



## **SECTION 11 61 13**

### **BRAVADO® ACOUSTICAL SHELL**

#### **PART 1-GENERAL**

##### **1.1 SUMMARY**

- A. This specification section includes the engineering, fabrication, furnishing, delivery and installation of new acoustical shell system as specified.
- B. The full stage acoustical shell shall consist of a system of acoustical panels of appropriate construction to reflect and transmit a maximum range of audible frequencies and adjustable to proper positions.
- C. Panels shall be tested for sound absorption and sound transmission. Testing shall be performed by an IAS accredited testing agency.
  - 1. Provide acoustical shell system comprised of acoustical shell panels having the following sound transmission requirements:
    - a. Sound Transmission Class (STC): Minimum 24 per ASTM E 413.

##### **1.2 SCOPE OF WORK**

- A. Comply with International Building Code, current edition based on Jurisdiction. Comply with state, local, and jurisdictional codes.
- B. Work under this section consists of the fabrication of new equipment and installation of a new acoustical shell. Work shall include the installation of all materials and equipment necessary for the proper operation of the orchestra shell.
- C. Preparation and submission of complete engineered shop drawings for approval.
- D. Submission of required record documents.
- E. Coordination with other affected work, trades and inspections.
- F. Final assembly of components to provide a complete, operable system.

##### **1.3 REFERENCES**

- A. Aluminum Association (AA):
  - 1. AA Standard AA-M12C22A41.
  - 2. AA Standard AA-M12C22A42/44.
- B. American Institute of Steel Construction (AISC):
  - 1. AISC Manual of Steel Construction.

C. American Plywood Association (APA)

1. US. Product Standard PS 1-83

D. American Society for Testing and Materials (ASTM):

1. ASTM A36: Standard Specification for Structural Steel.
2. ASTM A283: Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
3. ASTM A307: Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
4. ASTM A325: Standard Specification for High-Strength Bolts for Structural Steel Joints.
5. ASTM A500: Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
6. ASTM A501: Standard Specifications for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
7. ASTM A570: Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.
8. ASTM B209: Standard Specification for Aluminum-Alloy Sheet and Plate.

E. American Welding Society (AWS):

1. AWS D1.1 Structural Welding Code-Steel.
2. AWS D1.3 Structural Welding Code-Sheet Steel, Second Edition.

F. Americans with Disabilities Act (ADA)

**1.4 RELATED SECTIONS**

A. 09 90 00 Painting and Coating

B. 11 61 33 Rigging Systems and Controls- For rigging requirements for the attachment and support of the acoustical shell ceilings.

C. 26 55 61 Theatrical Lighting- For electrical requirements for the lighting components of the acoustical shell ceilings.

**1.5 SUBMITTALS**

A. Product Data: Provide third party acoustical test data sheets for acoustical panels.

1. Provide test results by certified independent testing laboratory with IAS accreditation (International Accreditation Service, Inc.), indicating compliance with performance requirements.

B. Shop Drawings: Prepared by Staging Concepts. Include dimensioned plans, sections and elevations showing acoustical shell system layout, component sizes and details of each condition of the shell system.

1. Include fabrication and installation details.

C. Samples: If requested, Staging Concepts shall submit a sample of a typical shell panel and framework construction.

D. Contract Closeout Submittals: Comply with Section 01 70 00 Execution and Closeout Requirements.

1. Project record documents
2. Operating and maintenance manuals.

## 1.6 WARRANTY

- A. Special Warranty: Staging Concepts written warranty indicating Staging Concepts intent to repair or replace the Bravado™ acoustical shell components that fail in materials or workmanship within three (3) years from the date of substantial completion. Paint and exterior surfaces are excluded. Failures are defined to include, but are not limited to the following:
1. Mechanical defects
  2. Damaged materials due to fabrication
  3. Material deterioration and discoloration other than normal wear and weathering conditions
  4. failure to maintain dimensional stability

## PART 2- PRODUCTS

### 2.1 MANUFACTURER

- A. Basis of design: Acoustical shell system design is based upon the Bravado® Acoustical Shell.
1. Staging Concepts. 8400 Wyoming Ave. North, Suite 100, Minneapolis, MN 55445. 763-533-2094 [www.stagingconcepts.com](http://www.stagingconcepts.com)

### 2.2 MATERIALS

- A. Aluminum extruded bars, profiles, and tubes: ASTM B 221 (ASTM B 221M), 6061-T6 alloy.
- B. Steel tube: ASTM A 501, hot formed steel tubing
- C. Cold-rolled steel sheet: ASTM A 1008/A 1008M, commercial steel, type B.
- D. Hardboard: AHA A135.4, Class 1 Tempered – formaldehyde free
- E. High-Pressure Laminate (HPL): NEMA LD 3, Grade VGS.
- F. Veneer-faced panel products (MDF core): AWI Premium Grade Hardboard meets all CARB-2 requirements for formaldehyde emissions.

