LEED IEQc3.2 Overview

The goal of LEED IEQc3.2 is to minimize IAQ issues that result from construction or renovation activities in order to improve the comfort and well-being of both construction workers and occupants. The credit applies to LEED Programs for New Construction, Commercial Interiors, and Schools (which are now included in the Green Building Design and Construction Program under LEED Version 3).

The construction process introduces a number of potential contaminants into the indoor environment including:

- airborne particulates (dust)
- dust / debris on surfaces and in heating, ventilating and air conditioning (HVAC) systems
- volatile organic compounds (VOCs) and formaldehyde from sealants, adhesives, paints, etc.
- combustion products

If not properly controlled these contaminants could negatively impact occupant comfort, health and productivity. The credit offers two options, flush-out or IAQ testing, to verify acceptable IAQ after construction is complete.

Managing the Timeframe for Credit Implementation

Project teams typically consider construction complete when the temporary or final certificate of occupancy is obtained; a point when the project is substantially complete but there may be minor items (e.g., punch-list) outstanding. However, in some cases the definition of construction completion required by LEED IEQc3.2 for beginning the flush-out or IAQ testing is not in agreement with the typical definition of construction completion. As specified in the credit, construction completion is defined as:

- All interior finishes are installed, including millwork, paints, and carpet.
- All HVAC systems are functional.
- All punch-list items are complete.
- Furniture should be in place but is not required.

The credit definition of construction completion poses some complex scheduling logistics since this milestone may not be defined by project contractual documents or anticipated in the construction schedule. Therefore, the schedule for implementation of either option, IAQ testing or flush-out, must be carefully managed. It is vital that communication be established early among the building owner as well as design and construction teams in order to meet the requirements of the credit and minimize the risk of failure.

It is also important to understand that LEED IEQc3.2 not only has to be implemented after construction but prior to occupancy. The credit considers "occupancy" as the point when occupants of the facility, including support staff, are present in the building and using the space for its intended purpose.

If the construction project involves phased completion and/or occupancy, the USGBC allows implementation of the credit in separate areas as long as completed areas are isolated from areas under construction. The isolation methods must be documented in the Construction IAQ Management Plan (IEQc3.1).

Evaluating the Options

It is important to have a complete understanding of the requirements of LEED IEQc3.2 because each construction project is different and will have unique characteristics that impact the feasibility of achieving the credit and determining whether to pursue the flush-out or IAQ testing.

Flush-out

This option requires that the building be flushed with a specified amount of outdoor air (14,000 cubic feet per square foot of space) after construction completion and that specific temperature and humidity conditions be maintained in all areas of the building. Depending upon how soon after construction occupancy needs to occur; there are two paths that can be taken to implement the flush-out. The first path is a 100% flush-out conducted before occupancy. The second path involves completing a minimum of one-third of the flush-out before occupancy and two-thirds while the building is occupied. If the second flush-out path is selected, there are additional requirements for maintaining minimum outdoor air delivery rates during the occupied flush-out phase.

Generally, the flush-out process and credit submission requirements can be managed by the project team (e.g., by the commissioning agent).

When considering the flush-out option you must evaluate the construction schedule and the air handling system capacity to determine the amount of time that will be required to complete the flush-out. In some buildings, particularly during the summer and winter months, the capacity of the air-handling system to deliver outdoor air and maintain indoor temperature and humidity requirements is especially limited, resulting in flush-out time periods that are not feasible. We've found that for most buildings, either flush-out path will require a minimum of one to two weeks (and can be substantially longer) to complete after construction, but prior to occupancy, and that this timeline is often prohibitive.

IAQ Testing

This option requires performing baseline IAQ testing at a minimum number of sampling locations in the building after construction and before occupancy. The testing parameters include airborne particles, carbon monoxide, VOCs, and formaldehyde. In addition, if certain carpeting or fabrics are installed in the building, testing must be conducted for 4- phenylcyclohexene. All test results in the building must meet acceptable levels set by the credit prior to occupancy. Re-testing is allowed in the event of an initial failure as long as the results pass before occupancy.

Similar to the flush-out, the IAQ testing must be performed after construction, but before occupancy. There are a number of sampling and building conditions that must be met during testing, including performing sampling for a minimum of four hours during anticipated occupied hours with air-handling systems running in their occupied settings. Also, testing must be conducted using U.S. Environmental Protection Agency (EPA) sampling methodologies (or comparable methods). The IAQ testing option also prescribes a minimum number of sampling locations, depending on the building size, the different types of spaces (e.g., office areas vs. laboratories), and the HVAC system distribution.

Ensuring that the IAQ testing meets the requirements of the credit and that sampling is performed using acceptable methods requires expertise in this area in order to avoid failure, and to ensure that the testing results and documentation can hold up to the rigorous requirements of the USGBC. EH&E recommends using a qualified expert to develop and conduct the testing program.

However, in our experience, many project teams elect to conduct the IAQ testing as opposed to the flush-out because testing can be implemented during the brief window of time between construction completion and occupancy (usually within one to two days). Another advantage of the sampling is that the test results provide objective data that can be used to verify acceptable IAQ conditions in a new building and act as documentation to support the success of the multiple measures used to enhance IAQ in LEED buildings. In our experience, owners can use testing data as an effective tool to communicate project success and the acceptability of IAQ in the new facility with occupants and other stakeholders. Plus, the pre-occupancy test results provide a baseline metric of IAQ conditions in the building that can be used by building managers in the future.