



Issue Date:	11/10/2020
Code/Section:	2018 IECC C403.5
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Issue: 2018 IECC code section C403.5 states, “An air or water economizer shall be provided for the following cooling systems: Individual fan systems with cooling capacity greater than or equal to 54,000 Btu/h (15.8 kW) in buildings having other than a Group R occupancy.

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”.

Interpretation:

1. 300,000 Btu/h < System Load

Air conditioning cooling units less than 54,000 Btu/h sensible cooling do not require economizers. All air conditioning units greater than 54,000 Btu/h sensible cooling requires economizers. The exception is where the cooling efficiency is greater than or equal to the efficiency requirements in IECC Table C403.5(2).

2. 300,000 Btu/h < System Load <1,500,000 Btu/h

When the individual building system sensible cooling load exceeds 300,000 Btu/h but less than 1,500,000 Btu/h, the units required to have economizers shall be the difference from the calculated sensible load and 300,000 Btu/h sensible load. For example, if all the AC equipment within the individual building system adds up to 408,000 Btu/h, code allows up to 300,000 Btu/h without economizers with standard efficiency. The AC units cooling the remaining 108,000 Btu/h must have economizers or be 10% higher efficiency per IECC Table C403.5(2).

3. System Load >1,500,000 Btu/h

When the individual building system sensible cooling load exceeds 1,500,000 Btu/h, 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. For example, if all the AC equipment within the individual building system adds up to 2,000,000 Btu/h, code allows up to 20% or 400,000 Btu/h without economizers with standard efficiency. The AC units cooling the remaining 1,600,000 Btu/h must have economizers or be 10% higher efficiency per IECC Table C403.5(2).

4. Identify all AC units with economizers on plan and mechanical schedules for permitted or new work only. State total sensible cooling load for system in mechanical schedule. The mechanical schedule must match the energy calculations or evaluations being submitted.

5. See examples below for further explanation and clarification.

Example 1 – Same space, different AC configuration

< 300 MBH

Scenario 1
(1) 51,000 Btu/h
Cooling Capacity AC Unit

< 54,000 Btu/h
No economizer required

< 300 MBH

Scenario 2
(1) 81,000 Btu/h
Cooling Capacity AC Unit

>54,000 Btu/h
Economizer required

Example 2 – Same space, different AC configuration

< 300 MBH

Scenario 1
(3) 51,000 Btu/h cooling units each
153 MBH System Cooling Capacity

AC Units

No economizer required
<54,000 Btu/h units
<300,000 MBH system
cooling capacity

< 300 MBH

Scenario 2
(2) 81,000 Btu/h each
162 MBH System Cooling Capacity

AC Units

Economizer required
>54,000 Btu/h or efficiency
upgrades per IECC C403.5

Example 3 – Same space, different AC configuration

< 300 MBH < Cooling Capacity < 1,500 MBH

Scenario 1
 (8) 51,000 Btu/h cooling units each
 408 MBH System Cooling Capacity

AC Units

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< 300 MBH < Cooling Capacity < 1,500 MBH

Scenario 2
 (5) 81,000 Btu/h each
 405 MBH System Cooling Capacity

AC Units

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System cooling capacity > 300 MBH
 Economizer Requirements

Total cooling capacity	408 MBH
economizer allowance	<u>- 300 MBH</u>
Cooling units requiring economizers	108 MBH

Number of units = 108 MBH/51 MBH
 requiring economizers = 2.1
 rounding up to 3

(3) 51,000 MBH AC units require
 economizer per IECC C403.5 or
 efficiency upgrades

Economizer required
 >54,000 Btu/h or efficiency upgrades

Example 3 (cont.) – Same space, different AC configuration

From example 3, scenario 2, substitute (4) 81,000 Btu/h units for (4) 51,000 Btu/h cooling units, (2) 43,100 Btu/h cooling units, and (1) 32,400 Btu/h cooling units. (1) 81,000 Btu/h cooling unit to remain.

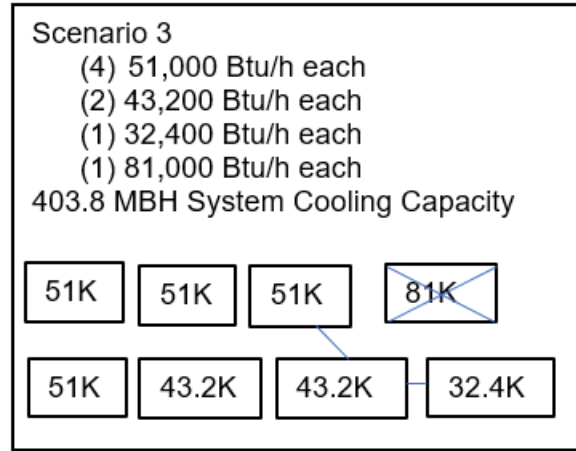
Total system cooling = 403.8 MBH

Economizer allowance = 300 MBH

Cooling units requiring economizer = 103.8 MBH

Therefore, per IECC 403.5, economizers are required on (1) 81,000 Btu/h (>54,000 Btu/h) and either one of 32,400 Btu/h, 43,200 Btu/h, or 51,000 Btu/h units or efficiency upgrades.

< 300 MBH < Cooling Capacity < 1,500 MBH



Example 4 – Same space, different AC configuration

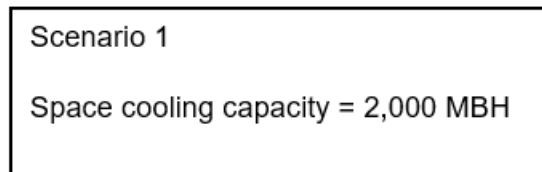
Total system cooling = 2,000 MBH

Economizer allowance = 400 MBH

(20% of cooling capacity
 per IECC C403.5)

Cooling units requiring economizers = 1,600 MBH
 or efficiency upgrades per IECC C403.5

> 1,500 MBH Capacity



Example 5 – Shopping Center, (1) individual space or (1) occupiable space

(7) 51,000 Btu/h cooling units = 357,000 Btu/h or 357 MBH	
Total cooling capacity	357 MBH
Economizer allowance	<u>- 300 MBH</u>
Cooling units requiring economizers	57 MBH
Number of units requiring economizers = 57 MBH/51 MBH = 1.1 Rounding up to 2	
(2) 51,000 MBH AC units require economizer per IECC C403.5 or efficiency upgrades	

Example 6 –Strip Mall, (7) individual spaces or (7) occupiable spaces or (7) individual suites
 (Same building area and same number of AC units as in Example 5)

Space 1	Space 2	Space 3	Space 4	Space 5	Space 6	Space 7
□	□	□	□	□	□	□
51K Cooling Capacity	51K Cooling Capacity	51K Cooling Capacity	51K Cooling Capacity	51K Cooling Capacity	51K Cooling Capacity	51K Cooling Capacity

Economizers are not required for individual cooling systems that are 54,000 Btu/h cooling capacity or less, IECC C403.5.

If one space or suite decides to do a tenant improvement that would exceed 54,000 Btu/h cooling capacity, that space or suite only would have to comply with IECC C403.5 economizer requirements.

Example: Suite 7 does a tenant improvement that would increase the cooling capacity from 51,000 Btu/h to 162,000 Btu/h cooling capacity. That suite only, suite 7, doing the tenant improvement would have to comply with IECC C403.5 economizer requirements. Only new work or permitted work would apply. The other suites would not be affected since they are not new work or permitted work.

