



SECTION 11 61 23

STAGING DIMENSIONS THEATRE AND STAGING EQUIPMENT

PART 1- GENERAL

1.1 SUMMARY

- A. This specification section includes the engineering, fabrication, furnishing, delivery and installation of new theatre and staging equipment as specified
- B. The equipment shall consist of a system of interlocking platforms of appropriate construction on a support system to provide the height and configuration as indicated

1.2 SCOPE OF WORK

- A. Comply with state, local, and jurisdictional codes
- B. Work under this section consists of the fabrication of new equipment and installation of new theatre and staging equipment. Work shall include the installation of all materials and equipment necessary for the proper operation of the equipment
- C. Preparation and submission of complete engineered shop drawings for approval
- D. Submission of required record documents
- E. Coordination of other affected work, trades, and inspections
- F. Final Assembly of components to provide a complete operable system

1.3 RELATED SECTIONS

- A. Division 01 Section “Special Project Procedures for Music Education Facilities” for coordinating installation of products
- B. Division 05 51 00 “Metal Stairs”
- C. Division 05 52 00 “Metal Railings”

D. Division 9 60 00 “Flooring”

E. Division 09 90 00 “Painting and Coating”

F. Division 12 62 00 “Portable Audience Seating”

1.4 REFERENCES

A. The Engineered Wood Association

1. Voluntary Product Standard PS 1-95

B. Aluminum Association

1. AA Standard AA-M12CCA41

2. AA Standard AA-M12C22A42/44

C. American Institute of Steel Construction

1. AISC Manual of Steel Construction

D. IBC and ASTM Load Ratings Standards

1. 2015 International Building Code; Section 1607 “Live Loads; Table 1607.1 Minimum Uniformly Distributed Loads and Minimum Concentrated Live Loads”

2. 2015 International Building Code; Section 1604 “General Design Requirements; Table 1604.3 Deflection Limits

3. 2015 International Building Code; Section 1709 “Preconstruction Load Tests”; Section 1709.3 “Load Test Procedures Not Specified”

E. American Society for Testing and Materials (ASTM) Materials Definitions

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 and Structural Steel Joints

5. ASTM A500: Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing

6. ASTM A501 Standard Specification 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
9. ASTM B 221: Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
10. ASTM B 429: Specification for Aluminum and Aluminum Alloy Extruded Structural Pipe and Tube
11. ASTM B85: Standard Specification for Aluminum Alloy Die Castings
12. ASTM A513 Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing
13. ASTM A1011: Standard Specification for Steel, Sheet and Strip, hot Rolled, Carbon, Structural, High-Strength Low Alloy, High-Strength Low Alloy with Improved Formability, and Ultra High Strength

F. American Society for Testing and Materials (ASTM) Testing Specifications

1. ASTM E648-08 Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
2. ASTM D257: Standard Test Methods for DC Resistance or Conductance of Insulating Materials
3. ASTM D4060: Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
4. ASTM D523: Standard Test Method for Specular Gloss
5. ASTM D785: Standard Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials
6. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials
7. ASTM D1929: Standard Test Method for Determining Ignition Temperature of Plastics
8. ASTM D2863: Standard Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)
9. ASTM D1044: Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion
10. ASTM D256e10: Standard Test Methods for Determining Izod Pendulum Impact Resistance of Plastics
11. ASTM D747: Standard Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam
12. ASTM 1043-16: Standard Test Method for Stiffness Properties of Plastics as a Function of Temperature by Means of a Torsion Test
13. ASTM D638-14: Standard Test Method for Tensile Properties of Plastics
14. ASTM D1238-13: Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer
15. ASTM D1505-10: Standard Test Method for Density of Plastics by the Density-Gradient Technique
16. ASTM D746-14: Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact

G. American Society for Testing and Materials (ASTM) Load Ratings Standards

1. ASTM E2322-03: Standard Test Method for Conducting Transverse and Concentrated Load Tests on Panels used in Floor and Roof Construction Section 10 “Applying Uniform Load Via Air Bag”, Section 11 “Applying Concentrated Load via 25.4mm Diameter Pin, Measurement Method, Max Load”
2. ASTM E611-03: Standard Test Method for Performance of Wood and Wood-Based Floor and Roof Sheathing Under Concentrated and Impact Loads. Section 4, 6 “Applying Concentrated Load Via 25mm and 76mm Diameter Loading Disks, Loading Location”
3. ASTM Standard for Stair and Tread Loads

