

Natural Ventilation in High-Rise Office Buildings

An output of the CTBUH Sustainability Working Group

Anthony Wood & Ruba Salib



Guide To Natural Ventilation In High Rise Office Buildings Ctuh Technical Guide

Edited by Dr. Hourakhsh Ahmad Nia



Guide To Natural Ventilation In High Rise Office Buildings Ctuh Technical Guide:

Guide to Natural Ventilation in High Rise Office Buildings Antony Wood, Ruba Salib, 2013 This guide sets out recommendations for every phase of the planning construction and operation of natural ventilation systems in these buildings including local climatic factors that need to be taken into account how to plan for seasonal variations in weather and the risks in adopting different implementation strategies All of the recommendations are based on analysis of the research findings from richly illustrated international case studies This is the first technical guide from the Council on Tall Buildings and Urban Habitat s Tall Buildings Sustainability Working Group looking in depth at a key element in the creation of tall buildings with a much reduced environmental impact while taking the industry closer to an appreciation of what constitutes a sustainable tall building and what factors affect the sustainability threshold for tall

Guide to Natural Ventilation in High Rise Office Buildings Antony Wood, 2017-07-11 Tall buildings are not the only solution for achieving sustainability through increased density in cities but given the scale of current population shifts the vertical city is increasingly being seen as the most viable solution for many urban centers However the full implications of concentrating more people on smaller plots of land by building vertically whether for work residential or leisure functions needs to be better researched and understood It is generally accepted that we need to reduce the energy equation in both operating and embodied terms of every component and system in the building as an essential element in making it more sustainable Mechanical HVAC systems Heating Ventilation and Air Conditioning in tall office buildings typically account for 30 40 percent of overall building energy consumption The increased efficiency or possibly even elimination of these mechanical systems through the provision of natural ventilation could thus be argued to be the most important single step we could make in making tall buildings more sustainable This guide sets out recommendations for every phase of the planning construction and operation of natural ventilation systems in these buildings including local climatic factors that need to be taken into account how to plan for seasonal variations in weather and the risks in adopting different implementation strategies All of the recommendations are based on analysis of the research findings from richly illustrated international case studies Tried and tested solutions to real life problems make this an essential guide for anyone working on the design and operation of tall buildings anywhere in the world This is the first technical guide from the Council on Tall Buildings and Urban Habitat s Tall Buildings and Sustainability Working Group looking in depth at a key element in the creation of tall buildings with a much reduced environme

Designing Spaces for Natural Ventilation Ulrike Passe, Francine Battaglia, 2015-03-12 Buildings can breathe naturally without the use of mechanical systems if you design the spaces properly This accessible and thorough guide shows you how in more than 260 color diagrams and photographs illustrating case studies and CFD simulations You can achieve truly natural ventilation by considering the building s structure envelope energy use and form as well as giving the occupants thermal comfort and healthy indoor air By using scientific and architectural visualization tools included here you can develop

ventilation strategies without an engineering background Handy sections that summarize the science explain rules of thumb and detail the latest research in thermal and fluid dynamics will keep your designs sustainable energy efficient and up to date

Green Walls in High-Rise Buildings Antony Wood, Payam Bahrami & Daniel Safarik, The Images Publishing Group, 2014-08-29 The Council on Tall Buildings and Urban Habitat has produced four Technical Guides to date since the series launched in late 2012 Each of these guides is the product of a CTBUH Working Group committees formed specifically to address focused topical subjects in the industry The intention of each guide is the same to provide working knowledge to the typical building owner or professional who wants a better understanding of available options for improving tall buildings and what affects their design The object of the series is to provide a tool kit for the creation of better performing tall buildings and to spread the understanding of the considerations that need to be made in designing tall This technical guide offers an extensive overview of the use of vertical vegetation in high rise buildings an indepth analysis of green walls definitions and typology including standards policies and incentives It features comprehensive case studies along with architectural theories of the public and private benefits of green walls The book delves into architect design considerations and limitations the effects of green walls on energy efficiencies and includes recommendations and future research **SFPE**