### 2.3 COMPONENTS

- A. 1. General: Staging Concepts standard stressed-skin laminated composite acoustical shell panel designed to reflect a range of audible frequencies for maximum performance and maximum audible audience range.
2. Core; 1 ½ inch thick (38 millimeters) phenolic impregnated honeycomb core material, (3/8-60-60-15%) shall have an open geometric pattern with cell walls vertical to panel skins and defined by alternating straight and sine wave layers. Height of sine wave shall be 3/8 inches (10 millimeters). Panel wall thickness shall correspond to 60 pound (22.40 kilogram) kraft. Bonding of core material to panel faces shall be with permanently cured polyurethane adhesive. Foam core materials and contact adhesives shall not be permitted.
3. Panel Face skins: Panel stressed skin front and back substrate shall be 3/16" (5 millimeters) tempered hardboard.
4. Panel Face Finish Options:
- a. Painted. Painted finish color as selected by the owner, architect or consultant.
  - b. High Pressure Laminate (HPL): Formica® brand grade 20 (VGP) or approved equal, with no exposed fasteners. Color as selected by the owner, architect or consultant.

- c. Wood Veneer: AWI premium grade hardwood plywood veneer, species as specified by the owner, architect or consultant. Slip-matched and balance matched within panel face. Species and finish selected by the owner, architect or consultant. No exposed fasteners.
5. Panel Back Finish: Rear face shall be painted matte black for painted or veneer faced panels. HPL panels shall have black laminate on the rear panel face to balance the panel.
6. Panel edging; Extruded aluminum edge on straight sides of panel.
7. Base panel weight is approximately 2.7 pounds per square foot (13.2 kilograms per square meter).

B. Acoustical shell towers:

1. Tower frame: Extruded 6005-T5 aluminum alloy vertical tower frames with welded cross tube assemblies.
2. Stage tower transporter: Wheeled mover will be a one stroke lifting design using mechanical leverage to lift the tower. The wheeled mover must incorporate tri-casters that are a minimum of 3 inches (76 millimeters) in diameter for ease of movement by one person, with one person as a guide.
3. Shell tower size and configuration: as indicated.
4. Shell tower panel radius: 5-foot (1524 millimeters) or Flat Panel Standard. Custom radius curves available upon request.
5. Door and Wing panel hardware:
  - a. Hinges: extruded from high-strength aluminum with a seamless barrel and integral attachment flange. Aluminum, 6063T, with molded Delrin bearings designed for silent operation, with no metal-on-metal contact and requiring no replacement parts.
  - b. Slide-lock mechanism to lock door and pull handle.

C. Adjustable acoustical shell ceiling: Acoustical shell ceiling consisting of adjustable-angle acoustical cell ceiling panels supported by integral extruded aluminum truss. The shell ceiling to be suspended from stage rigging truss battens. Ceiling to be stored in fly-loft in vertical position as indicated.

1. Ceiling Panel size and configuration: as indicated
2. Ceiling Panel radius: 5-foot (1524 millimeters), 10-foot (3048 millimeters) and 20-foot (6096 millimeters) Standard. Custom radius curves available upon request.
3. Ceiling rotational hinges: Aluminum, with self-lubricating Delrin® bearings.

D. Stage rigging and battens: Rigging and battens supporting acoustical shell ceiling shall be provided by others per specifications.

E. Integrated Lighting: Staging Concepts standard UL-approved fixtures located as indicated. Final approved lighting to be chosen by the architect, theatre consultant or engineer.

1. UL listed connector strip that attaches to ceiling set as indicated on the drawings (incandescent lighting). Daisy chain Powercon/DMX cables between fixtures (LED lighting). Provide circuits as indicated wired to location as indicated on the drawings for connection by others.
2. A tilt switch to be provided with each light fixture (incandescent) or circuit (LED) to prevent accidental activation when the ceiling row is in the storage position.
3. Lighting options:
  - a. ETC Source Four PAR MCM
  - b. ETC Source Four PAR EA
  - c. ETC Desire D40 LED series
  - d. ETC ColorSource PAR LED

e. Additional lighting options upon request.

## **2.4 FINISHES**

A. Aluminum Framing: Mill Finish.

B. Panel face finish as determined by the architect.

## **PART 3- EXECUTION**

### **3.1 SITE INSPECTION**

A. Examine jobsite conditions for compliance with requirements for the installation tolerances, including required overhead clearances, and other existing conditions affecting installation and performance of acoustical shells. Proceed with unit installation upon correction of unsatisfactory conditions.

### **3.2 DELIVERY, STORAGE AND HANDLING**

A. Packing and Shipping: Deliver products in original unopened packaging as applicable, with legible manufacturer's identification.

B. Storage and Protection: Comply with manufacturer's recommendations.

1. Store in a cool, dry place out of direct sunlight.
2. Protect from the elements and from damage.

### **3.3 ACOUSTICAL SHELL TOWER INSTALLATION**

A. Erect acoustical shell towers in location indicated in coordination with Owner's personnel to verify components are complete and operational.

### **3.4 ACOUSTICAL SHELL CEILING INSTALLATION**

A. Install acoustical shell ceiling units plumb, level and true, in accordance with Staging Concepts recommendations and approved submittals. Suspend from stage rigging using specified installation accessories.

1. Verify setting of units in performance and storage positions
2. Verify adjustability of units.
3. Install and test integral lighting.

### **3.5 CLEANING**

A. Clean exposed surfaces of acoustical shells. Comply with Staging Concepts written instructions for cleaning and touchup of minor finish damage.

B. Repair or replace defective work as directed by the architect upon inspection.

### **3.6 TRAINING AND DEMONSTRATION**

A. Train Owner's personnel to assemble, adjust, operate and maintain acoustical shell towers and acoustical shell ceiling units.

**END OF SECTION 11 61 13**