

**NIBS Guideline 3-2006**

**Exterior Enclosure  
Technical Requirements  
For the  
Commissioning Process**

*by Joseph J. Deringer AIA LEED AP  
The Deringer Group Inc  
Berkeley CA*

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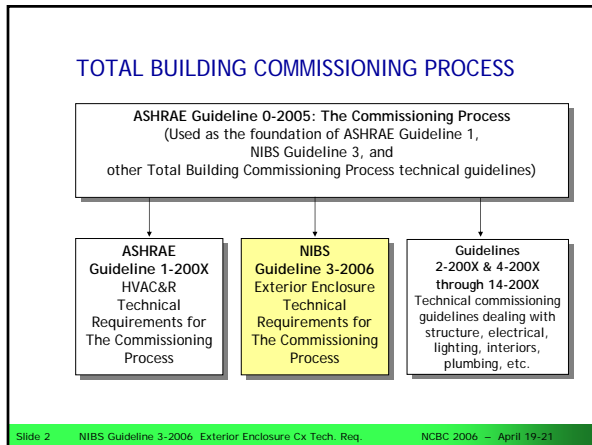
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**PROJECT COMMITTEE for NIBS GL3**

Joseph Deringer	<i>Committee Chair</i>	K. Quinn Hart	
Don Acker		Earle Kennett	
Fiona Aldous		Marc LaFrance	
David Altenhofen	<i>Design Chair</i>	Dan Lemieux	
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## STATUS

- In Final Stages of Preparation for Public Review
- To be Issued in next few weeks

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## STRUCTURE

- Table of Contents
  - Foreword
  - 1. Purpose
  - 2. Scope
  - 3. Utilization
  - 4. Definitions
  - 5. Pre-Design Phase
  - 6. Design Phase
  - 7. Construction Phase
  - 8. Occupancy and Operations Phase
  - Annexes



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## ANNEXES: *Focus on Exterior Enclosure*

- B - Commissioning Process Flowchart
  - C - Costs and Benefits
  - D - Documentation and Responsibilities
  - F - Roles and Responsibilities - Cx Team Members
  - J - Owner's Project Requirements
  - K - Basis of Design
  - L - Specifications
  - M - Construction Checklists
  - O - Systems Manual
  - R - Integration Requirements
  - S - Interference and Coordination with other Systems
  - U - Exterior Enclosure Testing Procedures
  - Z - List of Example Calculation Procedures and Tools
- Annexes A, E, G, H, I, N, P, T, V, W, X, Y are not used, see GL0*

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**ANNEX B - REFINEMENT TO GLO APPROACH**

- Expands on GLO flow diagram
- Building Development Process on Left
- Commissioning (Cx) process on right
- Each element of Cx process tagged to a section in text of GL3-2006.
- Examples follow

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**ANNEX B - PREDESIGN**



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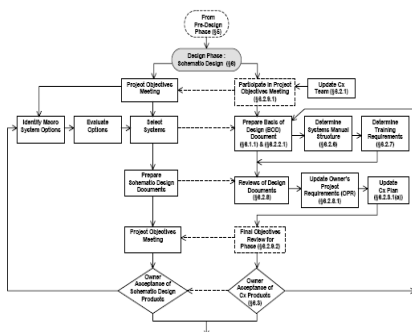
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**ANNEX B - Building Development Process**  
**SCHMATIC DESIGN**

**Commissioning Process**



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## ANNEX L - SPECIFICATIONS

- Likely Specification Sections with Cx EE specs
- Cx EE MasterSpec Section
- Example from project

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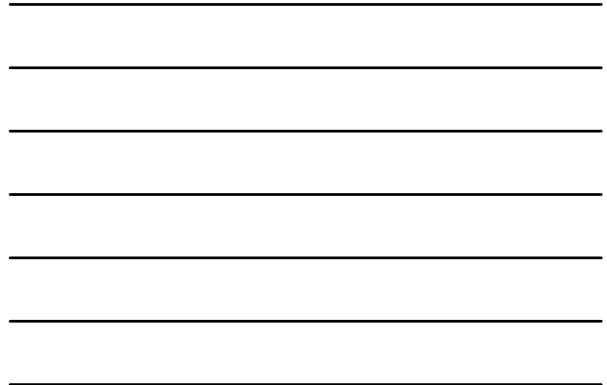
## ANNEX L - SPECIFICATION T of C

Part of a 3-page listing

Preliminary Table of Contents of Sections That May Include Facility Exterior Envelope Commissioning Requirements

