CONTENTS

ANSI/ASHRAE Standard 203-2018 (RA2025)
Method of Test for Determining Heat Gain of Office Equipment Used in Buildings

SECTION	PAGE
Foreword	2
1 Purpose	2
2 Scope	2
3 Definitions	2
4 Nomenclature	3
5 Test Apparatus Specifications	3
6 Test Procedures	3
7 Reporting	3
Normative Appendix A: Product Test Report Form	4
Informative Appendix B: Bibliography	5

NOTE

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FOREWORD

Plug loads are important contributors to a building's total air-conditioning or cooling load and energy consumption. Plug loads over time have evolved to become a larger percentage of a building's overall heat gain. Two factors are responsible for this increased significance. First, over time, computer use has continued to increase, resulting in a much larger number of personal computers in use in buildings; second, advances in building techniques have improved envelopes and reduced that portion of the load/energy use.

Engineers optimize HVAC equipment selections by carefully performing cooling load calculations. Internal heat gains from plug loads (e.g., computers, monitors, printers, projectors, etc.) are a significant portion of the cooling load calculations. Most plug loads operate at a fraction of their nameplate electrical load and, as a result, produce significantly less heat load than engineers may use in their cooling load calculations based on nameplate values.

Manufacturers of plug-load-type equipment report electrical requirements for their equipment, and some include power consumption (heat rejection) information. Some equipment manufacturers include nameplate values showing the total power rating, while others do not. Some manufacturers measure maximum electric power consumption by the equipment and list that as power ratings on the nameplate or in the equipment literature, while some others list the maximum power capacity of the system. Since the manufacturers' power ratings are usually based on instantaneous measurement while equipment is working at maximum capacity, use of equipment nameplate values for cooling load calculation may lead to over sizing of air-conditioning equipment, resulting in extra initial cost for air-conditioning equipment as well as higher operating cost. On the other hand, underestimating of cooling load calculation may result in insufficient cooling capacity.

Since there are no standards for establishing how the power consumption or heat rejection data for various plug loads is determined, it is difficult for engineers to accurately use this data in their cooling load calculations. In the past, ASHRAE has funded research projects (RP-822, RP-1055, RP-1482) to develop a test method and measure plug load type equipment heat rejection. Since plug load type equipment is an ever evolving market, equipment design changes frequently require new testing for power consumption and generation of heat rejection data for cooling load calculation use.

Standard 203 defines a method of test for determining heat gain from plug-load-type electrical office equipment in buildings. The data is to be used to evaluate the range and average operating heat gains for cooling load calculations. The 2025 reaffirmation of Standard 203 converts Normative Appendix B to Normative Appendix A and Informative Appendix A to Informative Appendix B.

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1. PURPOSE

This standard prescribes methods of test to determine the range and average operating heat gains of electrical equipment for use in cooling load calculations.

2. SCOPE

This standard applies to plug-load-type electrical equipment.

3. DEFINITIONS

HVAC: heating, ventilating, and air-conditioning.

plug load: the heat load (heat rejected) or energy consumed by any electrical device plugged into an electrical wall outlet (socket) or a device wired to electrical power.

power: defined as $P = v \times i$, where i and v are the instantaneous values of the voltage and current. For constant DC circuit, power is simply the product of the voltage and the current. The power in an AC circuit is the product of the voltage, current, and power factor, $P = v \times \mathrm{i} \times \varphi$, where φ is the power factor. Power is a measure of the rate at which work is being done. Watt (or power) transducers provide a means of measuring either AC or DC power and provide a signal proportional to the rate at which work is being done. The unit of electric power is the watt.