

University of Houston Master Specification

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SECTION 01 4339 - MOCKUPS

Maintain Section format, including the UH master spec designation and version date in bold in the center columns of the header and footer. Complete the header and footer with Project information.

Edit and finalize this Section, where prompted by Editor's notes, to suit Project specific requirements. Make selections for the Project at text identified in bold.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. The Contractor's attention is specifically directed, but not limited, to the following documents for additional requirements:
 - 1. The current version of the *Uniform General Conditions for Construction Contracts*, State of Texas, available on the web site of the Texas Facilities Commission.
 - 2. The University of Houston's *Supplemental General Conditions and Special Conditions for Construction*.

1.2 SUMMARY

- A. Section Includes: Standalone exterior mockups.
- B. Mockups, testing, and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific mockup and testing requirements for individual elements of the Work are specified in the Sections that specify that Work. Requirements in those Sections may also cover production of standard products.
 - 2. Specified mockups, tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide mockup construction and testing, including those required by Authorities Having Jurisdiction, are not limited by provisions of this Section.

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C. Related Requirements:

1. Refer to Section 01 4000 "Quality Requirements" for quality assurance requirements for aesthetic and workmanship mockups specified in other Sections.

1.3 DEFINITIONS

- A. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing or operation; to show interface between adjacent materials and systems; and to demonstrate compliance with specified installation tolerances. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Stand-alone Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on the Project site, consisting of multiple products, assemblies and sub-assemblies.

- B. See Section 01 4000 "Quality Requirements" for additional definitions that apply to this Section.

1.4 MOCKUP PRE-INSTALLATION MEETING

- A. Pre-installation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, testing and inspecting agency representative and installers of major systems whose Work is included in stand-alone exterior mockups.
2. Review locations and extent of mockups.
3. Review testing procedures to be performed on mockups.
4. Review and finalize schedule for mockups, and verify availability of materials, personnel, equipment, and facilities needed to complete mockups and testing and maintain schedule for the Work.

1.5 ACTION SUBMITTALS

- A. Shop Drawings: For each type of mockup.

1. Include plans, elevations, sections, and mounting, attachment and support details.
2. Indicate manufacturer and model number of individual components, subassemblies and assemblies.
3. Include site location drawing indicating orientation of mockup.
4. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.
5. Revise and resubmit Shop Drawings to reflect approved modifications in details and component interfaces resulting from changes made during testing procedures.

- B. Delegated-Design Submittal: Refer to Section 01 3573 "Delegated Design Requirements and Procedures" for delegated design submittal procedures and requirements.

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1. Provide delegated-design submittal for temporary structural supports for mockups not attached to building structure.

1.6 INFORMATIONAL SUBMITTALS

A. Installation Instructions:

1. Include instructions specific to the use and conditions, including:
 - a. Sequence of component/assembly.
 - b. Direction of operations for installation, unitized systems erection.
 - c. Surface preparation requirements.
 - d. All components of the system.
 - e. Coordination requirements for adjacent systems where appropriate.
2. Provide three-dimensional and "exploded views" to address components not easily expressed in orthographic drawings.
3. Maintain mockup installation instructions for mockup erection on location and make available to all parties throughout mockup construction, testing and reference.

B. Qualification Data: For Contractor's quality-control personnel.

C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests.
3. Description of each test.
4. Identification of applicable standards.
5. Identification of test methods.
6. Number of tests required.
7. Time schedule or time span for tests.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

D. Mock-up Completion: Process submittal for documentation when mock-up is complete.

1.7 CONTRACTOR'S MOCKUP AND TESTING PLAN

A. Mockup and Testing Plan, General: Submit plan for mockup fabrication, construction, and testing before proceeding with Project submittals for associated exterior envelope Work.

1. Include the following information in this plan, at a minimum:
 - a. Mockup shop drawing and submittals schedule.
 - b. Lead time for obtaining required mockup materials.
 - c. Times for testing and, if necessary, retesting of mockups.

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1.8 REPORTS AND DOCUMENTS

- A. Test Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
 2. Project title and number.
 3. Name, address, and telephone number of testing agency.
 4. Dates and locations of samples and tests.
 5. Names of individuals making tests.
 6. Description of the Work and test method.
 7. Identification of product and Specification Section.
 8. Complete inspection data.
 9. Test results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of testing.
 11. Comments or professional opinion on whether tested Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on re-testing and re-inspecting.

1.9 QUALITY ASSURANCE

- A. Build mockups to achieve the following:
1. Verify selections made under Sample submittals.
 2. Demonstrate aesthetic effects.
 3. Demonstrate the qualities of products and workmanship.
 4. Demonstrate acceptable coordination between components and systems.
 5. Perform preconstruction testing, such as window air- leakage and water-leakage testing.
- B. Fabrication: Before fabricating or installing portions of the Work requiring mockups, build mockups for each form of construction and finish required. Use materials and installation methods as required for the Work.
1. Build mockups of size indicated.
 2. Build mockups in location indicated or, if not indicated, as directed by Architect.
 3. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
 4. Demonstrate the proposed range of aesthetic effects and workmanship.
 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 6. Notify Owner and Architect 14 days prior to proposed date of mockup removals. Proceed with demolition only upon written agreement by Architect .
 7. Demolish and remove mockups when directed, unless otherwise indicated.

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C. Notifications:

1. Notify Owner and Architect 14 days in advance of the dates and times when mockups will be constructed.
2. Notify Owner and Architect 14 days in advance of the dates and times when mockups will be tested.
3. Notify Owner and Architect 14 days in advance of the dates and times when mockups will be reviewed. Allow seven days for initial review and each re-review of each mockup.
4. Notify Owner and Architect 14 days prior to proposed date of mockup removals. Proceed with demolition only upon written agreement by Architect .

