermal indices. The thesis is divided into four parts. Part one provides an introduction to the subject and a comprehensive literature review. It also describes equipment, calibration procedures and methods used. Part two quantified the contribution of solar radiation to the heat load on a person. A human subject and a heated thermal manikin were exposed to outdoor thermal conditions, while in light clothing and (for the person) conducting a step test. They were then exposed to identical conditions in a thermal chamber, but without the contribution of the sun. The conditions outside were 23?C air temperature, 42?C mean radiant temperature and 54% relative humidity with an average air velocity of 0.75 ms-1. The difference in sweat rate (person) and heat required (manikin) between outdoor and indoor conditions were used to estimate the contribution of the sun. Using three different analyses estimates were 14 Wm-2, 35 Wm-2 and 50 Wm-2 depending upon the assumptions made. Part three describes current thermal indices that can be used to assess the effects of weather conditions on people. It also presents the results of weather station measurements over the time period considered. In chapters 8 and 9 field trials are described which capture both the thermal conditions and human physiological and subjective responses to those conditions. Chapter 10 uses the data collected to provide an evaluation of current thermal indices for predicting human responses. The range of air temperature and relative humidity (at 2 pm) over a year was -2?C to 29?C and 34% to 95% respectively. Wind speed varied and was greater in winter and spring than in summer and autumn. Solar radiation was influenced by the altitude of the sun which depended upon season. Mean solar radiation increased from December to June and decreased from June to December. The subjective and physiological responses for 130 people (65 males and 65 females) over a range of outdoor weather conditions are presented. Physiological responses for females generally showed a stronger relationship with environmental variables and subjective responses than those for males. The subjective and physiological responses of four groups (one in each season of the year - involving a total of 38 people), are presented. It was found that there were significant individual differences in response. Part four provides a suggestion for an improved thermal index. The PMV (Predicted Mean Vote) out of four thermal indices (WBGT, PMV, WCI/tch and Twc) had the strongest relationship with environmental variables and physiological responses but had a weak relationship with subjective responses. A PMVoutdoors index was developed to improve the prediction of subjective responses for the outdoor conditions investigated. Conclusions and recommendations for future research are provided.

This book discusses the latest findings on ensuring employees' safety, health, and welfare at work. It combines a range of disciplines – e.g. work physiology, health informatics, safety engineering, workplace design, injury prevention, and occupational psychology – and presents new strategies for safety management, including accident prevention methods such as performance testing and participatory ergonomics. The book, which is based on the AHFE 2017 International Conference on Safety Management and Human Factors, held on July 17–21, 2017, in Los Angeles, California, USA, provides readers, including decision makers, professional ergonomists and program managers in government and public authorities, with a timely snapshot of the state

of the art in the field of safety, health, and welfare management. It also addresses agencies such as the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH), as well as other professionals dealing with occupational safety and health.

Thermal Protective Clothing for Firefighters explores the materials, design, and usage of thermal protective clothing. The characteristics of fire hazards are discussed in detail, and the thermal environments faced by firefighters in these fire hazards are also examined. The different types of potential burn injuries and the heat stress that occurs to firefighters' bodies when exposed to such thermal environments are analyzed. Furthermore, the development of various high performance fibers and fabrics for thermal protective clothing is discussed. The test methods and existing standards to evaluate the thermal protective and physiological comfort performances of the fabrics and clothing are critically reviewed. Recent developments in the field of fire- and heat-resistant materials have led to significant improvements in thermal protective clothing. In parallel with this, the complexity and risk levels of fires, especially in industrial-storage facilities, and developments in health and safety cultures have increased the demand for high-performance heat- and flame-resistant clothing and equipment, designed to mitigate skin burn injuries and reduce risk of death from fire hazards. Throughout the work, the gaps and limitations in existing test methods and standards are identified, and approaches are recommended for the development of enhanced test methods. Scenario modeling and its implications for firefighters' protective clothing is discussed, and various factors affecting performance are established. Finally, various key issues related to thermal protective clothing are addressed to guide the future research in the field of thermal protective clothing for firefighters. This book will help materials-textile engineers to develop high performance thermal protective clothing that can enhance the protection, safety, and comfort of firefighters. Offers a helpful guide to the successful specification and design of high performance protective clothing to meet the high standards of today's regulatory framework Introduces the new materials technical innovations that are transforming fire protective clothing Explores the role of clothing from the operational perspective, including technical innovations Offers a critical review of the test methods and existing standards to evaluate the thermal protective and physiological comfort performances of the fabrics and clothing

