GUIDELINE

ASHRAE Guideline 33-2013
(Supersedes ASHRAE Guideline 33-2000)

Guideline for Documenting Indoor Airflow and Contaminant Transport Modeling

Approved by the ASHRAE Standards Committee on June 22, 2013, and by the ASHRAE Board of Directors on June 26, 2013.

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The Manager of Standards of ASHRAE should be contacted for:

a. interpretation of the contents of this Guideline,
b. participation in the next review of the Guideline,
c. offering constructive criticism for improving the Guideline, or
d. permission to reprint portions of the Guideline.

CONTENTS

ASHRAE Guideline 33-2013, Documenting Airflow and Contaminant Transport Modeling Studies

NOTE

Approved addenda, errata, or interpretations for this guideline can be downloaded free of charge from the ASHRAE Web site at www.ashrae.org/technology.

(This foreword is not part of this guideline. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a guideline and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

FOREWORD

Airflow and contaminant transport modeling studies are performed for a number of reasons using a wide variety of analysis tools and techniques. This poses a challenge to the practitioners as well as those who might depend on the work of said practitioners to develop, execute, present, and interpret such studies. This guideline is meant to provide those who carry out and those who commission such studies with a common ground pertaining to the documentation of these types of studies. This guideline is not meant to provide an all-encompassing and restrictive set of rules but to establish a foundation upon which documentation of such studies can be formed.

1. PURPOSE

This guideline establishes a method and format for documenting inputs, assumptions, methods, and outputs utilized when conducting indoor-airflow and contaminant-transport modeling studies.

2. SCOPE

This guideline applies to the application of airflow and contaminant modeling for analyses of indoor air quality, thermal comfort, energy, and events related to chemical, biological, and radiological agents. This guideline only applies to modeling efforts using multizone network models, computational fluid dynamics (CFD), or combinations of the two.

3. DEFINITIONS

airflow path: a connection between two nodes of a multizone model through which air and contaminants can be transported.

analysis tool: a computer program that implements a multizone and/or computational fluid dynamics model and utilizes numerical techniques to solve the equations imposed by the underlying multizone or CFD model.

building envelope: the elements of a building that separate conditioned spaces from the exterior.

building model: a representation of a building or portion of a building for purposes of analysis with a multizone or CFD analysis tool.

computational fluid dynamics (CFD): quantitative prediction of thermal/fluid physical phenomena in an indoor space by numerically solving coupled, partial differential conservation equations.

contaminant: an airborne gas, particle, or liquid droplet of interest that is represented within an analysis tool.

leakage: airflow through cracks/openings in a building component or assembly.

multizone model: an analysis method whereby a building and its ventilation systems are idealized as a discrete set of air volumes or nodes that are interconnected by a set of airflow paths or links.

sink model: a representation within a building model of a contaminant removal mechanism.

source model: a representation within a building model of a contaminant emission or generation mechanism.

zone: a portion of a multizone building representation that is characterized by a well-defined volume of air.

4. PROJECT DOCUMENTATION

4.1 Project Description. Provide an overview of the project, the type of analysis being performed, and the tools used to perform the analysis. These might include the type of structure (e.g., whole building or section of a building) and its geographic location. Indicate which analysis methods are used (e.g., multizone, CFD, or coupled) and the type of evaluations being performed (e.g., airflow, contaminant transport, or energy consumption).

4.2 Objectives. Provide a statement of the overall objectives of the modeling study. Analysis tools often provide the option of implementing various modeling assumptions that are built into the tool. The objectives of a building simulation study can dictate the type of analysis to perform as well as the subset of modeling assumptions to be employed.

5. BUILDING DESCRIPTION

Provide a description of the building or structure being studied. If the study only pertains to a portion of a structure, then only the portion being studied needs to be addressed.

5.1 Site. Provide descriptions of building location, building shape and orientation, and surrounding terrain, including sketches, site plans, and images. Provide general climatic information, including climate zone, temperature range, and prevailing winds.

5.2 Drawings and Plans. Include references to building plans upon which the building information is based (e.g., drawing numbers and dates). These could include conceptual sketches, floor plans, elevation drawings, HVAC riser diagrams, sequences of operation, etc.

5.3 Layout and Dimensions. Provide a description of the number of floors above and below grade, space usage, layout, and dimensions of representative building floor plans. Provide nominal building volume and envelope surface area distinguished by above grade and below grade as well as roof surface area.

5.4 Ventilation Systems

5.4.1 Mechanical Forced Air Systems. Provide a summary of each system type (e.g., a constant volume, single-zone system), components, and layout of the systems, includ-