Compliance - Taking it from the Book to the Building

Anthony Floyd, FAIA, LEED-AP
City of Scottsdale
Office of Environmental Initiatives

Southwest Energy Codes Conference
403.3.1.5 System Balancing. The ventilation air distribution system shall be provided with means to adjust the system to achieve not less than the minimum ventilation airflow rate as required by Sections 403.3 and 403.3.1.2. Ventilation systems shall be balanced by an approved method. Such balancing shall verify that the ventilation system is capable of supplying and exhausting the airflow rates required by Sections 403.3 and 403.3.1.2.

Plan Review Note:
A copy of the AIR BALANCE REPORT shall be provided to the Building Inspector to show compliance with IMC 403.3.1.5 at or before Final Mechanical Inspection.
22. PROVIDE AN AIR BALANCE TEST AND REPORT PREPARED BY THIRD PARTY CERTIFIED AABC OR NEBB INDIVIDUAL OR FIRM AND SHALL NOT BE THE INSTALLING CONTRACTOR. AIR BALANCE REPORT SHALL BE PROVIDED TO THE MECHANICAL INSPECTOR FOR FINAL APPROVAL. ALL PUBLIC AREAS SUCH AS CORRIDORS, LEASING AND GYM SHALL BE PROVIDED WITH TEST AND AIR BALANCE. DWELLING UNITS COMFORT BALANCE ONLY.
# IMC Outside Air & Exhaust Airflow

## 2012 IMC Ventilation Calculation

<table>
<thead>
<tr>
<th>Room Name</th>
<th>Area (Az)</th>
<th>People Outdoor Airflow Rate (Rp - CFM/Person)</th>
<th>Area Outdoor Airflow Rate (Ra - CFM/SF)</th>
<th>ASHRAE Zone Population (Pz - Occupancy / 1000 SF)</th>
<th>Zone Air Distribution Effectiveness (Ez) (Table 403.3.1.2)</th>
<th>Breathing Zone Outdoor Air Flow (Voz - CFM)</th>
<th>Required Minimum Outdoor Air Intake (CFM)</th>
<th>Design Outdoor Air Intake (CFM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fitness</td>
<td>2,579</td>
<td>20.0</td>
<td>0.06</td>
<td>10</td>
<td>0.8</td>
<td>838</td>
<td>838</td>
<td>840</td>
</tr>
<tr>
<td>Leasing Lounge</td>
<td>715</td>
<td>5.0</td>
<td>0.06</td>
<td>30</td>
<td>0.8</td>
<td>188</td>
<td>258</td>
<td>260</td>
</tr>
<tr>
<td>Assist Office</td>
<td>145</td>
<td>5.0</td>
<td>0.06</td>
<td>5</td>
<td>0.8</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manager Office</td>
<td>167</td>
<td>5.0</td>
<td>0.06</td>
<td>5</td>
<td>0.8</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage</td>
<td>98</td>
<td>0.12</td>
<td></td>
<td></td>
<td>0.8</td>
<td></td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Files</td>
<td>99</td>
<td>5.0</td>
<td>0.06</td>
<td>5</td>
<td>0.8</td>
<td></td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Work Room</td>
<td>113</td>
<td>5.0</td>
<td>0.06</td>
<td>5</td>
<td>0.8</td>
<td></td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Reception</td>
<td>575</td>
<td>5.0</td>
<td>0.06</td>
<td>30</td>
<td>0.8</td>
<td>151</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conference</td>
<td>241</td>
<td>5.0</td>
<td>0.06</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Center</td>
<td>373</td>
<td>5.0</td>
<td>0.06</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resident Lounge</td>
<td>970</td>
<td>5.0</td>
<td>0.06</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td>750</td>
<td>5.0</td>
<td>0.06</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typical Corridor per Floor</td>
<td>1,954</td>
<td>0.06</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
System Balancing

Adjustments
Corrections
Sometimes Revised Plans
C408 System Commissioning
HVAC systems and Lighting Controls

- Commissioning Plan
  - Systems adjusting and balancing
  - Functional performance testing
- Preliminary Commissioning Report
  - Operation and maintenance manual
  - System balancing report
- Final Commissioning Report
The following systems are exempt from commissioning:

1. Mechanical systems and service water heating systems in buildings where the total mechanical equipment capacity is less than 40 tons cooling capacity and 50 tons combined service water-heating and space-heating capacity.

2. Systems included in Section C403.3 that serve individual dwelling units and sleeping units.
C408.2.1 Commissioning Plan. A commissioning plan shall be developed by a registered design professional or approved agency and shall include:

1. Narrative description of the activities that will be accomplished during each phase
2. Listing of the specific equipment, appliances or systems to be tested.
3. Functions to be tested
4. Conditions under which the test will be performed
5. Measurable criteria for performance
City of Scottsdale Commissioning Compliance Certificate

CITY OF SCOTTSDALE
PLANNING, NEIGHBORHOODS AND TRANSPORTATION
COMMERCIAL COMMISSIONING COMPLIANCE CERTIFICATE
2015 International Energy Conservation Code (IECC)

<table>
<thead>
<tr>
<th>Project Name:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address:</td>
<td>Plan Check No.:</td>
</tr>
<tr>
<td></td>
<td>Permit No.:</td>
</tr>
</tbody>
</table>

**OWNER’S NOTIFICATION OF COMMISSIONING**

To be filled in and signed by Owner before a building permit is issued.