There has been widespread dissatisfaction with accepted models for predicting the conditions that people will find thermally comfortable in buildings. These models require knowledge about clothing and activity, but can give little guidance on how to quantify them in any future situation. This has forced designers to make assumptions about people's future behaviour based on very little information and, as a result, encouraged static design indoor temperatures. This book is the second in a three volume set covering all aspects of Adaptive Thermal Comfort. The first part narrates the development of the adaptive approach to thermal comfort from its early beginnings in the 1960s. It discusses recent work in the field and suggests ways in which it can be developed and modelled. Such models can be used to set dynamic, interactive standards for thermal comfort which will help overcome the problems inherited from the past. The second part of the volume engages with the practical and theoretical problems encountered in field studies and in their statistical analysis, providing guidance towards their resolution, so that valid

conclusions may be drawn from such studies.

Our thermal environment is as rich in cultural associations as our visual, acoustic, olfactory, and tactile environments. This book explores the potential for using thermal qualities as an expressive element in building design. Until quite recently, building technology and design has favored high-energy-consuming mechanical methods of neutralizing the thermal environment. It has not responded to the various ways that people use, remember, and care about the thermal environment and how they associate their thermal sense with their other senses. The hearth fire, the sauna, the Roman and Japanese baths, and the Islamic garden are discussed as archetypes of thermal delight about which rituals have developed—reinforcing bonds of affection and ceremony forged in the thermal experience. Not only is thermal symbolism now obsolete but the modern emphasis on central heating systems and air conditioning and hermetically sealed buildings has actually damaged our thermal coping and sensing mechanisms. This book for the solar age could help change all that and open up for us a new dimension of architectural experience. As the cost of energy continues to skyrocket, alternatives to the use of mechanical force must be developed to meet our thermal needs. A major alternative is the use of passive solar energy, and the book will provide those interested in solar design with a reservoir of ideas.

This dissertation research examines the effects of different cool pavement design and management strategies on improving the thermal environment and mitigating near-surface heat island effects through field measurements, modeling and simulation. In this research, nine experimental test sections were designed, constructed and instrumented and the thermal performance of different types of pavements and management strategies (including high reflectance, high thermal resistance pavement, and permeable pavement with evaporative cooling) were empirically investigated. Different cooling effects were identified for each strategy along with their advantages and associated disadvantages. Relevant properties of pavement materials (e.g. albedo, permeability, thermal conductivity, heat capacity and evaporation rate) were measured in many cases using newly developed methods. With these fundamental materials properties, a local microclimate model was developed, validated and applied to conduct sensitivity analysis on some key parameters to evaluate the thermal impacts of different cool pavement strategies in different climate regions. In addition, the impacts of different strategies on outdoor human thermal comfort were evaluated for different climate regions (Sacramento and Los Angeles in California and Phoenix in Arizona). One type of thermal load associated with building energy use was evaluated for Davis, California. Findings indicate that using high reflectance pavement will reduce pavement surface temperature and consequently might help improve the air quality through reduction of the formation of ground-level ozone. However, increasing the pavement reflectance would affect human thermal comfort during hot periods due to an increase in the Mean Radiant Temperature contributed by the increased reflected radiation striking human bodies. Enhancing the evaporation from the pavement through use of permeable pavement and creating shading on pavement with trees or other devices (e.g. solar panels) are likely to be effective strategies to reduce pavement surface temperature and improve human thermal comfort in hot periods. However, to be effective in arid and semiarid climates such as California, the water level must be kept near the surface of

