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## LEED-NC® 2.2 And Standard 62.1-2004

*LEED-NC 2.2 relies heavily on ASHRAE Standard 62.1-2004. Standard 62 is a primary prerequisite for any LEED credits. Specifically for EQ credits, points are expected to be awarded when the project goes beyond the minimum requirements found in Standard 62.*

**By Dennis A. Stanke**, Member ASHRAE

The latest version of LEED-NC, the green building rating system for new construction and major renovations from the U.S. Green Building Council, relies heavily on ANSI/ASHRAE Standard 62.1-2004 (Standard 62). Compliance with this ASHRAE ventilation standard is not only a prerequisite for any credits, it helps provide a pathway to several indoor environmental quality (EQ) credits.

As chair of Standing Standards Project Committee 62.1 and as a member of the Leadership in Energy and Environmental Design (LEED) EQ technical advisory group (TAG), I decided to take a closer look at the relationship between Standard 62 and LEED EQ credits.

### **Prerequisite 1: Minimum IAQ Performance**

All requirements for this prerequisite refer to Standard 62. The overall intent is to establish a minimum IAQ level in LEED-rated buildings. LEED credits cannot be awarded unless the project:

1. Meets the minimum requirements presented in Sections 4 through 7 of Standard 62. These sections include many design requirements related to outdoor and indoor source control, ventilation system design, and minimum ventilation requirements as well as minimum ventilation system installation and startup requirements.

2. For mechanically ventilated systems, meets the prescribed minimum ventilation requirements of the Ventilation Rate Procedure (found in Section 6 of Standard 62), or those of the building code, whichever is more stringent. Note that the IAQ Procedure, a performance-based approach for determining minimum outdoor airflow requirements, found in Section 6.3 of Standard 62, cannot be used to meet this prerequisite.

3. For naturally ventilated systems, meets the minimum opening size and opening location requirements found in Section 5.1 of Standard 62.

### **Prerequisite 2: ETS Control**

The intent of this prerequisite is to minimize occupant exposure to environmental tobacco smoke (ETS) in LEED-rated buildings. LEED credits cannot be awarded unless the project:

1. Prohibits smoking throughout the building. The ventilation rates prescribed by Standard 62 apply only to nonsmoking areas, but the Standard itself does not prohibit smoking.

2. Locates designated outdoor smoking areas at least 25 ft (7.6 m) from building entries, intakes and operable windows. Standard 62 includes no such requirement.

OR

1. Restricts indoor smoking to designated smoking areas. Indirectly, compliance with Standard 62 may result in a similar restriction, since the prescribed outdoor airflow rates specifically apply only nonsmoking areas.

2. Locates designated outdoor smoking areas at least 25 ft (7.6 m) from building entries, intakes and windows.

3. Locates designated indoor smoking areas such that ETS can be effectively contained, captured and removed. Specifically, the project must directly exhaust air from smoking areas and may not recirculate air from smoking areas to non-smoking areas; these are also requirements of Standard 62, Section 6.2.9. In addition, the project must be designed to enclose smoking areas with deck-to-deck partitions and operate them at a negative pressure with respect to adjacent areas. These are not yet requirements of Standard 62.

4. Is tested to verify that proper differential pressures are maintained during "worse case conditions of air trans-



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port.” Standard 62 includes no such specific testing requirement, although it does require air balancing (Section 7.2.2), which should provide similar results.

OR

(for residential buildings only)

1. Prohibits smoking in all common areas.
2. Locates designated outdoor smoking areas at least 25 ft (7.6 m) from building entries, intakes and operable windows.
3. Includes sealed penetrations and vertical chases to minimize uncontrolled pathways for ETS transfer between individual units. Standard 62 includes no such sealing requirement.

### **Credit 1: Outdoor air delivery monitoring**

The intent of this credit is to help ensure that at least minimum ventilation rates are maintained during operation of LEED-rated buildings. One LEED credit can be awarded provided the project:

1. Includes permanent monitoring systems to provide feedback on actual ventilation system performance.
2. Includes the ability to generate an alarm if ventilation conditions vary from setpoint (presumably design minimum ventilation airflow values) by more than 10%.

