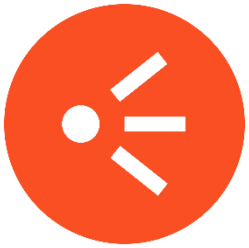
HVAKR

Compliance with ANSI/ASHRAE/ACCA Standard 183-2007 (RA 2020)



HVAKR
Huntington Beach, CA

Rev. 4/13/2023

Introduction

This report outlines how HVAKR complies with *ANSI/ASHRAE/ACCA Standard 183-2007 (RA 2020), Peak Cooling and Heating Load Calculations in Buildings Except Low-Rise Residential Buildings.*

As stated in Standard 183, *"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."* This report outlines the minimum requirements for a cooling and heating load computation program, but one should note that *reasonable and realistic* inputs by the user are equally important in achieving accurate load estimates.

HVAKR Compliance with ASHRAE Standard 183 Requirements

HVAKR complies with all requirements listed in Standard 183. The following table identifies each requirement from Standard 183 in the left-hand column and addresses how HVAKR complies with each in the right-hand column.

Table 1. Evaluation of HVAKR Compliance with ASHRAE Standard 183-2007 (RA 2020)

ASHRAE Standard 183 Requirement	How HVAKR Complies
5. Weather Data and Indoor Design Conditions	
5.1 Indoor design conditions shall be established by owner criteria, local codes, or comfort criteria.	HVAKR allows users to specify indoor setpoints, including dry-bulb temperature for summer and winter and relative humidity.
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.	Calculations utilize hourly profiles for outdoor air dry-bulb and wet-bulb temperature for one design day per month based on climactic data local to the building.
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.	Calculations utilize hourly profiles for solar flux for one design day per month based on the latitude, longitude, and orientation of the building.
5.4 Heating calculations shall use values of outdoor air temperature for the building use and the building location.	Calculations utilize winter design outdoor air temperature and humidity based on climactic data local to the building.
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.	HVAKR uses the ASHRAE Radiant Time Series (RTS) method, which accounts for convective and radiant heat transfer and for the delay in heat transfer influenced by the thermal properties of the building and its components.
6.2 The cooling load calculation shall address the hours of the day and months of the year necessary to establish the peak cooling load and the hour at which it occurs. The peak load may occur at any of a number of possible hours.	HVAKR computes the cooling load 24-hours a day for one design day per month, resulting in 288 calculations. These calculations are sifted to identify the peak load for each space, zone, and system.

Table 1 cont.

ASHRAE Standard 183 Requirement	How HVAKR 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.	Window load calculations include both the convective (temperature-driven) and radiant (solar-driven) heat gain for the assembly.
7.1.2 The temperature-driven heat gain shall be calculated using the thermal performance of the entire fenestration assembly.	Calculations utilize the user-specified overall U-Value for the assembly to determine the temperature-driven 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.	Calculations utilize the solar flux hitting the assembly and the user-specified solar heat gain coefficient (SHGC) of the assembly to determine window solar heat gain.
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.	HVAKR allows the user to specify interior shading properties for windows if applicable and accounts for interior shading when computing solar heat gain if such properties are present.
7.1.5 The solar heat gain calculation shall account for exterior shading when present.	HVAKR allows the user to specify horizontal and vertical exterior shading properties for windows if applicable and accounts for exterior shading when computing solar heat gain if such properties are present.
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.	Calculations include heat gain from solar radiation hitting the envelope component and heat gain or loss due to the temperature difference between the exterior and interior. HVAKR allows the user to specify opaque component assembly types, the overall U-Value of the component, and the absorption coefficient of the component. The RTS method is used to account for the delay in heat transfer influenced by the thermal properties of the component assembly. The overall U-Value and absorption coefficient are used to calculate the temperature-driven and solar radiation heat gain for the component.
7.3 Infiltration. The calculation method shall account for separate sensible and latent infiltration heat gains when infiltration exists.	HVAKR allows the user to specify infiltration airflow and calculates both sensible and latent infiltration heat gains if infiltration airflow is present.

Table 1 cont.

ASHRAE Standard 183 Requirement	How HVAKR Complies
8. Internal Heat Gains	
8.1 Internal heat gains shall be included in the cooling load.	Calculations include internal heat gains.
8.2 Sensible and latent heat gain components of all internal gain contributors shall be considered separately.	HVAKR calculates each individual source of internal heat gain and considers sensible and latent heat gain separately for sources that produce both sensible and latent heat.
8.3 Evaluation of heat gains from the occupants shall take into account the number of occupants, their activity levels, and the occupancy schedule.	HVAKR allows the user to specify the number of occupants, the per-person sensible and latent heat gain, and the hourly schedule for each space type. These inputs are used to calculate the appropriate heat gain from occupants for each hour in the space.
8.4 Evaluation of heat gains from lighting and internal equipment shall consider their operation schedules and load factors.	HVAKR allows the user to specify the load factor and hourly schedule for lighting and equipment for each space type. These inputs are used to calculate the appropriate heat gain from lighting and equipment for each hour in the space.
8.5 Evaluation of heat gains from lighting equipment shall account for heat transfer to the ceiling plenum (if applicable).	HVAKR allows the user to specify the percentage of heat gain from lighting that is to be applied to the ceiling plenum. If heat gain to the ceiling plenum is specified, HVAKR will apply that heat gain to the system load and omit it from the space and zone loads.
9. Heating Load	
9.1 Heating load calculations shall be based on peak temperature-driven heat loss through the building envelope.	Calculations utilize peak temperature-driven heat loss (winter design conditions) to determine heating loads.
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.	Calculations do not include solar heat gains nor internal heat gains when determining heating loads.
9.3 Infiltration shall be accounted for when it exists.	HVAKR allows the user to specify infiltration airflow and calculates both sensible and latent infiltration heat gains if infiltration airflow is present.
9.4 Heating load calculations shall account for cold processes or equipment in the zone that absorbs heat (for example, some refrigerated cases).	HVAKR allows the user to specify miscellaneous heating loads for each space if applicable. If a miscellaneous heating load is specified, HVAKR will include it in the heating load calculation.

Table 1 cont.

ASHRAE Standard 183 Requirement	How HVAKR Complies
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.	HVAKR includes psychrometric processes when calculating system capacity requirements and coil sizing based on the system configuration specified by the user.
10.2 Energy from fans and pumps used in cooling systems shall be accounted for in system cooling loads.	HVAKR allows the user to specify fan heat gain and other system inefficiencies when configuring each system. Fan heat gain and other inefficiencies is applied to the system loads if present.
10.3 Heat transfer through piping and ductwork walls shall be accounted for in determining system loads.	HVAKR allows the user to specify duct heat gain/loss when configuring each system. Duct heat gain/loss is applied to the system loads if present.
10.4 Duct leakage shall be considered in determining system load.	HVAKR allows the user to specify duct leakage when configuring each system. The additional load due to duct leakage is applied to the system loads if duct leakage is present.
10.5 Outside air cooling and heating loads shall be calculated for the particular system configuration and weather data.	HVAKR includes outside air ventilation loads when calculating cooling and heating loads for each system. Calculation is based on the system configuration specified by the user and climactic data local to the building.
10.6 Diversity due to variations in actual occupancy, lighting, or equipment use shall be considered in determining system cooling loads.	HVAKR allows the user to specify percent diversity for occupants, lighting, and equipment when configuring each system. Diversity is applied to the system loads if present.
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.	HVAKR allows the user to specify other system inefficiencies when configuring each system. The specified inefficiency can apply to damper leakage, coil bypass, or any other inherent system inefficiencies. The additional load due to other inefficiencies is applied to the system loads if present.