

Importance of the Building Enclosure in Meeting Sustainable Building-Performance Goals

By H. Jay Enck

Building enclosures are often underappreciated for their role in meeting building-performance goals. The design and quality of building-closure construction have a direct effect on occupant satisfaction, occupant productivity, energy efficiency, and low-maintenance-cost goals. The measure of how sustainable or green a specific building is depends on its performance from people, planet, and profit perspectives over its lifetime. Achieving these performance goals requires a collaborative effort. Holistic Commissioning® that begins during predesign of a new facility (or a major refurbishment) is one way of helping to ensure that the goals established by the owner are met.

The commissioning process starts with defining the Owner's Project Requirements (OPR), a statement that documents the Owner's goals and objectives. From a building-enclosure perspective the Owner defines the image the building will portray, weather events the building must withstand, the desired energy efficiency, the occupant mission the building will support, expected useful-service life, annual-maintenance cost, project budget, and commissioning scope, to name a few of the more important criteria. Each of these specific documented conditions governs the design, construction, and operation of the facility as well as the team members who will fulfill the various project-team roles and responsibilities.

It is essential that the Owner include in the project team's scope of work the commissioning-process roles and responsibilities for each team member. Incorporating the specific responsibilities that support the commissioning process into team members' agreements with the Owner helps the entire team deliver a building that meets the Owner's goals and objectives. Without these agreements in place, the resulting building may not meet the Owner's goals for supporting occupants and maintaining target operating/maintenance costs. To assist Owners, the American Society of Heating, Ventilation, Refrigeration, and Air Conditioning Engineers (ASHRAE) developed ASHRAE Standard 202, The Commissioning Process for Buildings and Systems.

ASHRAE Standard 202 defines the minimum commissioning process, roles and responsibilities, and the minimum set of deliverables required from the commissioning process from each team member in enforceable language. ASHRAE 202 was developed to support many other standards and programs without focusing upon specific building types, systems, or assemblies or on specific project sizes. Supplementary technical guidelines have been and continue to be developed to provide specific and detailed information on how to implement the Commissioning Process for each major building/facility, system, or assembly, and for various stages of facility development and operation. ASHRAE 202 will facilitate entities in utilizing the commissioning process to deliver better buildings through a better understanding of the process.

ASHRAE 202 supports ASHRAE 90.1 Energy Standard for Buildings (which in the 2010 version includes minimum day-lighting and air-barrier criteria), National Institute of Building Science (NIBS) Guideline 3, and ASTM Standard Practice for Building-Enclosure Commissioning. NIBS published the first Building-Enclosure-Commissioning Guideline (Guideline 3) in 2006 and an updated version in 2012. The American Society of Testing Materials (ASTM), in agreement with NIBS, has taken over NIBS Guideline 3 to support ASTM's Standard Practice for Building-Enclosure Commissioning. In addition, green-rating systems such as the U.S. Green-Building Council's (USGBC) LEED rating system for New Construction Version 4 (LEEDv4) requires that the Owner's Project Requirements (OPR) contain the goals, objectives, and criteria for the building enclosure. LEEDv4 also requires the design team to include building-enclosure Basis of Design (BOD) information and a commissioning review of the OPR, BOD, and project design. In addition, LEEDv4 gives two credits for construction-phase commissioning in accordance with NIBS

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Guideline 3—2006, Exterior-Enclosure Technical Requirements for the Commissioning Process, as they relate to energy, water, indoor environmental quality, and durability.

Beyond the aesthetic appearance of the building exterior, the enclosure's design and construction determine the noise from outside entering the building, the quantity and quality of natural light entering the building (i.e., the depth of daylight penetration into the building's interior), thermal efficiency, and control of air and moisture entering the building, all of which have energy and indoor-environmental-quality effects. The complexity of the building enclosure requires a diverse team of specialists working together to achieve the Owner's Project Requirements, and the body of the knowledge required exceeds the knowledge of any one person. The minimum Commissioning Process (CxP) applied in accordance with ASHRAE 202 provides the format to help ensure that the OPR is met.

The commissioning process correctly applied forms the foundation for integrated design, construction, and operation needed to deliver sustainable, high-performing buildings. In contrast, taking short cuts or failing to utilize the minimum CxP as outlined in ASHRAE 202 significantly reduces the benefits of commissioning and integrated-project delivery. In fact, going beyond ASHRAE 202 and following ASHRAE Guideline 0 of The Commissioning Process (Best Practices) can yield great financial, social, and environmental benefits resulting in higher occupant satisfaction and lower utility consumption, greenhouse-gas generation, and operation and maintenance costs. Maintainability is a key tenet of persistent performance that is part of the vision for a sustainable building that is grounded in using ongoing and monitoring-based commissioning.

Achieving the Owner's end goals requires continuous performance measurement and identification and correction of issues affecting the Owner's goals as defined in the OPR as well as continuous evaluation throughout the CxP. Achieving the OPR requires starting the commissioning process in pre-design to benefit construction from the foundation through complete construction and into operations for the life of the building. Holistic Commissioning® provides the integration of sustainable, viable, high-performing buildings for the life of the building, providing the continuous thread of evaluation from the beginning of a project through the many modifications and repurposing to support changing missions of the building occupants over the entire life of the building.