H. NFPA International

1. NFPA 701: Fire Tests for Flame-Resistant Textiles and Films
2. NFPA 253: Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source

I. U.S. Department of Commerce, National Institute of Standards and Technology

1. DOC APA PS 1: US Product Standard for Construction and Industrial Plywood

J. American Welding Society

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

K. Americans with Disabilities Act

L. National Fire Protection Association

1. NFPA 102: Standard for Assembly Seating, Tents, and Membrane Structures

M. Steel Structures Painting Council

1. SSPC SP3: Power Tool Cleaning

1.5 SUBMITTALS

A. Comply with Section 01 33 00 Submittal Procedures, unless otherwise indicated

B. Product Data: Staging Dimensions specifications and technical data including the following:

1. Detailed specification of construction and fabrication
2. Staging Dimensions installation instructions
3. Certified engineer's reports indicating compliance with performance requirements
4. Description of operations, including step-by-step setup and take-down tasks

C. Shop Drawings: Prepared by Staging Dimensions. Included dimensioned plans, sections, and elevations showing component sizes, arrangements, and details of each condition of installation. Drawings show fabrication and installation details for each platform type, understructure and accessories

D. Samples: Staging Dimensions will provide samples by request of the owner, architect, or consultant

E. Contract Closeout Submittals: Comply with Section 01 70 00

1. Project Record Documents

2. Operating and Maintenance Manuals

1.6 PERFORMANCE REQUIREMENTS

A. Stage Platforms and Risers: Standard Uniform Load 4'x8' Deck: 200lb/ft²

B. Stage Platforms and Risers: Dynamic Live Load: Side load of 15% of total uniform live load: 960 lbs. on a 4' x 8' platform under a total uniform live load of 6,400 lbs.

C. Stage Platforms and Risers: Point Load: 1,500 lbs. applied via 1" diameter pin

C. Stage Platforms and Risers: Fully replaceable components including corners, frame and wood deck. Replaceable in field with common tools

D. Treads of Stairs: Uniform Load: 100 lbs./ft² per stair tread (meets all 2015 IBC Standards). Concentrated Load: 300 lbs. per stair tread applied in a 2 inch by 2 inch area (meets all 2015 IBC Standards)

E. Guardrail linear (Uniform) Loading: 50 plf (pounds per linear foot) in accordance with Section 4.5.1 of ASCE 7

F. Guardrail Concentrated Load: Designed to resist a concentrated load of 200 pounds in accordance with Section 4.5.1 of ASCE 7

G. Guardrail Intermediate Rails: Designed to resist a concentrated load of 50 pounds in accordance with Section 4.5.1 of ASCE 7

G. Guard Rail In-Fill Panel compliant with IBC 4" sphere code

1.7 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Not less than 10 years of experience in the manufacture of stages, platforms, and risers in use in similar environments

B. Installer's Qualifications: not less than 3 years of experience in installation and application of systems similar in complexity to those required for this project

C. Submit substitution request not less than 15 days prior to bid date. Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements

D. Fire-Test-Response characteristics: Provide products meeting the following fire-test-response characteristics

1. Stage Drapery Fabric:
2. Carpet: Critical radiant flux classification of not less than 0.45 W/cm^2 per ASTM E 648 with an average critical radiant flux classification of 0.55 Watt/cm^2
 - a) Carpet meets or exceeds Class 1 rating as specified in NFPA Life Safety Code 101 and IBC 804.2 Classification

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle stage platforms and risers in accordance with Staging Dimensions' recommendations.

