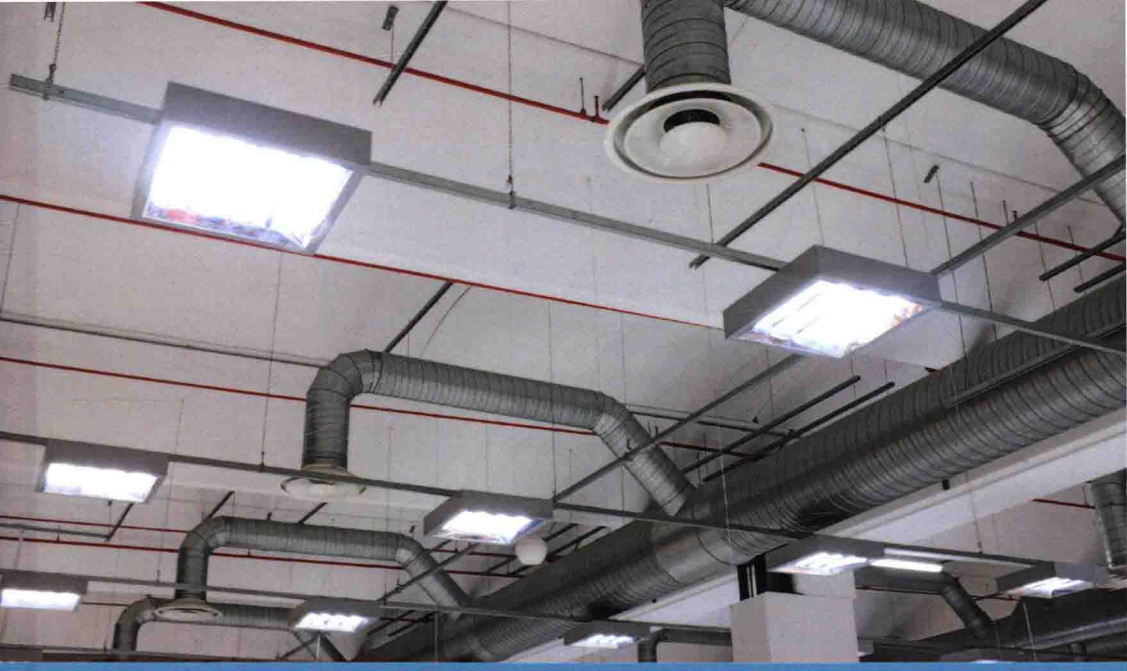

AIR CONDITIONING SYSTEM DESIGN

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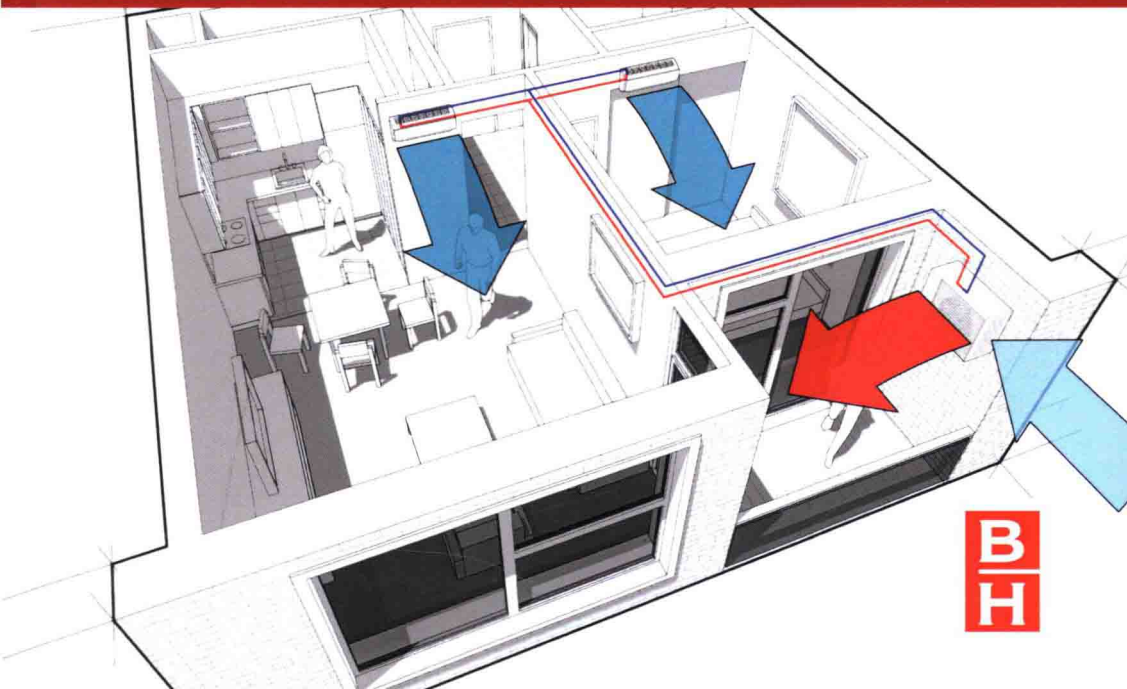

