



Designation: E2813 – 18

Standard Practice for Building Enclosure Commissioning¹

This standard is issued under the fixed designation E2813; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of supersession. Epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

Building Enclosure Commissioning (BECx) is a process that begins with the establishment of the Owner's Project Requirements (OPR) and endeavors to confirm that the exterior enclosure elements intended to provide environmental separation within a building or structure meet the expectations of the Owner as described in the OPR, and as defined by the current fundamental understanding of the most current published edition of ANSI/ASHRAE 202, Commissioning Process for Buildings and Systems and ASTM E2947, Standard Practice for Building Enclosure Commissioning is recommended for optimal use and application.

1. Scope

1.1 This practice is intended to serve as a concise, authoritative, and technically sound practice for Building Enclosure Commissioning (BECx) that establishes two levels of BECx: *Fundamental* and *Enhanced* (refer also to Section 4).

1.2 The BECx process as defined in this practice includes the following phases and sub-phases:

- 1.2.1 Pre-Design,
- 1.2.2 Design,
 - 1.2.2.1 Schematic Design
 - 1.2.2.2 Design Development
 - 1.2.2.3 Construction Documentation
- 1.2.3 Bidding and Negotiation
- 1.2.4 Construction
 - 1.2.4.1 Pre-Construction,
 - 1.2.4.2 Construction Administration, and
 - 1.2.5 Occupancy and Operations.

1.3 This practice includes the development of the Commissioning Plan (CP) and the Commissioning Test Plan (CTP) for both Fundamental and Enhanced BECx that address, at a minimum, the performance attributes and metrics in Annex A1 of this practice and the Commissioning Test Plan (CTP) in Annex A2 of this practice.

1.4 This practice includes mandatory BECx Performance Testing Requirements (Annex A2) approved for use with this practice to evaluate the performance and durability of enclosure materials, components, systems, and assemblies.

¹ This practice is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.55 on Performance of Building Enclosures.

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Designation: E2947 – 16a

Standard Guide for Building Enclosure Commissioning¹

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1. Scope

1.1 *Purpose*—This guide provides procedures, methods and documentation techniques that may be used in the application of the building enclosure commissioning (BECx) process. This guide is complementary to Practice E2813 and is aligned with ANSI/ASHRAE/IES Standard 202 and ASHRAE Guideline 0.

1.2 *Extent*—The process outlined in this standard guide applies to each building delivery phase from pre-design through Owner occupancy and operation. The specific application of this guide may vary to suit the Owner, the project delivery method and the building project as outlined in the Owner's Project Requirements (OPR).

1.3 *Practical Focus*—The primary focus of this process includes, but may not be limited to, new construction building enclosure and existing enclosures undergoing structural retrofits, alterations, and continuous commissioning systems.

1.4 *Contractual and Regulatory Obligations*—The methods described in this guide are not intended to supersede or otherwise replace the contractual obligations reserved specifically to the parties responsible for the design and construction of a building enclosure and to the roles, responsibilities and obligations that may otherwise be assigned to those parties by applicable regulatory or statutory law.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

- 2.1 *ASTM Standards*:²
 - E631 Terminology of Building Constructions

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

- E2813 Practice for Building Enclosure Commissioning
- 2.2 *ASHRAE Guidelines and Standards*:³
 - ANSI/ASHRAE/IES Standard 202 Commissioning Process for Buildings and Systems
 - ASHRAE Guideline 0 The Commissioning Process

3. Terminology

3.1 *Definitions*—Refer to the most current edition of the following:

- 3.1.1 ASTM E631 Terminology of Building Constructions.
- 3.1.2 ASHRAE Guideline 0, Section 4, Definitions.
- 3.1.3 ANSI/ASHRAE/IES Standard 202, Section 3, Definitions.

3.2 *Definitions of Terms Specific to This Standard*—The following definitions, abbreviations, and acronyms specific to the implementation of the commissioning process featuring enclosed spaces are the definitions are applicable throughout this guideline. Terms that are not defined have their ordinarily accepted meanings within the context in which they are used.

3.2.1 *basis of design, BOD, n*—a document developed by the design team that records the technical concepts, assumptions, calculations, decisions, and process selections used to meet the Owner's Project Requirements and is a closely applicable project requirement, statement, and guideline.

3.2.2 *Discussion*—The NOC documents include both narrative descriptions and a list of critical test points that occur during the design process.

