ASCE Manuals and Reports on Engineering Practice No. 67

Wind Tunnel Studies of Buildings and Structures

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Wind Tunnel Studies of Buildings and Structures

Task Committee on
Wind Tunnel Testing of Buildings and Structures
Aerodynamics Committee
Aerospace Division

Contributors:
J.E. Cermak, A.G. Davenport, F.H. Durgin,
P.A. Irwin, N. Isyumov, J.A. Peterka, S.R. Ramsay,
T.A. Reinhold R.H. Scanlan, T. Stathopoulos,
A.C. Steckley, H. Tieleman, and P.J. Vickery

Editor:
Nicholas Isyumov

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Abstract: This Manual of Practice provides guidelines to assist architects, building code officials, engineers, town planners, and others who become involved with the wind tunnel model testing of buildings and structures and/or the evaluation and use of information from such tests. Many Codes of Practice now permit such studies as alternative approaches for the design against wind action. Part 1 updates the Manual, which was first published in 1987, to reflect new developments in wind engineering and adds a chapter on atmospheric dispersion of exhausts and pollutants around buildings and in built-up areas. Part 2 is a Commentary which contains detailed information on specific methodologies of wind tunnel testing and the use of such data to predict the performance of full-scale buildings and structures. Rigorous model similitude requirements must be followed in order to assure that the findings of wind tunnel model studies are representative. A Glossary and an extensive list of references are included. This Manual has been prepared by a special Task group of the Aerodynamics Committee of the Aerospace Division and includes contributions from some of North America's leading wind engineering experts and laboratories.

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FOREWORD

The first edition of the *Manual of Practice for Wind Tunnel Studies of Buildings and Structures* was published in 1987. The wind engineering field continues to evolve, and this update of that manual emphasizes the circumstances under which tests might be needed, the types of tests that might be performed and the physical principles that need to be followed to ensure meaningful results.

This edition of the Manual has two parts. Part 1 is an updated version of *ASCE Manual 67* with an added section on Atmospheric Dispersion Around Buildings. Part 2 is a Commentary, which provides supporting information on the methodologies needed and examples of typical tests. It also includes a bibliography.

This Manual has been prepared by a Task Committee formed under the auspices of the Aerodynamics Committee of the Aerospace Division of the ASCE. Members of this Task Committee, who have contributed to the preparation of this Manual are:

Frank H. Durgin, Chairman
Wright Brothers Wind Tunnel
M.I.T., Building 17-110
Cambridge, Massachusetts, U.S.A. 02139
Tel: (617) 253-2270
FAX: (617) 258-7566

Nicholas Isyumov, Vice-Chair and Editor
Boundary Layer Wind Tunnel Laboratory
The University of Western Ontario
London, Ontario N6A 5B9, Canada
Tel: (519) 661-3338
FAX: (519) 661-3339

Jack E. Cermak
Fluid Dynamics and Diffusion Laboratory
Colorado State University
Fort Collins, Colorado, U.S.A. 805243
Tel: (970) 221-3371
FAX: (970) 221-3124

Alan G. Davenport
Boundary Layer Wind Tunnel Laboratory
The University of Western Ontario
London, Ontario N6A 5B9, Canada
Tel: (519) 661-3338
FAX: (519) 661-3339

Peter A. Irwin
Rowan Williams Davies & Irwin Inc.
650 Woodlawn Road West
Guelph, Ontario N1K 1B8, Canada
Tel: (519) 823-1311
FAX: (519) 823-1316

Jon A. Peterka
Cermak Peterka Petersen Inc.
1415 Blue Spruce Drive
Fort Collins, Colorado, U.S.A. 80524
Tel: (970) 221-3371
FAX: (970) 221-3124

Stephen R. Ramsay
U.S. Filter
1370-885 W. Georgia Street
Vancouver, British Columbia V6C 3E8, Canada
Tel: (604) 669-4422
FAX: (604) 669-5951

Timothy A. Reinhold
Department of Civil Engineering
Clemson University
110 Lowry Hall
Clemson, South Carolina, U.S.A. 29631
Tel: (864) 656-3326
FAX: (864) 656-2670

Robert H. Scanlan
Dept. of Civil Engineering
G.W.C. Whiting School of Engineering
202 Latrobe Hall
The Johns Hopkins University
Homewood Campus
Baltimore, Maryland, U.S.A. 21218-2686
Tel: (410) 516-7138
FAX: (410) 516-7473

Theodore Stathopoulos
Centre for Building Studies
Concordia University
1455 De Maisonneuve Blvd. West
Montreal, Quebec H3G 1M8, Canada
Tel: (514) 848-3186
FAX: (514) 848-7965

Andrew C. Steckley
QuantumLynx
202 Michael Grove Avenue
Bozeman, Montana, U.S.A. 59718
Tel: (406) 582-9745
FAX: (406) 582-9745

Henry Tieleman
Department of Engineering Science and Mechanics
Virginia Polytechnical Institute and State University
Blacksburg, Virginia, U.S.A. 24061
Tel: (540) 231-6651
FAX: (540) 231-4574

Peter J. Vickery
Applied Research Associates
811 Spring Forest Road, Suite 100
Raleigh, North Carolina, U.S.A. 27609
Tel: (919) 876-0018
FAX: (919) 878-3672

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Also acknowledged are the many valuable suggestions and comments by members of the ASCE Blue Ribbon Review Panel who reviewed this document and generously shared their experience and viewpoints with the Committee. These very much appreciated reviews and scrutiny have greatly improved this Manual.

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Part 1

WIND TUNNEL STUDIES OF BUILDINGS AND STRUCTURES

Chapter 1
INTRODUCTION

1.1 OBJECTIVES

This Manual of practice provides guidelines intended to assist architects and engineers who may become involved with the wind tunnel model testing of buildings and structures. Included are procedures required to provide representative information on wind effects experienced during particular wind conditions, and methods for using such information to provide statistical predictions of full-scale behavior. ASCE Standard 7 (Formerly ANSI A58.1) and many other codes of practice now permit or require wind tunnel model studies for the design of buildings and structures against the action of wind. In some situations, such studies may be desirable in order to improve the reliability of performance, economy of design, or both.

The first *ASCE Manual of Practice for Wind Tunnel Model Studies of Buildings and Structures* was printed in 1987. Part 1 of this updated Manual reflects new developments in the wind engineering field. The Commentary in Part 2 contains detailed information on specific methodology and specific aspects of wind tunnel testing. Added to the Manual is a section dealing with wind tunnel studies of the dispersion of pollutants around buildings and in urban environments. If in doubt, the reader should seek the assistance of an established wind tunnel testing laboratory or a recognized wind engineering specialist. Finally, approval of the use of wind tunnel model data for design may rest with local code authorities. Appropriate inquiries about any special requirements or limitations would therefore be prudent.

The testing of prototype buildings and components and mock-ups of curtain-wall systems are outside the scope of this Manual. Model studies of the effects of wind on the deposition and drifting of snow on roofs and around buildings and structures also are not covered.