AIR CONDITIONING SYSTEM DESIGN

ROGER LEGG

A practical introductory guide to the concepts and technologies essential to air conditioning design

- Covers essential theory on fluid flow and the latest in A/C technology
- Explains the significance of factors, such as climate and thermal comfort, as A/C design considerations
- Addresses design using a range of air conditioning technologies, such as evaporative cooling, VRF systems, psychrometric software, and desiccant dehumidification

Air Conditioning System Design summarizes essential theory and then explains how the latest air conditioning technology operates. Load calculations, energy efficiency, and selection of technology are all explained in the context of air conditioning as a system, helping the reader fully consider the implications of design decisions.

Whether users need to figure out how to apply their mechanical engineering degree to an air conditioning design task or simply want to find out more about air conditioning technology for a research project, this book provides a perfect guide.

About the Author

Roger Legg spent 10 years as a design engineer and then 5 years as a research engineer with the Hospital Engineering Research Unit, at Glasgow University. Roger lectured at the Institute of Environmental Engineering, South Bank University, London, for almost 30 years. He was awarded a PhD from the University of Strathclyde for his work on control dampers. Since his retirement, Roger has spent much of his time working as a volunteer with refugees and asylum seekers in the London Borough of Bromley. A number of other engineers have made significant contributions to the book, and are named within the text.

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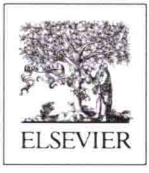

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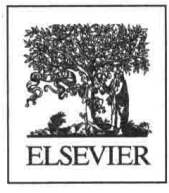
AIR CONDITIONING SYSTEM DESIGN

ROGER LEGG
Retired, previously senior lecturer at London South Bank University



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AIR CONDITIONING SYSTEM DESIGN

DEDICATION

To staff and students,
past and present,
of the
'National College'.

The general antiphlogistic remedies are ... free admission of pure cool air.

John Alikin, 'Elements of Surgery', 1779

... the dreadful consequences which have been experienced from breathing air in situations either altogether confined or ill ventilated ... if others are in the same apartment, the breath from each person passes from one to another, and it is frequently in this way that diseases are communicated.

The Marquis de Chabannes, 1818

The very first rule of nursing ... is this: to keep the air he breathes as pure as the external air, without chilling him.

Florence Nightingale, 1863

FOREWORD

Air conditioning is no longer regarded as the luxury that it once was, and there is now an increasing demand for applications ranging through domestic, commercial, industrial, and transport and for specialized installations such as hospitals, research facilities, data centres, and clean rooms. The engineering systems in modern buildings and installations make a significant contribution to the overall building performance in terms of energy use. Systems need to be increasingly sophisticated in their design, installation, operation, control, and maintenance at a time when there is increasing pressure for greater energy efficiency.

This has led to a demand for more qualified engineers and other professionals involved in building design. All those involved need to understand the underlying principles of the topics covered in this volume.

The book, which is a complete revision of Roger's previous work published by Batsford in 1991, contains new chapters on unitary systems and chilled beams. It provides a good technical foundation of building service engineering and covers significant proportions of the syllabus requirements of academic courses in this discipline. The theoretical coverage is backed with relevant worked examples and the use of data from the latest editions of CIBSE and ASHRAE publications, which should make this text appeal to students and practising professionals in both Europe and North America.

The author is well qualified in this discipline having taught the subject for more than 30 years at the Institute of Environmental Engineering (formerly the National College for Heating, Ventilation, Refrigeration and Fan Engineering, South Bank University, London). In addition, he has used contributions from key specialists to support specific areas; these included Associate Prof. Risto Kosonen, Prof. Tim Dwyer, Mr. Terry Welch, Prof. Ron James, Prof. John Missenden, and Mr. Stan Marchant.

Prof. Michael J. Farrell
London 2017
(Retired, previously principle lecturer at London South Bank University and head of the Institute of Environmental Engineering)

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