HAGYS FORD STUDIO

architecture + science

BUILDING ENCLOSURE COMMISSIONING

VALIDATION+ VERIFICATION

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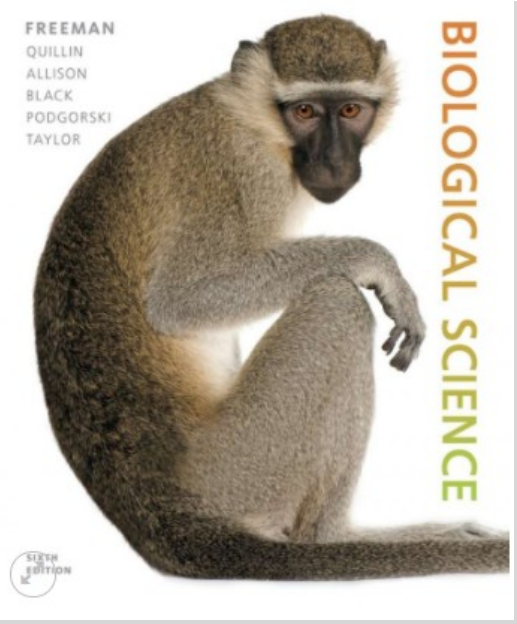
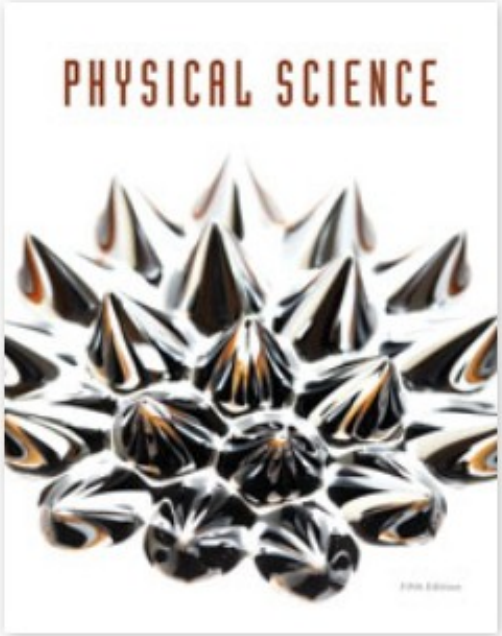
HAGYS FORD STUDIO
architecture + science

Background in Science | B.S. Biology (1997)
Degree in Architecture | M.Arch (2003)
Specialty with Enclosures | BECxP (2016)

Architecture + Science

Intersections





Two major branches of natural science

Architecture + Science

Intersections

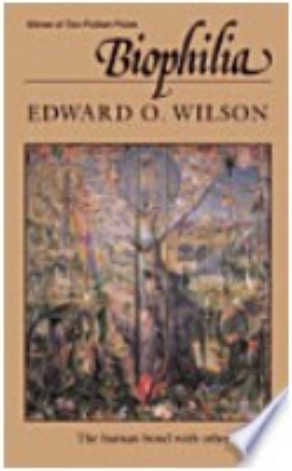
Biological Science | encompasses all the divisions of natural sciences examining various aspects of vital processes. The concept includes anatomy, physiology, cell biology, biochemistry and biophysics, and covers all organisms from microorganisms, animals to plants.

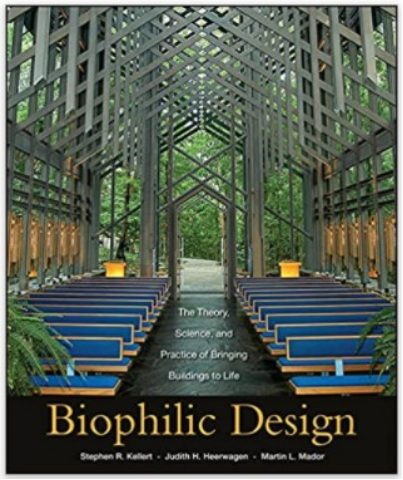
Architecture + Science

Intersections

Biological Science + Architecture...

- Biophilia
- Biomimicry
- Neuroscience and architecture





BIOMIMICRY INSTITUTE

ACADEMY OF NEUROSCIENCE FOR ARCHITECTURE
ANFA

Architecture + Science

Intersections

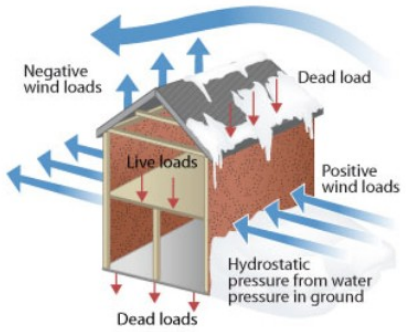
Physical Science | Physical sciences are those academic disciplines that aim to uncover the underlying laws of nature - often written in the language of mathematics. It is a collective term for areas of study including astronomy, chemistry, materials science and physics.

