ASHRAE Standard Project Committee 183
Cognizant TC: TC 4.1, Load Calculation Data and Procedures
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SPECIAL NOTE

This American National Standard (ANS) is a national voluntary consensus standard developed under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). Consensus is defined by the American National Standards Institute (ANSI), of which ASHRAE is a member and which has approved this standard as an ANS, as "substantial agreement reached by directly and materially affected interest categories. This signifies the concurrence of more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that an effort be made toward their resolution." Compliance with this standard is voluntary until and unless a legal jurisdiction makes compliance mandatory through legislation.

ASHRAE obtains consensus through participation of its national and international members, associated societies, and public review.

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The Manager of Standards of ASHRAE should be contacted for:

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

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ANSI/ASHRAE/ACCA Standard 183-2007
Peak Cooling and Heating Load Calculations
in Buildings Except Low-Rise Residential Buildings

NOTE

When addenda, interpretations, or errata to this standard have been approved, they can be downloaded free of charge from the ASHRAE Web site at http://www.ashrae.org.

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FOREWORD

Standard 183 was created in a collaborative effort between ASHRAE and ACCA, the Air Conditioning Contractors of America. It establishes minimum requirements for performing peak cooling and heating load calculations for buildings except low-rise residential buildings. Although there are many methods available to perform peak cooling and heating load calculations, the intent of this standard is to establish a minimum level of requirements that is as inclusive of as many methods as possible while still being restrictive enough to mandate an appropriate level of care and accuracy. An accurate estimate of peak cooling or heating load requires not only that a sound method be used but also that inputs to the method are reasonable and realistic (the execution of the method).

The heat transfer interactions that occur outside and inside a conditioned building are complex and involve many interrelated variables. All load calculation methods therefore involve some level of simplification of the actual interactions among these variables to allow practical solutions to these very complex problems. The requirements in this standard that relate to the load calculation method are technical to the extent that they address these simplifications of the fundamental heat transfer interactions. If a method oversimplifies the problem, then an inaccurate load estimate can result. Complying with this standard requires knowledge of the underlying principles of the methods used and the techniques that these methods use to address the fundamental heat transfer interactions.

There is a distinction in this standard between zone load and system load. This standard is intended to address the calculation of zone load, but it is impossible to completely decouple the system load or capacity calculation from the zone load calculation. Systems and the processes to calculate their loads or capacities vary dramatically. Some aspects of the overall approach to systems are included in this standard, but the standard is not intended to be a comprehensive or detailed discussion of how to calculate system loads. Users of this standard are cautioned not to confuse zone heat gain with system sizing.

1. PURPOSE

This standard establishes requirements for performing peak cooling and heating load calculations for buildings except low-rise residential buildings.

2. SCOPE

This standard sets minimum requirements for methods and procedures used to perform peak cooling and heating load calculations for buildings except low-rise residential buildings.

3. DEFINITIONS, ABBREVIATIONS, AND ACRONYMS

3.1 Terms Defined in this Standard

beam solar: the component of solar radiation received from the sun without being scattered by the atmosphere or reflected by other surfaces.

building location: for purposes of load calculation, the building's latitude and longitude or the country, state, and city.

convective heat gain: the portion of a heat gain that is transferred by convection to air inside a building.

cooling load: a general term used to refer to the sensible and latent cooling load of a zone or an HVAC system.

diffuse solar: the component of solar radiation composed of the sky diffuse and ground diffuse solar flux.

design conditions: for outdoor conditions, the air temperature, humidity, and solar flux values used to calculate cooling and heating loads. For indoor conditions, the air temperature and/or humidity requirements for a zone or a building.

diversity: adjustments to internal heat gains made to account for the fact that the instantaneous heat output of all load-producing items (i.e., occupants, lighting, appliances, devices, equipment) is normally less than the maximum output for the same set of items. The instantaneous load is discounted for factors such as on-off cycles, occupancy schedules, duty cycles, and reduced power input.

fenestration: windows, skylights, and doors. Fenestration is typically composed of multiple components or assemblies, such as framing, glazing, dividers, and mullions.

flux: energy flow rate per unit surface area.

ground diffuse solar: the component of solar radiation received after being reflected by ground surfaces surrounding a building.

heat gain: the rate at which heat enters a surface, an airstream, or a zone. Heat gain is classified by its mode (convective or radiant) and by whether it is a sensible or latent gain. The radiant portion of heat gain becomes cooling load by a conversion process over time that causes a delay between the time the heat gain occurs and the time the heat is converted to cooling load.

heating load: for zones, the rate at which heat must be added to maintain indoor design conditions. For systems, the rate at which heat must be added to a transport fluid (air, water) to maintain indoor design conditions.

incident solar flux: the beam, sky diffuse, and ground diffuse solar flux received by fenestration and opaque building surfaces.

infiltration: the flow of outdoor air into a building through cracks and other unintentional openings and through normal use of exterior doors for entrance and egress.