the permeable pavement through infusions of waste water such as waste landscape irrigation. Some cool pavement strategies used to improve the summer thermal environments might make the cold winter slightly colder. Therefore strategies such as evaporation and shading only in summer that can help reduce the summer hot temperatures but will not heavily reduce the winter cold temperature is desirable for some regions. Based on the findings from this study, some preliminary recommendations on the application of cool pavement strategies for mitigating near-surface heat island are: (1) Pave less and plant more. For some areas such as parking lots and alleys, the sites could be partly paved, and more grass and/or trees could be planted on the sites to reduce negative impacts of pavement. (2) Pave smart if it has to be paved. Permeable pavements (integrated with irrigation systems during hot dry seasons), including pervious concrete pavement, porous asphalt pavement, and permeable interlocking concrete pavers and reinforced grass pavers, could be good alternatives for paving if applicable, to both manage the stormwater runoff and potentially help mitigate near-surface heat island effect and improve thermal environments. (3) Care should be taken with the application of high-reflectance pavements. High-reflectance pavements can be used in open areas to help mitigate the heat island effects. However, special attention should be given when applied in high-density areas or areas with frequent walking or cycling human occupancy. (4) Consider evaporation and shading. Evaporation and shading could be very effective strategies to help improve the thermal environments in hot climates. (5) The models developed in this study for local microclimate, thermal comfort and building energy use can be used, if needed, and improved for evaluating seasonal impacts of different pavement strategies in different contexts. (6) Life cycle cost analysis (LCCA) and/or benefit-cost analysis (BCA), as well environmental life cycle assessment (LCA) should be performed to quantitatively evaluate the life cycle economic and environmental impacts for different cool pavement strategies in different climates.

Providing a methodology for evaluating indoor thermal comfort with a focus on children, this book presents an in-depth examination of children’s perceptions of comfort. Divided into two sections, it first presents a history of thermal comfort, the human body and environmental parameters, common thermal comfort indexes, and guidelines for creating questionnaires to assess children’s perceptions of indoor thermal comfort. It then describes their understanding of the concepts of comfort and energy, and the factors that influence that perception. In this context, it takes into account the psychological and pedagogical aspects of thermal comfort judgment, as well as architectural and environmental characteristics and equips readers with the knowledge needed to effectively investigate children’s perspectives on environmental ergonomics. The research field of indoor thermal comfort adopts, on the one hand, physical parameter measurements and comfort indexes (e.g. Predicted Mean Vote (PMV) or adaptive comfort), and on the other, an ergonomic assessment in the form of questionnaires. However the latter can offer only limited insights into the issue of comfort, as children often use different terms than adults to convey their experience of thermal comfort. The books aims to address this lack of understanding with regard to children’s perceptions of indoor thermal comfort. The book is intended for HVAC engineers and researchers, architects and researchers interested in thermal comfort and the built environment. It also provides a useful resource for environmental psychologists, medical and cognitive researchers.

This book reviews the research pertaining to nutrient requirements for working in cold or in high-altitude environments and states recommendations regarding the application of this information to military operational rations. It addresses whether, aside from increased energy demands, cold or high-altitude environments elicit an increased demand or requirement for specific nutrients, and whether performance in cold or high-altitude environments can be enhanced by the provision of increased amounts of specific nutrients.

This book offers broad overview of the field of cognitive engineering and neuroergonomics, covering emerging practices and future trends toward the harmonious integration of human operators and computer systems. It presents novel theoretical findings on mental workload and stress, activity theory, human reliability, error and risk, and a wealth of cutting-edge applications, such as strategies to make assistive technologies more user-oriented. Further, the book describes key advances in our understanding of cognitive processes, including mechanisms of perception, memory, reasoning, and motor response, with a particular focus on their role in interactions between humans and other elements of computer-based systems. Gathering the proceedings of the AHFE 2020 Virtual Conferences on Neuroergonomics and Cognitive Engineering, and Industrial Cognitive Ergonomics and Engineering Psychology, held on 16–20 July 2020, this book provides extensive and timely information for human–computer interaction researchers, human factors engineers and interaction designers, as well as decision-makers.

The fundamental function of buildings is to provide safe and healthy shelter. For the fortunate they also provide comfort and delight. In the twentieth century comfort became a 'product' produced by machines and run on cheap energy. In a world where fossil fuels are becoming ever scarcer and more expensive, and the climate more extreme, the challenge of designing comfortable buildings today requires a new approach. This timely book is the first in a trilogy from leaders in the field which will provide just that. It explains, in a clear and comprehensible manner, how we stay comfortable by using our bodies, minds, buildings and their systems to adapt to indoor and outdoor conditions which change with the weather and the climate. The book is in two sections. The first introduces the principles on which the theory of adaptive thermal comfort is based. The second explains how to use field studies to measure thermal comfort in practice and to analyze the data gathered. Architects have gradually passed responsibility for building performance to service engineers who are largely trained to see comfort as the ‘product’, designed using simplistic comfort models. The result has contributed to a shift to buildings that use ever more energy. A growing international consensus now calls for low-energy buildings. This means designers must first produce robust, passive structures that provide occupants with many opportunities to make changes to suit their environmental needs. Ventilation using free, natural energy should be preferred and mechanical conditioning only used when the climate demands it. This book outlines the theory of adaptive thermal comfort that is essential to understand and inform such building designs. This book should be required reading for all students, teachers and practitioners of architecture, building engineering and management – for all who have a role in producing, and occupying, twenty-first century adaptive, low-carbon, comfortable buildings.