Standard 62 has no specific requirement for monitoring ventilation system performance or for alarming if monitored performance deviates from design setpoint. However, monitoring may be necessary in some cases, to maintain minimum outdoor airflow under any load condition (a requirement of Section 5.4).

For mechanically ventilated spaces, in addition to Requirements 1 and 2 above, this credit requires:

- a. Monitoring of CO<sub>2</sub> concentration in all spaces designed, for 25 or more people per 1,000 ft<sup>2</sup> (93 m<sup>2</sup>).
- b. Measurement of outdoor air intake flow within plus or minus 15% of the minimum rate determined using Standard 62 (per Prerequisite 1), for systems serving spaces designed for fewer than 25 people per 1,000 ft (93 m<sup>2</sup>).

For naturally ventilated spaces, in addition to Requirements 1 and 2, this credit also requires monitoring of CO<sub>2</sub> concentration in all spaces. Standard 62 has no such requirement.

### **Credit 2: Increased Ventilation**

The intent of this credit is to improve indoor air quality in LEED-rated buildings by providing more than the minimum outdoor air ventilation rates required by Prerequisite 1.

For mechanically ventilated buildings, one LEED credit can be awarded provided the project increases minimum breathing zone outdoor airflow rate to all spaces to at least 30% above the minimum rates required to meet Prerequisite 1 (that is, the minimum rates determined using either the Ventilation Rate Procedure of Standard 62 or the building code). Many studies have shown that increased

outdoor airflow (in excess of the minimum rates prescribed by Standard 62) usually results in improved indoor air quality, both in terms of health outcomes and productivity measurements, so this credit seems reasonable.

For naturally ventilated buildings, one LEED credit can be awarded provided the project:

1. Meets the recommendations found in the Carbon Trust “Good Practice Guide 237.”
2. Follows the flow diagram process in Figure 1.18 of the Chartered Institute of Building Services Engineers (CIBSE) “Applications Manual 10: 2005, Natural ventilation in non-domestic buildings” to determine if natural ventilation is an effective strategy for the project.

3. Uses diagrams and calculations to show that the design meets the recommendations in CIBSE 2005; or, uses a multizone analytic model to predict that airflows will result in the minimum ventilation rates prescribed by Standard 62, Section 6 (the Ventilation Rate Procedure) for at least 90% of the spaces served.

To comply with Prerequisite 1, Standard 62 requires specific opening size, location, control and accessibility. Presumably, the additional requirements cited here will result in designs that exceed the minimum Standard 62, Section 5.1 requirements, while providing at least the minimum ventilation rates determined using either the Ventilation Rate Procedure of Standard 62 or the building code. If this is not the case, the natural ventilation requirements of Standard 62 may be more stringent than those of this credit.

### **Credit 3.1: Construction IAQ Management Plan**

The intent of this credit is to reduce the likelihood that construction practices will result in IAQ problems in LEED-rated buildings. One LEED credit may be awarded, provided the project develops and implements an IAQ management plan for construction, including provisions to:

1. Meet or exceed “control measures” recommended in SMACNA IAQ Guidelines of Occupied Buildings Under Construction, 1995, Chapter 3. Standard 62 does not refer to these guidelines.
2. Protect onsite-stored and installed absorptive materials from moisture damage. Standard 62, Section 7.1.3 (part of Prerequisite 1) also requires protection of building materials from moisture. In some cases, Standard 62 may be more stringent than this LEED credit requirement since it also requires that moldy materials be discarded or decontaminated prior to installation.

3. Require use of MERV 8 filters, installed at each return air grille, in any permanently installed air-handling system operated during construction; and require that all filters (presumably those in permanently installed air handlers, since those at each return grille are temporary filters) be replaced immediately prior to occupancy. Although a best practice approach would probably prohibit use of permanently installed air handlers during construc-

tion, Standard 62, Section 7.1.2, allows them to be used but prohibits the operation of such air handlers without filters; it doesn't specify filter efficiency or require temporary filters at the return grilles.