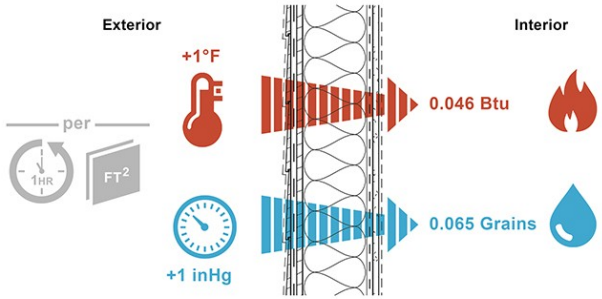
Architecture + Science

Intersections

Physical Science + Architecture...

- Structures and Forces
- Heat, Air, and Moisture Management
- Material Science





SLOPESHIELD SA®
SELF-ADHERED

Architecture + Science

Intersections

Building Science | biological + physical sciences

BECx | physical science

Building Enclosure Commissioning

Validation | the action of checking or proving the validity or accuracy of something (Design Phase)

Verification | the process of establishing the truth, accuracy, or validity of something (Construction Phase)

Building Enclosure Commissioning

"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 | Standard Guide for Building Enclosure Commissioning

Building Enclosure Commissioning

Guides + Standards

ASHRAE Guideline 0
The Commissioning Process

NIBS Guideline 3
Building Enclosure Commissioning Process

ASTM E2947
Standard Guide for Building Enclosure Commissioning

ASTM E2813
Standard Practice for Building Enclosure Commissioning

Building Enclosure Commissioning

LEED v4

National Institute of BUILDING SCIENCES™

NIBS Guideline 3
Building Enclosure Commissioning Process

LEED v4.1

ASTM INTERNATIONAL
Helping our world work better

ASTM E2947
Standard Guide for Building Enclosure Commissioning

ASTM E2813
Standard Practice for Building Enclosure Commissioning

Building Enclosure Commissioning

LEED v4

Prerequisite |
OPR input & review
BoD input & review
Project design review

Enhanced |
Commissioning per NIBS Guideline 3 for the thermal enclosure and issues related to energy, water, IEQ, and durability.

LEED v4.1

Prerequisite |
OPR input & review
BoD input & review
Project design review

Enhanced |
Commissioning per ASTM E2947 for the thermal enclosure and issues related to energy, air + water tightness, IEQ, and durability.

Building Enclosure Commissioning

vs

Building Enclosure Commissioning

Best Practice Fundamental Commissioning vs Best Practice Enhanced Commissioning

ASTM E2813 (Practice) defines the two levels of BECx

Building Enclosure Commissioning

	Fundamental BECx	Enhanced BECx
BECxP engagement	By start of DDs	By start of Pre-design
Number of IDRs	One	Three
Mock Up Testing	First installation mock up	First installation mock up; AND either a pre-construction laboratory mock up OR an on-site free standing building mock up
Participation during Bidding + Negotiation	BECxP	BECxP & BECxG

IDR : Independent 3rd Party Design Peer Review

Building Enclosure Commissioning

	TASKS
DESIGN	BECx Plan Scope + Budget Document Technical Independent Design Reviews (IDR) Review OPR and BoD BECx Specification
BIDDING	Reviews proposals and assist with BECx coordination
CONSTRUCTION	Construction Kick Off Meeting Submittal Review Field Observations at Milestones Verification Testing
OCCUPANCY	Prepare Systems Manual Issue final BECx Report 10 month post occupancy site visit Owner training

Building Enclosure Commissioning **Team**

CLIENT | Owner, Representative, User

DESIGNERS | Architect, Engineer, Sub-consultants

BECxG | Authority, Provider, Specialist, Technologist

BUILDERS | CM, GC, Sub-contractors

INDUSTRY | Manufacturers

Building Enclosure Commissioning **Team**

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Building Enclosure Commissioning **Group**

BECxP | Provider .....

BECxS | Specialist .....

BECxT | Technologist .....

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

Building Enclosure Commissioning **Group**

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

ASTM E2813 | Standard Practice for Building Enclosure Commissioning

Building Enclosure Commissioning **Group**

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.

Building Enclosure Commissioning **Group**

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.

Building Enclosure Commissioning **Group**

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.

Building Enclosure Commissioning **Group**

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

Building Enclosure Commissioning **Experience**

Municipal Buildings | Fire + Police

Secondary Education | Academic

Higher Education | Academic + Residence

Commercial | Office + Warehouse

THANK YOU

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

IECC 2018 does not require whole building testing, but IRC 2015 does require it.