This book highlights the importance of outdoor thermal comfort for improving urban living quality in the context of urban planning and urban geometry design. It introduces readers to a range of assessment methods and applications of outdoor thermal comfort and addresses urban geometry and thermal environment at the neighbourhood scale using real-world examples and parametric studies. In addition, the subjective evaluations by urban dwellers and numerical modelling tools introduced in this book provide not only a comprehensive assessment of outdoor thermal comfort but also an integrated approach to using thermal comfort indicators as a standard in high-density cities. Given its scope, the book offers a valuable guide for urban climate researchers, urban planners, and designers, and policymakers pursuing more liveable urban

environments.

Winner of the Choice Outstanding Academic Titles of 2010 award. Ensuring that buildings are healthy and comfortable for their occupants is a primary concern of all architects and building engineers. This highly practical handbook will help make that process more efficient and effective. It begins with a guide to how the human body and senses react to different indoor environmental conditions, together with basic information on the parameters of the indoor environment and problems that can occur. It then moves on to give a background to the development of the study and control of the indoor environment, examining the main considerations (including thermal, lighting, indoor air and sound-related aspects) for a healthy and comfortable indoor environment and discussing the drivers for change in the field. The final section presents a new approach towards health and comfort in the indoor environment, where meeting the wishes and demands of the occupants with a holistic strategy becomes the over-riding priority. The book is filled with useful facts, figures and analysis, and practical methods that designers who are keen to assess and improve the user experience of their buildings will find invaluable.

This book deals with indoor environmental quality (IEQ), which encompasses diverse factors that affect human life inside a building. These factors include indoor air quality (IAQ), lighting, acoustics, drinking water, ergonomics, electromagnetic radiation, and so on. Enhanced environmental quality can improve the quality of life and productivity of the occupants, increase the resale value of the building, and minimize the penalties on building owners. The book covers an overview of IEQ and its research progress, IAQ and its monitoring, the best indoor illumination scenes, IEQ in healthcare buildings, and acoustic comfort in residential buildings and places of worship. This book is expected to benefit undergraduate and postgraduate students, researchers, teachers, practitioners, policy makers, and every individual who has a concern for healthy life.

Thermal comfort is a desirable state familiar to all people. Providing inspirational indoor and outdoor environments that provide thermal comfort, in the context of energy use and climate change, is a challenge for the 21st century. This book provides an up-to-date, comprehensive coverage of thermal comfort from principles and theory to practical application. The book begins with current knowledge and understanding of thermal comfort and its application to providing thermal conditions for indoor and outdoor environments. It integrates and presents new ideas to provide a comprehensive model of thermal comfort so that we can move on from the 20th and early 21st century and provide a focus for developments for future decades. This book will be of interest to practitioners and students and anyone involved with fields such as environmental design, physiology, ergonomics, human factors, industrial hygiene, architecture, health and safety and air conditioning. • Provides current thermal comfort standards and regulations • Describes the PMV, PPD, ET* and SET thermal comfort indices • Discusses adaptive thermal comfort, adaptive opportunity and explains why we have not moved towards a more dynamic and interactive approach to providing thermal comfort • Presents a new model relating thermal discomfort to performance • Shows how to construct a computer model of thermal comfort • Offers how to conduct a thermal comfort survey Human Thermal Comfort provides new ideas for achieving thermal comfort for offices, vehicles, atriums, and plazas of the future.

The indoor environment affects occupants' health and comfort. Poor environmental conditions and indoor contaminants are estimated to cost the U.S. economy tens of billions of dollars a year in exacerbation of illnesses like asthma, allergic symptoms, and subsequent lost productivity. Climate change has the potential to affect the indoor environment because conditions inside buildings are influenced by conditions outside them. Climate Change, the Indoor Environment, and Health addresses the impacts that climate change may have on the indoor environment and the resulting health effects. It finds that steps taken to mitigate climate change may cause or exacerbate harmful

indoor environmental conditions. The book discusses the role the Environmental Protection Agency (EPA) should take in informing the public, health professionals, and those in the building industry about potential risks and what can be done to address them. The study also recommends that building codes account for climate change projections; that federal agencies join to develop or refine protocols and testing standards for evaluating emissions from materials, furnishings, and appliances used in buildings; and that building weatherization efforts include consideration of health effects. Climate Change, the Indoor Environment, and Health is written primarily for the EPA and other federal agencies, organizations, and researchers with interests in public health; the environment; building design, construction, and operation; and climate issues.

