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Architectural Testing

# Building Enclosure Commissioning


## BACKGROUND

Optimum building performance begins at conception. In order to achieve a fully integrated, high-performance building—one in which the design of the building enclosure reaches beyond the aesthetic and begins to support and enhance the comfort and productivity of the end-user—it is critical that issues of serviceability, durability, and performance receive the same weight as those associated with programming, massing, site orientation, and climate. These concepts are inextricably linked, of course, and must be fully considered during the early stages of a project, when ideas are promulgated and images begin to form. The traditional Commissioning process has long-held that optimum building performance can be achieved through the proper design, balancing, and operation of base-building mechanical systems. The Building Enclosure Design Commissioning (BEDCx) process builds upon that notion first by: a) recognizing the rapid pace at which building enclosure systems and technologies continue to evolve (and the limitations that often exist during the design process to properly evaluate and apply those technologies); and b) mandating that a design professional well-versed in building enclosure design and, more critically, failure, is given a seat at the table and an opportunity to positively influence the direction and outcome of a project. In its purest form, the BECx process can be summarized as follows:

## PRE-DESIGN

Establishing performance objectives that will support and enhance the comfort and productivity of the end-user by ensuring that the goals associated with initial design and construction costs are properly aligned with the long-term objectives of energy efficiency, serviceability, durability and performance (the hallmarks of good design practice and, arguably, the very definition of sustainable design).

## DESIGN

Ensuring consistency during the design process by requiring that performance objectives established at conception are properly maintained throughout the Schematic Design, Design Development, and Construction Document phases of the project.

## PRE-CONSTRUCTION

Verifying the design through detailed and effective submittal review, followed by the construction and subsequent performance testing of a full-scale pre-construction mock-up and further design refinement as required to better reflect the realities that exist among the building contractors and trades without sacrifice to the performance objectives established for the project.

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THE BUILDING ENCLOSURE COMMISSIONING PROCESS

- **Pre-Design Consultation**
  - Site Orientation, Building Use, and Climate Performance Objectives for Heat/Air/Moisture Transfer
  - Documentation of Owner Performance Requirements (OPR), Expectations, and Budget
- **Design Phase Services**
  - Schematic Design
  - Design Development
  - Construction Documents
  - Building Code Analysis
  - Structural Review
  - Design/Design Peer Review
  - Technical Specifications
  - Development of BECx Program
  - Documentation of Final Design vs. OPR, Expectations, and Budget
- **Pre-Construction Consultation**
  - Technical Review of Bids and Contractor/Subcontractor Qualifications and Exclusions
  - "Value Engineering" Consultation in Support of OPR, Expectations, and Budget
  - Laboratory Mock-Up and Performance Testing

CONSTRUCTION

Validating the construction by working closely with the individual contractors and trades to periodically review and evaluate the work in progress, as well as to provide technical guidance and quantifiable field quality assurance testing at critical stages throughout the construction process.

POST-OCCUPANCY

Improving performance and the future of truly sustainable design through a carefully-crafted, well-conceived Post-Occupancy Performance Evaluation Program that analyzes actual performance in a manner that is quantifiable and can be accurately measured against the performance objectives established at the outset of a project (the necessary evolution of good design practice will rely heavily upon this step).

Optimum building performance begins at conception. It is a concept worth repeating, if only to underscore the critical need to re-establish first-principles thinking to the design and construction of our built environment. The BEDCx process offers an opportunity for design and construction teams to re-embrace that principle, and to establish quantifiable metrics for performance testing and validation that demand accountability at every stage of the design and construction process.

  - Materials Testing and Evaluation
  - Shop Drawing and Submittal Review
  - Review of BECx Program
  - Documentation of Design Modifications vs. OPR, Expectations, and Budget
- **Construction Phase Services**
  - Implementation of BECx Program
    - ✓ Pre-Installation Meetings
    - ✓ On-Site Construction Observation
    - ✓ RFI Review and Assistance
    - ✓ Field-Oriented Detailing and Design Refinement
    - ✓ Field Testing for Air/Water/Structural Performance
    - ✓ Materials Testing and Evaluation
  - Documentation of Work-In-Progress vs. OPR, Expectations, and Budget
- **Project Close-Out**
  - Record Copies of Field Reports, Photographs, Field Sketches and Details
  - Warranty Schedule and Maintenance Guide
  - Documentation of Completed Construction vs. OPR, Expectations, and Budget
- **Post-Occupancy**
  - Evaluation of In-Service Condition and Performance
  - Warranty Surveys and Condition Assessment
  - Pre-Purchase/Pre-Sale (Due Diligence) Condition Assessment
  - Documentation of Installed Performance vs. Original OPR, Expectations, and Forecasted Operating Costs