Handbook of Fire Protection Engineering Morgan J. Hurley, Daniel T. Gottuk, John R. Hall Jr., Kazunori Harada, Erica D. Kuligowski, Milosh Puchovsky, Jose´ L. Torero, John M. Watts Jr., CHRISTOPHER J. WIECZOREK, 2015-10-07 Revised and significantly expanded the fifth edition of this classic work offers both new and substantially updated information As the definitive reference on fire protection engineering this book provides thorough treatment of the current best practices in fire protection engineering and performance based fire safety Over 130 eminent fire engineers and researchers contributed chapters to the book representing universities and professional organizations around the world It remains the indispensable source for reliable coverage of fire safety engineering fundamentals fire dynamics hazard calculations fire risk analysis modeling and more With seventeen new chapters and over 1 800 figures the this new edition contains Step by step equations that explain engineering calculations Comprehensive revision of the coverage of human behavior in fire including several new chapters on egress system design occupant evacuation scenarios combustion toxicity and data for human behavior analysis Revised fundamental chapters for a stronger sense of context Added chapters on fire protection system selection and design including selection of fire safety systems system activation and controls and CO2 extinguishing systems Recent advances in fire resistance design Addition of new chapters on industrial fire protection including vapor clouds effects of thermal radiation on people BLEVEs dust explosions and gas and vapor explosions New chapters on fire load density curtain walls wildland fires and vehicle tunnels Essential reference appendices on conversion factors thermophysical property data fuel properties and combustion data configuration factors and piping properties Three volume set not available separately

Eco-Towers K. Al-Kodmany, 2015-05-05 Eco Towers introduces readers to groundbreaking designs most progressive

projects and innovative ways of thinking about a new generation of green skyscrapers that could provide solutions to crises the world faces today including climate change depleting resources deteriorating ecology population increase decreasing food supply urban heat island effect pollution deforestation and more The book suggests that the eco tower culminates the cultural and technological evolutions of the 21st century by building and improving on the experiences of earlier designs of skyscrapers and philosophies particularly green sustainable and ecological It argues that the true green skyscraper is the one that engages successfully with its larger urban context by establishing symbiotic relationships with the social economic and environmental aspects Since tall buildings are becoming larger and taller serving greater number of people and exerting higher demand on the environment and existing infrastructure any improvements in their design and construction will significantly enhance urban conditions The book elucidates how green skyscrapers better serve tenants mitigate environmental impacts and improve integration with the city infrastructure It explains how skyscrapers long life cycle offers the greatest justifications for recycling precious resources and makes it a worthwhile to employ green features in constructing new skyscrapers and retrofitting existing ones Subsequently the book explores new designs that are employing cutting edge green technologies at a grand scale including water saving technologies solar panels helical wind turbines sunlight sensing LED lights rainwater catchment systems graywater and blackwater recycling systems seawater powered air conditioning and the like In the future new building materials and smart technologies will continue to offer innovative design approaches to sustainable tall buildings with new aesthetics referred to as eco iconic skyscrapers

The Vertical City K. Al-Kodmany, 2018-06-25 Each century has its own unique approach toward addressing the problem of high density and the 21st century is no exception As cities try to cope with rapid population growth adding 2.5 billion dwellers by 2050 and grapple with destructive sprawl politicians planners and architects have become increasingly interested in the vertical city paradigm Unfortunately cities all over the world are grossly unprepared for integrating tall buildings as these buildings may aggravate multidimensional sustainability challenges resulting in a vertical sprawl that could have worse consequences than horizontal sprawl By using extensive data and numerous illustrations this book provides a comprehensive guide to the successful and sustainable integration of tall buildings into cities A new crop of skyscrapers that employ passive design strategies green technologies energy saving systems and innovative renewable energy offers significant architectural improvements At the urban scale the book argues that planners must integrate tall buildings with efficient mass transit walkable neighbourhoods cycling networks vibrant mixed use activities iconic transit stations attractive plazas well landscaped streets spacious parks and engaging public art Particularly it proposes the Tall Building and Transit Oriented Development (TB TOD) model as one of the sustainable options for large cities going forward Building on the work of leaders in the fields of ecological and sustainable design this book will open readers eyes to a wider range of possibilities for utilizing green resilient smart and sustainable features in architecture and urban planning projects The 20 chapters offer

comprehensive reading for all those interested in the planning design and construction of sustainable cities

The Architecture of Natural Cooling Brian Ford, Rosa Schiano-Phan, Juan A. Vallejo, 2019-11-15 Overheating in buildings is commonplace This book describes how we can keep cool without conventional air conditioning improving comfort and productivity while reducing energy costs and carbon emissions It provides architects engineers and policy makers with a how to guide to the application of natural cooling in new and existing buildings It demonstrates through reference to numerous examples that natural cooling is viable in most climates around the world This completely revised and expanded second edition includes An overview of natural cooling past and present Guidance on the principles and strategies that can be adopted A review of the applicability of different strategies Explanation of simplified tools for performance assessment A review of components and controls A detailed evaluation of case studies from the USA Europe India and China This book is not just for the technical specialist as it also provides a general grounding in how to avoid or minimise air conditioning Importantly it demonstrates that understanding our environment rather than fighting it will help us to live sustainably in our rapidly warming world