A resource for individuals responsible for siting decisions, this guidelines book covers siting and layout of process plants, including both new and expanding facilities. This book provides comprehensive guidelines in selecting a site, recognizing and assessing long-term risks, and the optimal lay out of equipment facilities needed within a site. The information presented is applicable to US and international locations. Note: CD-ROM/DVD and other supplementary materials are not included as part of eBook file.

Provides a systematic review of modern methods and instruments for measuring environmental parameters • Profiles the most modern methods and instruments for environment control and monitoring • Gives an assessment of biotic and abiotic factors and their effect on quality of atmosphere and indoor air, soil, water • Provides a brief description of the main climatic (pressure, wind, temperature, humidity, precipitation, solar radiation), atmospheric, hydrographic, and edaphic factors • Covers a wide range environmental methods and instrumentation including those used in the fields of meteorology, air pollution, water quality, soil science and more • Supplied with practical exercises, problems, and tests that will help the reader to learn more deeply contents of the book

Our responses to our thermal environment have a considerable effect on our performance and behavior, not least in the realm of work. There has been considerable scientific investigation of these responses and formal methods have been developed for environmental evaluation and design. In recent years these have been developed to the extent that detailed national and international standards of practice have now become feasible. This new edition of Ken Parson's definitive text brings us back up to date. He covers hot, moderate and cold environments, and defines these in terms of six basic parameters: air temperature, radiate temperature, humidity, air velocity, clothing worn, and the person's activity. There is a focus on the principles and practice of human response, which incorporates psychology, physiology and environmental physics with applied ergonomics. Water requirements, computer modeling and computer-aided design are brought in, as are current standards. Special populations, such as the aged or disabled and specialist environments such as those found in vehicles are also considered. This book continues to be the standard text for the design of environments for humans to live and work safely, comfortably and effectively, and for the design of materials which help the same people cope with their environments.

This book focuses on human adaptive thermal comfort in the building environment and the balance between reducing building air conditioning energy and improving occupants' thermal comfort. It examines the mechanism of human thermal adaptation using a newly developed adaptive heat balance model, and presents pioneering findings based on an on online survey, real building investigation, climate chamber experiments, and theoretical models. The book investigates three critical issues related to human thermal adaptation: (i) the dynamics of human thermal adaptation in the building environment; (ii) the basic rules and effects of human physiological acclimatization and psychological adaptation; and (iii) a new, adaptive, heat balance model describing behavioral adjustment, physiological acclimatization, psychological adaptation, and physical improvement effects. Providing the basis for establishing a more reasonable adaptive thermal comfort

model, the book is a valuable reference resource for anyone interested in future building thermal environment evaluation criteria.

In the ten years since the publication of the second edition of Human Thermal Environments: The Effects of Hot, Moderate, and Cold Environments on Human Health, Comfort, and Performance, Third Edition, the world has embraced electronic communications, making international collaboration almost instantaneous and global. However, there is still a need for a compilation of up-to-date information and best practices. Reflecting current changes in theory and applications, this third edition of a bestseller continues to be the standard text for the design of environments for humans to live and work safely, comfortably, and effectively, and for the design of materials that help people cope with their environments. See What's New in the Third Edition: All existing chapters significantly updated Five new chapters Testing and development of clothing Adaptive models Thermal comfort for special populations Thermal comfort for special environments Extreme environments Weather Outdoor environments and climate change Fun runs, cold snaps, and heat waves The book covers hot, moderate, and cold environments, and defines them in terms of six basic parameters: air temperature, radiant temperature, humidity, air velocity, clothing worn, and the person's activity. It focuses on the principles and practice of human response, which incorporates psychology, physiology, and environmental physics with applied ergonomics. The text then discusses water requirements, computer modeling, computer-aided design, and current standards. A systematic treatment of thermal environments and how they affect humans in real-world applications, the book links the health and engineering aspects of the built environment. It provides you with updated tools, techniques, and methods for the design of products and environments that achieve thermal comfort.