### **Credit 3.2: Construction IAQ Management Plan—Before Occupancy**

The intent of this credit is to reduce the likelihood that contaminants generated during construction remain in LEED-rated buildings at the time of occupancy. One LEED credit can be awarded provided the project develops and implements an IAQ management plan for pre-occupancy, which includes provisions to either “flush out” the building with outdoor air for a prescribed period or to conduct testing to determine that contaminant levels are appropriately low. Standard 62 includes no such pre-occupancy flush-out or air testing requirements. However, it does include (in an informative, non-mandatory appendix) a limited list of potential chemical contaminants and target concentrations.

### **Credit 4: Low-Emitting Materials**

The intent of these credits (4.1 through 4.4) is to reduce the quantity of indoor contaminants produced by materials installed in LEED-rated buildings, including adhesives, sealants, paints, coatings, carpet systems, composite wood and agrifiber products. Up to four LEED credits can be awarded provided the project uses low-emitting materials. Credits 4.1 and 4.2 for adhesives, sealants, paints and coatings are based on outdoor air criteria. Credit 4.3 for

carpet systems is based on a rigorous testing protocol and an expanded list of target chemicals and concentrations applicable to non-industrial indoor environments. Credit 4.4 is based on elimination of formaldehyde from composite wood products. Although Standard 62 has no such material source-strength requirements, it does include (in an informative, non-mandatory appendix) a limited list of selected contaminants with target concentrations that are applicable to nonindustrial indoor environments.

### **Credit 5: Indoor Chemical and Pollutant Source Control**

This credit's intent is to reduce the quantity of contaminants introduced at entry points and recirculated from strong indoor sources in LEED-rated buildings. One LEED credit can be awarded provided the project:

1. Employs permanent entryway systems to capture dirt and particles as they first enter the building. Standard 62 has no such provisions.

2. Exhausts air from spaces where hazardous gases or chemicals may be present, sufficiently to create a negative pressure with respect to adjacent spaces. Although Standard 62 also requires capture and exhaust from some equipment (Section 5.7), and it prescribes exhaust airflow rates for some spaces (Section 6.2.8 and Table 6-4), it does not prescribe specific separation criteria or pressure differences.

3. Provides particle filters with efficiency of at least MERV 13. Standard 62 requires MERV 6 filters in some cases—upstream of wet-surface devices (Section 5.9) and when outdoor air is classified “non-attainment” for

## Standard 62.1-2004 Addenda Status

ANSI/ASHRAE Standard 62.1 is on continuous maintenance. This list recaps the status of addenda in process.

**62g**—Creates requirements for classification, signage and separation of areas where smoking is permitted. After five public reviews and one ASHRAE appeal, the Board of Directors (BOD) approved it for publication in June 2005. A second appeal was filed and the outcome of an Appeals Hearing held in December 2005 is pending.

**62ag**—Expected to address scope issues related to a BOD directive that Standard 62 apply only to non-smoking spaces. The scope wording is being reconsidered (pending the outcome of 62g) and is expected to be included in with Draft Addendum 62.1 DA-8 (formerly 62ak), along with other scope changes.

**62.1a**—Clarifies several issues from Addendum 62x including exceptions to 65% RH requirement and other exceptions in labs and industrial spaces. It has been approved by SSPC 62.1 and awaits publication approval by the Standards Committee and BOD in January 2006.

**62.1b**—(Formerly DA-3) Deals with inconsistencies and missing information in Tables 5-2, 6-1 and

6-4, which developed due to phased drafting and approval of Addenda 62y and 62n. It has been approved by SSPC 62.1 and awaits publication approval by the Standards Committee and BOD in January 2006.

**62.1c**—(Formerly DA-6) Updates information in tables in Appendix B. It has been approved by SSPC 62.1 and awaits publication approval by the Standards Committee and BOD in January 2006.