D. Approval: Obtain written approval from the Architect and Owner for all mockups prior to initiating fabrication or construction of the associated Work.

1. Pre-Review Coordination: Conduct a coordination meeting with UH Project Manager, UH Construction Inspector, Trade Contractors and Architect. Use the meeting to identify and document parameters that influence the design and execution of the mockup.
2. Representation: Designate a representative from the Contractor and the Architect to serve as primary points of contact throughout the mockup review and approval process.
3. Owner Review: Schedule and conduct an on-site review meeting with Owner representatives and the designated Contractor and Architect representatives. Present the mockup, supporting documentation and any relevant coordination outcomes for review.
4. Approval and Standards: Unless otherwise indicated, mockups approved by the Architect and Owner shall establish the standard of quality for materials, workmanship, and aesthetic intent for the corresponding Work.
 - a. Approval of mockups does not constitute approval of deviations from the Contract Documents unless such deviations are explicitly approved in writing by the Architect and Owner.

1.10 COORDINATION

- A. Coordinate schedule for construction of mockups, so that construction, testing and review of mockups do not delay the Project schedule.

PART 2 – PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a registered design professional, as defined in Section 01 3573 "Delegated Design Requirements and Procedures" to design support structure for free-standing mockups.
 1. Material properties indicated in this Section shall be considered as minimum properties.

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- B. Structural Performance:
 - 1. Wind Loads: As indicated on Drawings.
- C. Mockup Testing Performance Requirements: Perform tests using design pressures and performance criteria indicated for assemblies and products that are specified in other Sections and incorporated into stand-alone exterior mockups.

2.2 STAND-ALONE EXTERIOR MOCKUPS

- A. Construct stand-alone exterior mockups prior to commencing exterior construction. Construct mockups to demonstrate constructability, coordination of trades, and sequencing of Work; and to ensure materials, components, subassemblies, assemblies and interfaces integrate into a system complying with indicated performance and aesthetic requirements.
- B. Design and construct foundation and superstructure to support free-standing stand-alone exterior mockups.
- C. Build stand-alone exterior mockups using installers and construction methods that will be used in completed construction.
- D. Use specified products that have been approved by Architect. Coordinate installation of materials and products specified in individual Specification Sections that include Work included in stand-alone exterior mockups.
- E. The Work of stand-alone exterior mockups includes, but is not limited to, the following:
 - 1. Masonry veneer.
 - 2. Cold-formed metal framing and sheathing.
 - 3. Air and weather barriers.
 - 4. Thermal insulation.
 - 5. Through-wall flashing.
 - 6. Flashing and sheet metal trim.
 - 7. Joint sealants.
 - 8. Metal wall panels.
 - 9. Aluminum-framed entrances and storefront.
 - 10. Glazed curtain walls.
 - 11. Glazing.
- F. Photographic Documentation: Document construction of stand-alone exterior mockups with photographs. Provide annotated photographs showing details of interface of different materials and assemblies.
 - 1. Document testing procedures, including water leakage and other deficiencies. Photograph modifications to component interfaces intended to correct deficiencies.

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- G. Provide and document modifications to construction details and interfaces between components and systems required to properly sequence the Work, or to pass performance testing requirements. Obtain Architect's approval for modifications.

PART 3 – EXECUTION

3.1 TRACKING AND RE-LOGGING

- A. Tracking: Prepare plan and elevations indicating locations and results of testing for stand-alone exterior mockups. Update testing completion as work proceeds.
- B. Submit with Record Documents:
 - 1. Provide updated copies of documents to Architect upon completion of mockups and testing by type and location.

3.2 TESTING OF STAND-ALONE EXTERIOR MOCKUPS

- A. Stand-alone Exterior Mockup Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
 - 1. Testing and inspecting agency will interpret tests and state in each report whether tested Work complies with or deviates from requirements.
 - 2. Owner will furnish Contractor with names, addresses and telephone numbers of testing agencies engaged.
 - 3. Costs for re-testing and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- C. Stand-alone Exterior Mockup Testing Services: Perform the following tests in the following order:
 - 1. Water-Spray Test: Before installation of interior finishes has begun, test areas designated by Architect in accordance with AAMA 501.2 for evidence of water penetration.
 - a. Perform a minimum of two tests in areas as directed by Architect.
 - 2. Air Leakage: Test in accordance with ASTM E783 at 1.5 times the rate specified in "Mockup Testing Performance Requirements" Paragraph in "Performance Requirements" Article, but not more than 0.09 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
 - a. Perform a minimum of two tests in areas as directed by Architect.
 - 3. Water Penetration: Test in accordance with ASTM E1105 at a minimum uniform static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Mockup Testing Performance Requirements" Paragraph in

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"Performance Requirements" Article, but not less than 6.24 lbf/sq. ft., and verify no evidence of water penetration.

- D. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
 - 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 - 3. Schedule testing agencies functions sufficiently in advance of testing or inspecting to allow Architect observations.
 - 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 - 5. Submit additional copies of each written report directly to Authorities Having Jurisdiction, when they so direct.
- E. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies and installations, including connections, and also to observe testing for the following systems and assemblies.
 - 1. Curtain wall specified in Section 08 4413 "Glazed Aluminum Curtain Walls."
- F. See Section 01 4000 "Quality Requirements" for re-testing and re-inspecting requirements and Section 01 7300 "Execution" for requirements for correcting the Work.
- G. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
 - 1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the mockups and testing.
- H. Stand-alone exterior mockups will be considered defective if they do not pass tests and inspections.
- I. Prepare test and inspection reports.

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3.3 REPAIR AND PROTECTION

- A. General: Protect exterior stand-alone mockups until released for demolition or removal from Site by Architect and Owner.

END OF SECTION 01 4339