Carrier
Block Load v4.16

Compliance With

ANSI/ASHRAE/ACCA
Standard 183-2007

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Introduction

This document describes Carrier Block Load v4.16 compliance with *ANSI/ASHRAE/ACCA Standard 183-2007, Peak Cooling and Heating Load Calculations in Buildings Except Low-Rise Residential Buildings.* The description below applies to Block Load version 4.10 through 4.16.

The purpose of Standard 183 to establish minimum requirements for methods and procedures used to calculate peak cooling and heating loads for all buildings except low rise residential buildings. As the Foreword to Standard 183 notes "*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 being restrictive enough to mandate an appropriate level of care and accuracy. An accurate 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).*"

Block Load v4.16 Compliance with Standard 183 Requirements

Block Load v4.16 complies with the requirements of Standard 183-2007. In the table below the left-hand column shows requirements from Standard 183-2007 sections 5 through 10. The right-hand column describes how Block Load v4.16 complies with each requirement.

Table A-1. Evaluation of Block Load v4.16 Compliance with ASHRAE Standard 183-2007

ASHRAE Standard 183-2007 Requirements	Description of How Block Load v4.16 Complies
5. Weather Data and Indoor Design Conditions	-
5.1 Indoor design conditions shall be established by owner criteria, local codes or comfort criteria.	This requirement applies to how a user of the Block Load software determines indoor design conditions. Block Load permits indoor design conditions such as dry-bulb temperature and relative humidity to be specified.
5.2 Cooling calculations shall use values of outdoor air temperature and humidity for the building use, the building location, time of year and time of day.	**Block Load Complies.** Design cooling calculations use hour-by-hour profiles of outdoor air dry-bulb temperature and humidity, for one design cooling day in each of the 12 months, for the building site.
5.3 Solar radiation for cooling calculations shall use solar flux conditions for the building location, time of year, time of day, and orientation of the surface receiving the solar radiation.	**Block Load Complies.** Design cooling calculations use hour-by-hour profiles of solar flux, by orientation, for one design cooling day in each of the 12 months, for the building site latitude and longitude.
5.4 Heating calculations shall use values of outdoor air temperature for the building use and building location.	**Block Load Complies.** Design heating calculations use outdoor air temperature and humidity data representing a winter design condition for the building site.
6. Cooling Load Method	-
6.1 The calculation method shall account for convective heat gain, radiant heat gain and the thermal mass effect on cooling load.	**Block Load Complies.** Block Load offers a choice of two load calculation methods: the ASHRAE Transfer Function method and the ASHRAE Radiant Time Series method. Both methods account for separate convective and radiant heat gains, and for the delay caused by thermal mass in converting radiant heat gains to cooling load.
6.2 The cooling load calculation shall address the hours of the day and months of the year necessary to establish peak cooling load and the hour at which it occurs. The peak load may occur at any number of possible hours.	**Block Load Complies.** Block Load calculates design cooling loads 24-hours a day for one cooling design day in each of the 12 months. It scans results of these 288 hourly calculations to identify the peak space, peak zone and peak system coil loads.

ASHRAE Standard 183-2007 Requirements	Description of How Block Load v4.16 Complies
7. External Heat Gains	-
7.1 Fenestration	-
7.1.1 The calculation method shall account for both temperature-driven heat gain and solar heat gain.	**Block Load Complies.** Fenestration calculations account for both the temperature driven conduction heat gain and the solar heat gain through the fenestration assembly.
7.1.2 The temperature-driven heat gain shall be calculated using the thermal performance of the entire fenestration assembly.	**Block Load Complies.** An overall U-value representing performance of the entire fenestration assembly is used to calculate the temperature-driven conduction heat gain.
7.1.3 The solar heat gain shall be calculated from incident solar flux and the solar performance of the entire fenestration assembly.	**Block Load Complies.** Solar flux striking the entire window assembly, and a shade coefficient representing performance of the entire fenestration assembly is used to calculate solar heat gain for fenestration.
7.1.4 The solar heat gain calculation shall account for interior shading from devices such as blinds, shades or drapes when such devices are present.	**Block Load Complies.** The effect of interior shades is included in solar heat gain calculations, when shades are specified by the user.
7.1.5 The solar heat gain calculation shall account for exterior shading when present.	**Block Load Complies.** Block Load will model the effect of external shading from horizontal overhangs, vertical fins and fenestration reveals on solar heat gain, when these building features are specified by the user.
7.2 **Opaque Building Envelope.** The heat gain of opaque building envelope components shall account for solar radiation and temperature-driven heat gain, shall consider the thermal performance of materials in the opaque building envelope component, and shall consider the time delay occurring as heat is conducted through the material layers.	**Block Load Complies.** Opaque building envelope component heat gains are calculated considering heat gain from solar radiation striking the exterior surface of the building and due to heat gain or heat loss driven by temperature difference between the exterior surface and adjacent ambient air. Opaque building envelope assemblies are defined as a sequence of individual material layers with properties such as thickness, density, specific heat and thermal resistance. The conduction transfer function method is used to calculate heat flow through these assemblies and accounts for the time delay occurring due to heat storage and release in these material layers.
7.3 **Infiltration.** The calculation method shall account for separate sensible and latent infiltration heat gains when infiltration exists.	**Block Load Complies.** A user can define infiltration airflow. HAP calculates separate sensible and latent heat gains when such airflow is specified.
8. Internal Heat Gains	-
8.1 Internal heat gains shall be included in the cooling load.	**Block Load Complies.** Internal heat gains are considered.
8.2 Sensible and latent heat gain components of all internal gain contributors shall be considered separately.	**Block Load Complies.** Individual sources of internal heat gain are considered separately. As applicable, separate sensible and latent heat gains are calculated.
8.3 Evaluation of heat gains from the occupants shall take into account the number of occupants, their activity level and the occupancy schedule.	**Block Load Complies.** Occupant heat gain calculations account for the number of occupants, their activity level (i.e. per-person sensible and latent heat gain) and hour by hour schedules defining the quantity of occupants present.