**62.1d**—(Formerly DA-7) Updates Table 4-1 to be more consistent with current U.S. Environmental Protection Agency National Ambient Air Quality Standards listings. It has been approved by SSPC 62.1 and awaits publication approval by the Standards Committee and BOD in January 2006.

**DA-1**—Consolidates interpretations of Standard 62 related to demand control ventilation (DCV), and provisions of Standard 62.1-2004. Expected to provide language that clarifies DCV is an acceptable method to comply with ventilation requirements.

**DA-2**—Expected to add documentation requirements, incorporating existing requirements with new requirements to provide single point reference for users.

**DA-4**—General cleanup of Standard 62.1-2004, adding clarity and removing errors and inconsistencies, with no significant new requirements.

**DA-5**—Reconciles differences in ventilation for residential occupancies between Table E-2 and Standard 62.2. Expected to add some high-rise residential ventilation requirements to Table 6-1, while eliminating Table E-2.

**DA-8**—(Formerly 62ak) Expected to remove information from the title, purpose and scope that is covered by Standard 62.2, which was approved by the BOD in July 2003. After public review in April 2004, changes to target title/purpose/scope were discussed by SSPC in June 2005 and will be circulated as an information item to interested ASHRAE committees, for preview prior to an SSPC recommendation for publication and public review processing.

10 micron particles (PM10)—it does not require MERV 13 filters.

## **Credit 6.1: Controllability of Systems—Lighting**

The intent of this credit is to provide a high level of lighting control by individual occupants of in LEED-rated buildings. One LEED credit can be awarded provided the project includes lighting control for at least 90% of occupants or for all groups in multiple-occupant spaces (such as conference rooms). Standard 62 has no such lighting control provisions.

## **Credit 6.2: Controllability of Systems—Thermal Comfort**

The intent of this credit is to provide a high level of comfort system control by individual occupants of in LEED-rated buildings. One LEED credit can be awarded provided the project includes:

1. Individual comfort controls for at least 50% of occupants. In buildings with operable windows, the individual control requirement is met for occupants in an area that extends 10 ft (3 m) on each side of the window and 20 ft (6 m) into the occupied space. This credit requires that window areas meet the requirements of Standard 62, Section 5.1. Standard 62 has no such individual thermal comfort control requirements.

2. System comfort controls for multi-occupant spaces, to allow adjustment to suit group comfort needs. Standard 62 has no such group thermal-comfort control requirements.

## **Credit 7: Thermal Comfort**

The intent of these credits (7.1 and 7.2) is to ensure that LEED-rated buildings are designed so that thermal comfort criteria, defined by ANSI/ASHRAE Standard

55-2004, *Thermal Environmental Conditions for Human Occupancy*, can be met. Up to two LEED credits can be awarded, one for design and another for verification. Design credit requires that the project use a design with sufficient mechanical system capacity and envelope characteristics to allow it to meet Standard 55 criteria. Verification credit requires that the project include a plan to validate that the building meets Standard 55 criteria after construction. Standard 62 has no such thermal comfort requirements.

## **Credits 8.1 and 8.2: Daylight and Views**

The intent of these credits (8.1 and 8.2) is to ensure that LEED-rated buildings provide daylighting for a significant number of spaces (at least 75% of area) and provide outdoor views for a significant number of occupants (at least 90% of occupants). Up to two LEED credits can be awarded, one for daylighting and another for views. Standard 62 has no such daylighting or view requirements.

## **Summary**

LEED-NC 2.2 relies heavily on ASHRAE Standard 62.1-2004. Standard 62 is a primary prerequisite for any LEED credits. Specifically for EQ credits, points are expected to be awarded when the project goes beyond the minimum requirements found in Standard 62. With the possible exception of Credit 2, in the case of naturally ventilated buildings, and Credit 3.1 in the case of moldy building materials, the EQ credit requirements exceed the minimum requirements found in Prerequisite 1 and no apparent conflicts exist.

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