3.2.3 *bidding and negotiation phase, n*—preparatory phase of the construction process delivery that assists in the solicitation and selection of prospective bidders, including evaluation of requests for information, substitutions, development of Addenda, review of bids and qualifications and the award of trade contracts.

3.2.3.1 *Discussion*—This phase is followed by the pre-construction sub-phase.

3.2.4 *building enclosure, n*—the terms "building enclosure" and "enclosure" refer collectively to materials, components, systems, and assemblies intended to provide shelter and

³ Available from American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE), 1791 Tullie Circle, NE, Atlanta, GA 30329, <http://www.ashrae.org>.

“Qualify-focused process for enhancing the delivery of a project by focusing on **VALIDATING** during the design phase and **VERIFYING** during the construction phase that the performance of building enclosure materials, components, assemblies and systems are design and installed to meet the **OWNER’S PROJECT REQUIREMENTS**”

- *ASTM E2947 – 16a*
Standard Guide for Building Enclosure
Commissioning

“Clear, concise, complete, and correct documenting of the OPR allows for emphasis on commissioning as an integral process for achieving the facilities owner’s expectations”

*- ASHRAE GUIDELINE 0
The Commissioning Process*

Client *Owner, Representative, User*

Designers *Architect, Engineer, Sub-consultant*

BECxG *Authority, Provider, Specialist, Technologist*

Builders *CM, GC, Sub-contractors*

Industry *Manufacturers*

BECxP *Provider*

BECxS *Specialist*

BECxT *Technologist*

BECxP *Provider*

Authorized person or firm in the jurisdiction of the project retained by the Owner to develop, manage, and be in responsible charge of the BECx process

Trained. Experienced. Has Knowledge of BECx Process.

4.2.1 – ASTM E2813

BECxG Core Competencies

The BECxP shall assemble a group (BECxG) that, at a minimum, demonstrates a level of proficiency in the core competencies listed below that meets or exceeds the requirements of building codes, standards, guidelines, and regulations applicable to or otherwise voluntarily adopted by the Owner to govern enclosure-related design, construction, and performance. Determination of the qualification of the BECxG is at the discretion of the Owner.

- Building & Material Science
- Procurement & Project Delivery
- Contract Documents & Construction Administration
- Performance Testing Standards & Methodology

BECxS *Specialist*

A registered design professional and/or duly authorized firm in the jurisdiction of the project, who is retained by the Owner with the applicable experience and technical knowledge of the performance of building enclosure systems and who is able to demonstrate and maintain throughout the project third party independence in order to avoid conflicts of interest.

BECxT *Technologist*

Individuals and/or accredited testing agencies who possess the skills, knowledge, experience and certification, as required, to perform the testing outlined in the building enclosure commissioning specification.

The BECxP and BECxS, who are retained by the Owner, should maintain third party independence.

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The BECx Process is **NOT** intended to replace QA/QC processes (including inspections, checks and/or tests) that the contractor should perform to ensure that the product furnished and installed meets their contractual obligations

Levels of BECx: Fundamental + Enhanced

Key differences

- Starting point
- Number of IDRs
- Amount of mandatory testing

IDR = Independent Design Review

	Fundamental	Enhanced
BECxP Engagement	Design Phase no later than start of DDs	Predesign Phase
Number of IDRs	One	Three
Mandatory Testing	?	Pre-construction lab mock-up or on-site free standing building mock-up

Both require first installation mock-ups

AIR	WATER	THERMAL	ADHESION
<p>ASTM E783 Leaks through Installed Exterior Windows & Doors <i>Air Pressure Difference</i></p>	<p>ASTM E1105 Water Penetration Of Windows, Skylights, Doors & Curtain Walls <i>Spray Rack / Test Chamber</i></p>	<p>ASTM C1060 Thermal Gradients Across Building Enclosure Assemblies</p>	<p>ASTM D4541 Pull Off Strength of Membranes</p>
<p>ASTM E1186 Leaks in Building Envelopes & Air Barrier Systems <i>Pressurized / Bubble Gun</i></p>	<p>ASTM D7877 Leaks In Roof Waterproofing Membrane</p>		
<p>ASTM E1827 Air Tightness Of Whole Building <i>Orifice Blower Door</i></p>	<p>AAMA 501.2 Leaks Of Installed Storefronts, Curtain Walls & Sloped Glazing Systems <i>Hose Nozzle Test</i></p>		
<p>ASTM E779 Air Tightness Of Whole Building <i>Non-Orifice Blower Door</i></p>			

COMMON TESTING

BECx Verification



ASTM D4541 – Test Method For Pull Off Strength