Occupational exposure to heat can result in injuries, disease, reduced productivity, and death. To address this hazard, the National Institute for Occupational Safety and Health (NIOSH) has evaluated the scientific data on heat stress and hot environments and has updated the Criteria for a Recommended Standard: Occupational Exposure to Hot Environments [NIOSH 1986a]. This updated guidance includes information about physiological changes that result from heat stress, and relevant studies such as those on caffeine use, evidence to redefine heat stroke, and more. Related products: Weather & Climate collection is available here: https://bookstore.gpo.gov/catalog/weather-climate Emergency Management & First Responders can be found here: https://bookstore.gpo.gov/catalog/emergency-management-first-responders Fire Management collection is available here: https://bookstore.gpo.gov/catalog/fire-management

Urban heat islands are a new type of microclimatic phenomenon that causes a significant increase in the temperature of cities compared to surrounding areas. The phenomenon has been enforced by the current trend towards climate change. Although experts consider urban heat islands an urgent European Union public health concern, there are too few policies that address it. The EU carried out a project to learn more about this phenomenon through pilot initiatives. The pilots included feasibility studies and strategies for appropriately altering planning rules and governance to tackle the problem of urban heat islands. The pilots were carried out in eight metropolitan areas: Bologna/Modena, Budapest, Ljubljana, Lodz, Prague, Stuttgart, Venice/Padova, and Vienna. The feasibility studies carried out in these pilot areas focused on the specific morphology of EU urban areas, which are often characterised by the presence of historical old towns.

Protective clothing protects wearers from hostile environments, including extremes of heat and cold. Whilst some types of protective clothing may be designed primarily for non-thermal hazards (e.g. biological hazards), a key challenge in all protective clothing remains wearer comfort and the management of thermal stress (i.e. excessive heat or cold). This book reviews key types of protective clothing, technologies for heating and cooling and, finally, modeling aspects of thermal stress and strain. Explores different types of protective clothing, their uses and their requirements, with an emphasis on full-scale or prototype clothing, including immersion suits, body armour and space suits Considers

novel and commercial technologies for regulating temperature in protective clothing, including phase change materials, shape memory alloys, electrically heated clothing and air and water perfusion-based cooling systems Reviews the human thermoregulatory system and the methods of modelling of thermal stress in protective clothing through various conditions, including cold water survival and firefighting

Awareness that many aspects of public health are influenced by climate is growing dramatically. Results presented at the Wengen conference make clear that the science and art of integrating climate knowledge into the control of climate sensitive diseases on a year to year time frame, as well as careful assessments of the potential impacts of climate change on health outcomes over longer time frames, is advancing rapidly. This book provides a snapshot of these emerging themes.

The transfer of heat and moisture through textiles is vital to the manufacture and design of clothing, technical and protective textiles. Continued advances in textile processing technology, the growth of manufactured nonwovens and the application of nanotechnology have resulted in a wealth of research in order to characterise the behaviour of these materials. Thermal and moisture transport in fibrous materials provides a comprehensive guide of the technological developments and scientific understanding in this area. The first section summarises the structure, geometry and stereology of fibrous materials. The fundamentals of wetting and its dynamics are also discussed. Part two analyses thermal and liquid interactions in textiles and offers insights into the thermodynamic behaviour of moisture as well as heat and moisture coupling. The book concludes with chapters on the human thermoregulatory system, interfacing between fibrous materials and the human body and innovative computer modelling simulations. Thermal and moisture transport in fibrous materials is an essential reference for all those involved in the textile industry, especially those concerned with the design and manufacture of technical textiles and protective clothing. Summarises the structure, geometry and stereology of fibrous materials Discusses the fundamentals of wetting and its dynamics Analyses thermal and liquid interactions in textiles

Environments are assessed and environmental limits defined often only in terms of air temperature, which is insufficient; in most situations the interaction of air temperature with five other factors - radiant temperature; humidity; air movement; activity-generated metabolic heat; and clothing is central to that environment's evaluation.; In this book, Ken Parsons focuses on the principles and practice of human response to thermal environments. He incorporates psychology, physiology and environmental physics with an applied ergonomic approach. The book details important new developments in determining the thermal properties of clothing, computer modelling and computer-aided environmental design, and offers practical applications and case studies.