DIVISION 01 - GENERAL REQUIREMENTS	
01 0000	GENERAL REQUIREMENTS
01 1000	SUMMARY
01 1100	MULTIPLE CONTRACT SUMMARY
01 1100	PROJECT MANAGEMENT AND COORDINATION
01 5200	CONSTRUCTION PROGRESS DOCUMENTATION
01 5300	SUBMITTAL PROCEDURES
01 5513	SPECIAL PROJECT PROCEDURES
01 5591	HISTORIC TREATMENT PROCEDURES
01 4000	QUALITY REQUIREMENTS
01 4300	REFERENCES
01 5000	TEMPORARY FACILITIES AND CONTROLS
01 5000	PRODUCT REQUIREMENTS
01 5900	ERECTOR
01 7329	CUTTING AND PATCHING
01 7419	CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
01 7700	CLOSEOUT PROCEDURES
01 7823	OPERATION AND MAINTENANCE DATA
01 7833	PROJECT RECORD DOCUMENTS
01 7900	DEMONSTRATION AND TRAINING
01 8113	SUSTAINABLE DESIGN REQUIREMENTS
01 8113	GENERAL COMMISSIONING REQUIREMENTS
01 8115	FACILITY EXTERIOR ENVELOPE COMMISSIONING
DIVISION 02 - EXISTING CONDITIONS	

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## ANNEX L - MASTERSPEC SECTION 019115

Section 019115 - Facility Exterior Envelope Commissioning (019115 - 000) (Section 019115)

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### SECTION 019115 - FACILITY EXTERIOR ENVELOPE COMMISSIONING

Refer the Section by drawing and numbering text to meet Project-specific requirements.  
 The Section uses the term "Architect" Change the term to match that used to identify the design professional or firm in the General and Supplementary Conditions.  
 Verify that Section titles referenced in this Section are correct for the Project's Specifications; Section titles may have changed.

#### PART 1 - GENERAL

1.1 RELATED DOCUMENTS  
 Refer to other sections in all Division of Project Manual.

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specifications Sections, apply to this Section.

Compliance referenced in paragraphs below should be treated being minimum design phase or earlier and updated as design progresses. They may be provided for the Contractor when the commissioning process is implemented on the Project.

B. Owner's Project Requirements and Basis of Design documentation are included for information only.

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### ANNEX U - TESTING PROCEDURES

- Annex U: Exterior Enclosure Testing Procedures
  - Sub-Annex Ua: Laboratory Testing
    - Sub-Annex Ua1: Laboratory Testing Case Study Example
  - Sub-Annex Ub: Field Testing
    - Sub-Annex Ub1: Field Testing Case Study Example
    - Sub-Annex Ub2: Recommended Practice for Incremental Field Air and Water Testing
  - Sub-Annex Uc: Resources for Testing
    - Sub-Annex Uc1: Reference Standards for Field Testing
    - Sub-Annex Uc2: Technical information
    - Sub-Annex Uc3: Testing Resources by wall Assembly

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### ANNEX U - LAB TESTING CASE STUDY

Project: Children's Hospital of Wisconsin Administration Building

Case Study By Waply Anis AIA, LEED-AP, Member ASHRAE  
Shepley Bulfinch Richardson and Abbott  
Architecture - Planning - Interior Design  
<http://www.sbra.com>

- Order of tests performed:
1. Preload
  2. Air infiltration static method. (Including chamber calibration.)
  3. Water penetration static method.
  4. Water penetration dynamic method. (Including engine calibration.)
  5. Uniform and concentrated load deflection test at design wind load and window washing scaffold tie-back anchor at design conditions.
  6. Interstory differential movement, vertical and horizontal displacement test -- six (6) cycles. Test method is usually developed in conjunction with the testing laboratory. Architect and Project Structural Engineer to ensure test is a reasonable replica of what can be anticipated on the structure. Test specimen is then left in maximum open horizontal joint condition at conclusion of testing for the continuation of test.
  7. Condensation resistance AAMA 1503.2 with each of both test conditions maintained for 24 hours after equilibrium has been maintained.
  8. Thermal cycle. (Six (6) cycles).
  9. Structural test at 1.5 times design load. Depending upon the design of the system.
  10. Interstory differential horizontal/seismic test to verify connection and panel joint design satisfies requirements of ASCE 7 Section 9.5.2.2.4.3, six (6) cycles. At conclusion of test, wall shall be structurally intact and sound.
  11. In event structural silicone is employed to provide structural bond, apply 30 PSF negative load for one minute and inspect work for loss of silicone adhesive bond under load.
  12. Perform supplemental test as directed by removing sealant at locations, as determined by the architect, and retesting for water penetration to verify sufficiency of internal drainage systems.

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### ANNEX U - LAB TESTING CASE STUDY



Figure 1. Lab mockup during ASTM E283 air infiltration test

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ANNEX U - LAB TESTING CASE STUDY



Figure 2 Dynamic Water test

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ANNEX U - LAB TESTING CASE STUDY



Figure 3. Strain gauges for measuring inter-story drift

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ANNEX U - FIELD TESTING CASE STUDY



A chamber is created using polyethylene and a simple wood frame (Figure 2), a smoke device is released, or generated using theatrical foggers, while air from a fan depressurizes or pressurizes depending on the configuration.

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**THANK YOU!**

**ANY QUESTIONS?**

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