Fire Safety for Very Tall Buildings International Code Council, 2021-10-30 This Guide provides information on special topics that affect the fire safety performance of very tall buildings their occupants and first responders during a fire This Guide addresses these topics as part of the overall building design process using performance based fire protection engineering concepts as described in the SFPE Engineering Guide to Performance Based Fire Protection This Guide is not intended to be a recommended practice or a document that is suitable for adoption as a code The Guide pertains to super tall very tall and tall buildings Throughout this Guide all such buildings are called very tall buildings These buildings are characterized by heights that impose fire protection challenges they require special attention beyond the protection features typically provided by traditional fire protection methods This Guide does not establish a definition of buildings that fall within the scope of this document

The Costs of Climate Change Mitigation Innovations David S-K. Ting, Jacqueline A. Stagner, 2024-04-18 The notion that humanity may be too late to alter climate change could potentially lead to fear and therefore the advocacy of implementing radical strategies and or hastening the execution of certain measures to the extreme There is evidence that extensive and intensive implementation of some climate change solutions can significantly alter the environment and ecosystems in unintended ways For example the microclimate of a field in the proximity and downstream of a closely packed array of wind turbines can be noticeably altered by the modified lower atmospheric fluxes caused by the turbines which can then negatively affect crop yields Additionally some studies have found that large scale solar fields can result in the modulation of atmospheric circulation leading to changes in regional precipitation The Costs of Climate Change Mitigation Innovations A Pragmatic Outlook provides a forum for discussion on the long term consequences of various climate strategies It promotes our striving toward minimizing the potential negative impact of new interventions by performing objective holistic analyses The bottom line is that we do not want today s solutions

to become tomorrow's problems

Advances in Sustainable Building Materials, Design and Energy Systems Sanjay Kumar, Brahim ElBhiri, 2025-01-23 This book is a great opportunity to make the research community discuss the dangerous environmental challenges such as climate change and its huge effects in addition to the world's reliance on fossil fuel and non renewable resources In recent years the authors have been focused on the advancements of technology and how it can improve our lives but the authors often overlook the fact that it is creating an unsustainable approach that comes at a high cost which makes a sustainable approach to cities necessary focusing on accessible public transport energy water and food security and regenerating compact fabric areas To discuss how to reach this sustainable approach IEREK held the Advances in Energy Research Materials Science and Built Environment EMBE conference from October 3 to 4 2024 with attendees from all over the world It provides an opportunity to exchange ideas and solutions on urban planning sustainable architecture climate change mitigation and innovative design The EMBE conference hosts a variety of knowledgeable keynote speakers and researchers who discussed the integration of technology in sustainable urban planning green urbanism preservation of coastal areas innovative renewable materials and responsive architecture The book covers a wide range of scientific knowledge that can lead humanity toward a sustainable and greener future

New Approaches in Contemporary Architecture and Urbanism Edited by Dr. Hourakhsh Ahmad Nia, 2020-07-01 This book is an intellectual discourse and a concise compendium of current research in architecture and urbanism Primarily it is a book of readings of 16 chapters The book brings together theories manifestos and methodologies on contemporary architecture and urbanism to raise the understanding for the future architecture and urban planning Overall the book aimed to establish a bridge between theory and practice in built environment Thus it reports on the latest research findings and innovative approaches methodologies for creating assessing and understanding of contemporary built environment

New Frontiers in Light Metals Laurens Katgerman, Frans Soetens, 2010 Held at the Auditorium of the Eindhoven University of Technology Eindhoven the Netherlands on 23-25 June 2010 t p

Advances in Sustainable Living in the Built Environment Zakiah Wan Ismail (Wan), Azhani Abd Manaf, 2021

A Guide to Natural Ventilation Design C. Don Manuel, P.E., 2014-05 This book is an attempt to combine all the books literatures researches and universities master's theses available for a shortcut fundamental knowledge to design basic passive or natural ventilation in residential homes As in depth studies in passive design will take years of immense work due to so many variables involved we tried to gather just enough information to provide you the basic working knowledge to start designing your simple naturally ventilated project We also included our NV study of a high rise building that was successfully built

Indoor air quality in office buildings : a technical guide, 1993

Natural Ventilation in Buildings Francis Allard, 1998 AIOLOS is a computational tool for the calculation of the airflow rates in naturally ventilated buildings

