internal equipment: equipment that is located in the zone or building and that generates heat (e.g., computers, copy machines, laboratory equipment, kitchen equipment, motors, factory machinery).

internal heat gain: heat that is generated from sources that are within the zone (e.g., people, lights, equipment).

latent cooling load: for zones, the rate at which moisture must be removed from the zone to maintain indoor design humidity. For systems, the rate at which heat is removed at a cooling coil or dehumidifying device in order to condense or remove moisture from the supply airstream or dehumidified space.

latent heat gain: an energy gain to a zone that occurs when moisture is added to the air in the zone.

load factor: the ratio of actual power use to rated or nameplate power for equipment. For example, equipment with a nameplate rating of 250 W may have a peak measured power of 180 W. In this example, an internal heat gain of 180 W should be used rather than 250 W for load calculations.

low-rise residential: single-family houses, multi-family structures of three stories or fewer above grade, and manufactured houses, which includes both mobile homes and modular homes.

method: a procedure used to calculate the cooling or heating load of a zone or building. Load calculation methods that comply with this standard include, but are not limited to:

- the cooling load temperature difference/cooling load factor (CLTD/CLF) family of methods,
- total equivalent temperature difference/time averaging (TETD/TA) methods,
- transfer function methods (TFM),
- radiant time series (RTS) methods, and
- heat balance (HB) methods.

Note: Recommendations on how to choose a method are provided in informative Appendix B.

peak load: the largest cooling load or heating load calculated based on design conditions.

radiant heat gain: the portion of a heat gain that is transferred by thermal radiation from the source of the heat gain to surfaces within the zone or the building.

reheat: heat used to raise the temperature of air after the air has been mechanically cooled. Reheat is often discouraged by energy codes.

sensible cooling load: for zones, the rate at which heat must be removed from the zone to maintain indoor design temperature. For systems, the rate at which heat is removed at the apparatus in order to reduce the temperature of the supply airstream.

sensible heat gain: an energy gain to a zone that occurs when heat is directly added to the zone through convection, conduction, and/or radiation.

sky diffuse solar: the component of solar radiation whose character has been changed by scattering in the atmosphere.

solar heat gain: energy from the sun that enters a zone through fenestration.

thermal mass effect: the ability of a material layer to store heat and the ability of an opaque envelope component to dampen and delay transfer of heat.

time delay: the time interval between heat transfer events in a zone or building.

temperature-driven heat gain: the heat gain or loss due to the difference between the indoor and outdoor temperatures.

zone: a room or space or group of rooms or spaces in a building.

zone load: the cooling load or heating load occurring in a zone.

3.2 Abbreviations and Acronyms Used in This Standard

HVAC: heating, ventilating, and air conditioning.

4. COMPLIANCE

4.1 Where validation of compliance with this standard is part of a permit or other review process, documentation shall be provided indicating that the method used, the assumptions, and the execution of the method meet the requirements of this standard.

Note: The recommended format for this documentation is shown in Appendix A.

4.2 The method shall utilize data and perform calculations in a manner that meets the requirements of this standard.

4.3 Inputs to a method shall be determined in a manner that meets the requirements of this standard.

5. WEATHER DATA AND INDOOR DESIGN CONDITIONS

5.1 Indoor design conditions shall be established by owner criteria, local codes, or comfort criteria.

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.

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.

5.4 Heating calculations shall use values of outdoor air temperature for the building use and the building location.

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.

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.

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.

7.1.2 The temperature-driven heat gain shall be calculated using the thermal performance of the entire fenestration assembly.

7.1.3 The solar heat gain shall be calculated from incident solar flux and the solar performance of the entire fenestration assembly.

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.

7.1.5 The solar heat gain calculation shall account for exterior shading when 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.

7.3 Infiltration. The calculation method shall account for separate sensible and latent infiltration heat gains when infiltration exists.

8. INTERNAL HEAT GAINS

8.1 Internal heat gains shall be included in the cooling load.

8.2 Sensible and latent heat gain components of all internal gain contributors shall be considered separately.

8.3 Evaluation of heat gains from the occupants shall take into account the number of occupants, their activity level, and the occupancy schedule.

8.4 Evaluation of heat gains from lighting and internal equipment shall consider their operation schedule and load factor.

8.5 Evaluation of heat gains from lighting equipment shall account for heat transfer to the ceiling plenum (if applicable).

9. HEATING LOAD

9.1 Heating load calculations shall be based on 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.

Exception: Where constant or permanent internal heat gains are known to be present in the zone to be heated, the peak heating load may be adjusted to account for these available heat gains.

9.3 Infiltration shall be accounted for when it exists.

9.4 Heating load calculations shall account for cold processes or equipment in the zone that absorbs heat (for example, some refrigerated cases).

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, humidification, and air mixing.

10.2 Energy from fans and pumps used in cooling systems shall be accounted for in system cooling loads.

10.3 Heat transfer through piping and ductwork walls shall be accounted for in determining system loads.

10.4 Duct leakage shall be considered in determining system load.

10.5 Outside air cooling and heating loads shall be calculated for the particular system configuration and weather data.

10.6 Diversity due to variations in actual occupancy, lighting, or equipment use shall be considered in determining system cooling 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.

(This appendix is not part of this standard. 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 standard 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 to ASHRAE or ANSI)

APPENDIX A

RECOMMENDED ASHRAE/ACCA COMPLIANCE FORM FOR STANDARD 183

Building or Zone Name:

_____

Location or Address:

_____

Design Conditions:

	Cooling	Heating
Weather Data Used		
Indoor Dry Bulb Design Temperature		
Indoor Design Relative Humidity		

Load Calculation Method: *(indicate which of the following methods is used)*

- ❑ ***CLTD/CLF****—Cooling Load Temperature Difference/Cooling Load Factor methods*
- ❑ ***HB****—Heat Balance methods*
- ❑ ***TETD/TA****—Total Equivalent Temperature Difference/Time Averaging methods*
- ❑ ***TFM****—Transfer Function Methods*
- ❑ ***RTS****—Radiant Time Series methods*
- ❑ ***OTHER*** *(please specify)* _____

The undersigned attests that the above information is correct and that the procedures used to perform the load calculations comply with ANSI/ASHRAE/ACCA Standard 183.

Signed: Date:

_____ _____

Submitted by: Date:

_____ _____