

2015 Commercial Minimum A/C Calculation & Sizing Requirements

2015 IMC

SECTION 312 HEATING AND COOLING LOAD CALCULATIONS

312.1 Load calculations.

Heating and cooling system design loads for the purpose of sizing systems, appliances and *equipment* shall be determined in accordance with the procedures described in the ASHRAE/ACCA Standard 183. Alternatively, design loads shall be determined by an *approved* equivalent computation procedure, using the design parameters specified in Chapter 3 [CE] of the *International Energy Conservation Code*.

2015 IECC

SECTION C302 DESIGN CONDITIONS

C302.1 Interior design conditions.

The interior design temperatures used for heating and cooling load calculations shall be a maximum of 72°F (22°C) for heating and minimum of 75°F (24°C) for cooling.

SECTION C303 MATERIALS, SYSTEMS AND EQUIPMENT

C303.1 Identification.

Materials, systems and equipment shall be identified in a manner that will allow a determination of compliance with the applicable provisions of this code.

SECTION C401 GENERAL

C401.1 Scope.

The **provisions** in this chapter are applicable to commercial buildings **and their building sites**.

C401.2 Application.

Commercial buildings shall comply with one of the following:

1. The requirements of ANSI/ASHRAE/IESNA 90.1.
2. The requirements of Sections **C402 through C405**. In addition, commercial buildings shall comply with Section **C406 and tenant spaces shall comply with Section C406.1.1**.

SECTION C403 BUILDING MECHANICAL SYSTEMS

C403.1 General.

Mechanical systems and equipment serving the building heating, cooling or ventilating needs shall comply with Section C403.2 and **shall comply with Sections C403.3 and C403.4 based on the equipment and systems provided. Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with Section C403.2.15 or 403.2.16.**

C403.2 Provisions applicable to all mechanical systems (Mandatory).

Mechanical systems and equipment serving the building heating, cooling or ventilating needs shall comply with Sections C403.2.1 through C403.2.16.

C403.2.1 Calculation of heating and cooling loads.

Design loads associated with heating, ventilating and air conditioning of the building shall be determined in accordance with ANSI/ASHRAE/ACCA Standard 183 or by an approved equivalent computational procedure using the design parameters specified in Chapter 3. Heating and cooling loads shall be adjusted to account for load reductions that are achieved where energy recovery systems are utilized in the HVAC system in accordance with the ASHRAE *HVAC Systems and Equipment Handbook* by an approved equivalent computational procedure.

C403.2.2 Equipment sizing.

The output capacity of heating and cooling equipment shall be not greater than the loads calculated in accordance with Section C403.2.1. A single piece of equipment providing both heating and cooling shall satisfy this provision for one function with the capacity for the other function as small as possible, within available equipment options.

Exceptions:

1. Required standby equipment and systems provided with controls and devices that allow such systems or equipment to operate automatically only when the primary equipment is not operating.
2. Multiple units of the same equipment type with combined capacities exceeding the design load and provided with controls that have the capability to sequence the operation of each unit based on load.

C403.2.3 HVAC equipment performance requirements.

Equipment shall meet the minimum efficiency requirements of Tables C403.2.3(1), C403.2.3(2), C403.2.3(3), C403.2.3(4), C403.2.3(5), C403.2.3(6), **C403.2.3(7)**, C403.2.3(8) and **C403.2.3(9)** when tested and rated in accordance with the applicable test procedure. Plate-type liquid-to-liquid heat exchangers shall meet the minimum requirements of Table **C403.2.3(10)**. The efficiency shall be verified through certification under an approved certification program or, where a certification program does not exist, the equipment efficiency ratings shall be supported by data furnished by the manufacturer. Where multiple rating conditions or performance requirements are provided, the equipment shall satisfy all stated requirements. Where components, such as indoor or outdoor coils, from different manufacturers are used, calculations and supporting data shall be furnished by the designer that demonstrates that the combined efficiency of the specified components meets the requirements herein.

C403.3 Economizers (Prescriptive).

Each cooling system that has a fan shall include either an air or water economizer complying with Sections C403.3.1 through C403.3.4

Exceptions: Economizers are not required for the systems listed below.

1. In cooling systems for buildings located in Climate Zones 1A and 1B.
2. In climate zones other than 1A and 1B, where individual cooling units have a capacity of less than 54,000 Btu/h (15.8 kW) and meet one of the following:
 - 2.1. Have direct expansion cooling coils.
 - 2.2. The total chilled water system capacity less the capacity of fan units with air economizers is less than the minimum specified in Table C403.3(1).

The total supply capacity of all fan-cooling units not provided with economizers shall not exceed 20 percent of the total supply capacity of all fan-cooling units in the building or 300,000 Btu/h (88 kW), whichever is greater.

3. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7°C) dew-point temperature to satisfy process needs.
4. Systems that serve residential spaces where the system capacity is less than five times the requirement listed in Table C403.3(1).
5. Systems expected to operate less than 20 hours per week.
6. Where the use of outdoor air for cooling will affect supermarket open refrigerated casework systems.
7. Where the cooling efficiency meets or exceeds the efficiency requirements in Table C403.3(2).
8. Chilled-water cooling systems that are passive (without a fan) or use induction where the total chilled water system capacity less the capacity of fan units with air economizers is less than the minimum specified in Table C403.3(1).
9. Systems that include a heat recovery system in accordance with Section C403.4.7.

TABLE C403.3(2)

EQUIPMENT EFFICIENCY PERFORMANCE

EXCEPTION FOR ECONOMIZERS

CLIMATE ZONES COOLING EQUIPMENT PERFORMANCE IMPROVEMENT (EER OR IPLV)

2B 10% efficiency improvement

3B 15% efficiency improvement

4B 20% efficiency improvement