Natural Ventilation in Non-domestic Buildings, 1998

An Introduction to Natural Ventilation of Buildings for Professional Engineers J. Paul Guyer, P.E., R.A., 2022-05-08 Introductory technical guidance for professional

engineers architects and construction managers interested in natural ventilation of buildings Here is what is discussed 1 INTRODUCTION 2 SITE SELECTION AND PLANNING 3 LANDSCAPING 4 BUILDING FORM 5 BUILDING ENVELOPE AND STRUCTURE 6 AUXILIARY FAN SYSTEMS *Natural Ventilation of Buildings* David Etheridge, 2011-11-07 Natural ventilation is considered a prerequisite for sustainable buildings and is therefore in line with current trends in the construction industry The design of naturally ventilated buildings is more difficult and carries greater risk than those that are mechanically ventilated A successful result relies increasingly on a good understanding of the abilities and limitations of the theoretical and experimental procedures that are used for design There are two ways to naturally ventilate a building wind driven ventilation and stack ventilation The majority of buildings employing natural ventilation rely primarily on wind driven ventilation but the most efficient design should implement both types Natural Ventilation of Buildings Theory Measurement and Design comprehensively explains the fundamentals of the theory and measurement of natural ventilation as well as the current state of knowledge and how this can be applied to design The book also describes the theoretical and experimental techniques to the practical problems faced by designers Particular attention is given to the limitations of the various techniques and the associated uncertainties Key features Comprehensive coverage of the theory and measurement of natural ventilation Detailed coverage of the relevance and application of theoretical and experimental techniques to design Highlighting of the strengths and weaknesses of techniques and their errors and uncertainties Comprehensive coverage of mathematical models including CFD Two chapters dedicated to design procedures and another devoted to the basic principles of fluid mechanics that are relevant to ventilation This comprehensive account of the fundamentals for natural ventilation design will be invaluable to undergraduates and postgraduates who wish to gain an understanding of the topic for the purpose of research or design The book should also provide a useful source of reference for more experienced industry practitioners

This book delves into Guide To Natural Ventilation In High Rise Office Buildings Ctuh Technical Guide. Guide To Natural Ventilation In High Rise Office Buildings Ctuh Technical Guide is a crucial topic that needs to be grasped by everyone, from students and scholars to the general public. The book will furnish comprehensive and in-depth insights into Guide To Natural Ventilation In High Rise Office Buildings Ctuh Technical Guide, encompassing both the fundamentals and more intricate discussions.

1. The book is structured into several chapters, namely:
 - Chapter 1: Introduction to Guide To Natural Ventilation In High Rise Office Buildings Ctuh Technical Guide
 - Chapter 2: Essential Elements of Guide To Natural Ventilation In High Rise Office Buildings Ctuh Technical Guide
 - Chapter 3: Guide To Natural Ventilation In High Rise Office Buildings Ctuh Technical Guide in Everyday Life
 - Chapter 4: Guide To Natural Ventilation In High Rise Office Buildings Ctuh Technical Guide in Specific Contexts
 - Chapter 5: Conclusion
 2. In chapter 1, this book will provide an overview of Guide To Natural Ventilation In High Rise Office Buildings Ctuh Technical Guide. The first chapter will explore what Guide To Natural Ventilation In High Rise Office Buildings Ctuh Technical Guide is, why Guide To Natural Ventilation In High Rise Office Buildings Ctuh Technical Guide is vital, and how to effectively learn about Guide To Natural Ventilation In High Rise Office Buildings Ctuh Technical Guide.
 3. In chapter 2, the author will delve into the foundational concepts of Guide To Natural Ventilation In High Rise Office Buildings Ctuh Technical Guide. This chapter will elucidate the essential principles that need to be understood to grasp Guide To Natural Ventilation In High Rise Office Buildings Ctuh Technical Guide in its entirety.
 4. In chapter 3, this book will examine the practical applications of Guide To Natural Ventilation In High Rise Office Buildings Ctuh Technical Guide in daily life. The third chapter will showcase real-world examples of how Guide To Natural Ventilation In High Rise Office Buildings Ctuh Technical Guide can be effectively utilized in everyday scenarios.
 5. In chapter 4, the author will scrutinize the relevance of Guide To Natural Ventilation In High Rise Office Buildings Ctuh Technical Guide in specific contexts. The fourth chapter will explore how Guide To Natural Ventilation In High Rise Office Buildings Ctuh Technical Guide is applied in specialized fields, such as education, business, and technology.
 6. In chapter 5, the author will draw a conclusion about Guide To Natural Ventilation In High Rise Office Buildings Ctuh Technical Guide. This chapter will summarize the key points that have been discussed throughout the book.
- This book is crafted in an easy-to-understand language and is complemented by engaging illustrations. It is highly recommended for anyone seeking to gain a comprehensive understanding of Guide To Natural Ventilation In High Rise Office Buildings Ctuh Technical Guide.

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