The International Energy Conservation Code requires a registered design professional or approved agency to ensure buildings are designed, constructed and commissioned in accordance with the approved plans, specifications and commissioning plan.

I, as owner/legal agent, do hereby certify that I have retained ______________________ to be responsible for building commissioning services in accordance with this certificate.

Signed: ___________________________ Print name: ___________________________
       (signature of owner or legal representative)

Relation to Project (owner/agent): ___________________________ Date: __________

**COMMISSIONING RESPONSIBILITY**

To be filled in and signed by the registered design professional or approved agency before a building permit is issued.

As the commissioning agency for the above named project, I certify that I am familiar with the design of the project and hereby assume full responsibility for carrying out the required commissioning responsibilities in accordance with this certificate.

Signed: ___________________________ Print name: ___________________________
       (signature of commissioning agency representative)

Name of Commissioning Agency: ___________________________ Date: __________
   (commissioning agency must be independent from the contractor responsible for the work being inspected)

Processed by: ___________________________ Date: __________
   City Planner

**COMMISSIONING REQUIREMENTS (IECC C408.1, C408.2, C408.3)**

The 2015 International Energy Conservation Code (IECC), Section C408.1 requires commissioning of the building mechanical systems and electrical power/lighting systems. Construction document notes shall clearly indicate provisions for commissioning and completion requirements in accordance with the provisions of the code.

**Exception:** The following systems are exempt:

1. Mechanical systems and service water heater systems in buildings where the total mechanical equipment capacity is less than 480,000 Btu/h (45 tons or 140.7 kW) cooling capacity and 600,000 Btu/h (50 tons or 175.8 kW) combined service water-heating and space-heating capacity.
2. Systems included in Section C403.3 that serve dwelling units and sleeping units.

**COMMISSIONING PLAN (IECC C408.2.1)**

A commissioning plan shall be developed by a registered design professional or approved agency and shall include the following terms:

1. A narrative description of the activities that will be accomplished during each phase of commissioning, including the personnel intended to accomplish each of the activities.
2. A listing of the specific equipment, appliances or systems to be tested and a description of the tests to be performed.
3. Functions to be tested, including, but not limited to calibrations and economizer controls.
4. Conditions under which the test will be performed. Testing shall affirm winter and summer design conditions and full outside air conditions.
5. Measurable criteria for performance.
Owner’s Notification of Commissioning and Certificate of Compliance

OWNER’S NOTIFICATION OF COMMISSIONING

To be filled in and signed by Owner before a building permit is issued.

The International Energy Conservation Code requires a registered design professional or approved agency to ensure buildings are designed, constructed, and commissioned in accordance with the approved plans, specifications, and commissioning plan.

I, as owner/legal agent, do hereby certify that I have retained _____________________________ to be responsible for building commissioning services in accordance with this certificate.

Signed: _____________________________ Print name: _____________________________

(signature of owner or legal representative)

Relation to Project (owner/legal agent): _____________________________ Date: ____________

COMMISSIONING RESPONSIBILITY

To be filled in and signed by the registered design professional or approved agency before a building permit is issued.

As the commissioning agency for the above named project, I certify that I am familiar with the design of the project and hereby assume full responsibility for carrying out the required commissioning responsibilities in accordance with this certificate.

Signed: _____________________________ Print name: _____________________________

(signature of commissioning agency representative)

Name of Commissioning Agency: _____________________________ Date: ____________

(c ommissioning agency must be independent from the contractor responsible for the work being inspected)

CERTIFICATE OF COMPLIANCE

To be signed by commissioning agency prior to Certificate of Occupancy issuance.

I certify that, to the best of my knowledge, the requirements of the International Energy Conservation Code and the approved plans and specifications have been complied with, insofar as the portion of the work requiring verification and commissioning in accordance with the responsibilities listed on this certificate. A preliminary commissioning report has been provided to the building owner indicating that the work was or was not completed in conformance with the approved construction documents and discrepancies have been brought to the attention of the contractor for correction.

Within 90 days of the date of receipt of the Certificate of Occupancy, an operating and maintenance manual, system balancing report and final commissioning report shall be provided to the building owner in accordance with this certificate. Contractor’s responsibilities shall be in accordance with the performance obligations set by the Arizona Registrar of Contractors.

Signed: _____________________________ Print name: _____________________________

(signature of approved commissioning agency representative)

Name of Commissioning Agency: _____________________________ Date: ____________

(commissioning agency must be independent from the contractor responsible for the work being inspected)
Functional Performance Testing
Commissioning Reports

Preliminary Report

• Itemization of deficiencies found during testing
• Deferred tests

Final Report

• Drawings
• O & M manuals
• System balancing report
Your Vote is Needed – and Now It's Easier Than Ever

Posted on June 21, 2016

Every three years, hundreds of building industry members from states across the nation convene to develop the next U.S. model building energy code via a consensus process held by the International Code Council. The process, which includes code officials, architects, engineers, product manufacturers, builders and energy efficiency advocates, is designed to ensure that modern-day technology and building practices are incorporated into the current model building code. This year, some members of the residential code committee were more focused on lowering costs for home builders than improving energy efficiency of homes. As a result, the 2018 IECC has the potential to be significantly weaker than its previous iterations.

Office of Environmental Initiatives
Community and Economic Development
Green Building Program
Anthony Floyd, FAIA, LEED-AP
afloyd@scottsdaleaz.gov
www.scottsdaleaz.gov/greenbuilding