ASHRAE Standard 183-2007 Requirements	Description of How Block Load v4.16 Complies
8.4 Evaluation of heat gains from lighting and internal equipment shall consider their operation schedule and load factor.	**Block Load Complies.** Block Load requires actual lighting, electric equipment and non-electric equipment heat gains to be specified directly. This eliminates any need to consider load factor to convert from nameplate data to actual heat gain. All of these internal heat gain components also consider hour by hour schedules defining how heat varies as a function of time.
8.5 Evaluation of heat gains from lighting equipment shall account for heat transfer to the ceiling plenum (if applicable).	**Block Load Complies.** Block Load allows a user to specify that a ceiling plenum is present and that a portion of lighting heat gain is transferred to that plenum.
9. Heating Load	-
9.1 Heating load calculations shall be based on peak temperature-driven heat loss through the building envelope.	**Block Load Complies.** Block Load uses the industry standard approach for design heating calculations which calculates load based on the peak temperature-driven heat loss through the building envelope.
9.2 Credit for solar heat gains and for internal heat gains shall not be included as part of the calculation of the peak heating load.	**Block Load Complies.** Block Load does not consider solar heat gain or internal heat gains in heating load calculations.
9.3 Infiltration shall be accounted for when it exists.	**Block Load Complies.** Block Load calculates infiltration load when infiltration airflow is specified.
9.4 Heating load calculations shall account for cold processes or equipment in the zone that absorbs heat (for example, some refrigerated cases).	**Block Load Does Not Comply.** Block Load does not currently permit internal heat losses (representing cold processes, for example) to be considered in heating load calculations.
10. System Cooling and Heating Loads	-
10.1 Cooling and heating system loads shall account for the capacity required to accomplish psychrometric processes. Psychrometric processes include conditioning for reheat, dehumidification and air mixing.	**Block Load Complies.** Block Load calculates system capacity requirements required to accomplish psychrometric processes of the specific HVAC system configured by the user.
10.2 Energy from fans and pumps used in cooling systems shall be accounted for in system cooling loads.	**Block Load Complies.** Block Load accounts for fan heat gain in system calculations, as specified by the user.
10.3 Heat transfer through piping and ductwork walls shall be accounted for in determining system loads.	**Block Load Does Not Comply.** Block Load does not currently offer inputs for modeling duct heat gain or heat loss.
10.4 Duct leakage shall be considered in determining system load.	**Block Load Does Not Comply.** Block Load does not currently offer inputs for modeling duct air leakage when calculating system loads.
10.5 Outside air cooling and heating loads shall be calculated for the particular system configuration and weather data.	**Block Load Complies.** Block Load calculates outdoor air ventilation loads both for cooling and heating conditions when calculating system loads.
10.6 Diversity due to variations in actual occupancy, lighting, or equipment use shall be considered in determining system cooling loads.	**Block Load Does Not Comply.** Block Load currently does not offer features for considering diversity for lighting equipment and occupants when calculating system loads.
10.7 Based on the specific type of system designed, the system cooling and heating loads shall account for inherent system inefficiencies such as damper leakage.	**Block Load Does Not Comply.** Block Load currently does not offer features for modeling leakage of dampers.