1. Ship to jobsite only after roughing-in, painting work, and other related finish work has been completed
2. Ensure installation areas are ready to accept units and recommended temperature and humidity levels will be maintained during the remainder of construction

B. Storage and protection: Comply with Staging Dimensions' recommendations.

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

1.9 WARRANTY

A. Special Warranty: Staging Dimensions written warranty indicating Staging Dimensions' intent to repair or replace seating riser components that fail in materials or workmanship within three (3) years from the date of shipment (with the exception of the SD6000 Weather Resistant Deck which is guaranteed for a period of one (1) year from date of shipment). This warranty does not apply to the buyer's misuses, damages, improper maintenance, repairs or replaces with a part not of STAGING DIMENSIONS manufacture. Paint and exterior surfaces are excluded. Failures are defined to include, but not limited to the following

1. Fracturing or breaking of unit components which results from normal wear and tear and normal use.
2. Delamination or others or other failures of glue bond of components

3. Warping of components not resulting from leaks, flooding, or other uncontrolled moisture or humidity

PART 2- PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Stage Platform and riser design is based upon products of the manufacturer listed below. Provide basis of design product or approved comparable product. Comply with requirements of Part 1 Quality Assurance Article for approval of products not named below.
- B. Staging Dimensions, New Castle, DE, Telephone: (866) 591-3471, Email: Sales@stagingdimensions.com, Website: www.stagingdimensions.com

2.2 COMPONENTS

- A. SD 5000 Stage Deck
 1. Edging: 3.782” High extruded 6005-T5 (4) sided aluminum frame (including protective edge), mill finish (standard), powder coat and anodizing as an option. Frame is designed to accept:
 - a. Built-in Dual Lock System
 - b. Skirting via Velcro
 - c. Guardrail
 - d. Closure Panels
 - e. Chair Stops
 - f. Stair Units
 - g. ADA Compliant Ramps
 2. Subfloor: 1 inch thick 9-ply marine grade, Douglas Fir plywood
 - a. Finish surface:
 - I. “Non-Skid Quad Ripple”: 0.05” Black, non-skid quad ripple polypropylene applied to the top surface, and a 0.02” polypropylene applied to the bottom surface. COF value = 0.83
 - II. “Haircell Poly”: 0.05” Black, smooth polypropylene surface and a 0.02” polypropylene applied to the bottom. COF value = 0.71
 - III. “Weather Resistant”: Two-step CP10 primer/sealer applied to the edges of “Non-Skid Quad Ripple” or “Haircell Poly” prior to positioning in the aluminum frame
 - IV. “Pepper Grey Carpet”: 3/4" thick 11-ply marine grade plywood with a 26 oz. pepper grey loop carpet adhered to plywood surface.
 - V. “Black Carpet”: 3/4" thick 11-ply marine grade plywood with a 30 oz. jet black pile carpet adhered to plywood surface.

- VI. “Unfinished Plywood”: 1" thick 9-ply marine grade plywood can be sold unfinished or finished with stain or clear polyurethane.
- VII. “Plywood with Black Flame Retardant Paint”: 1" thick 9-ply marine grade plywood painted on all sides & edges with black exterior paint treated with Rosco FlameX.
- VIII. “Grated Aluminum”: 1" x 3/16" mill finish swaged aluminum grating is welded to aluminum deck frames allowing for up-lighting, fog, haze and other special effects
- IX. “Diagonal Punch Aluminum Planks”: 6" planks are welded to aluminum deck frames providing an impervious, weather-proof surface for permanent outdoor installations.
- X. “Clear Plexi”: 1" thick clear acrylic provides an unobstructed surface for up-lighting stages and runways. A combination of 3/4" + 1/4" thick surfaces can also be used to allow inexpensive replacement of the 1/4" surface so that decks remain in like new condition.
- XI. “Milk Plexi”: 1" thick natural polypropylene (Milk) provides a diffused surface for up-lighting. A combination of 3/4" + 1/4" thick surfaces can also be used to allow inexpensive replacement of the 1/4" surface so that decks remain in like new condition.
- XII. “Tongue and Groove”: 3/8" x 3" hardwood floor planks are glued to a 3/4" thick 11-ply marine grade plywood base. Color TBD

- 3. Deck will support a uniform live load of 200 psf. Lateral sway-bracing loads: 24 lbf/ft applied parallel to and 10 lbf/ft applied perpendicular to platforms. (Standard). Additional support beams can be installed to increase load rating

- B. SD 5000 Leg supports: For use with the SD 5000 stage deck. Support system to include the following:
 - 1. 1-1/4" (nominal size) SCH 40 aluminum pipe. System joins to stage deck in a compression-loading condition. Leg supports are secured to the stage deck by (4) 3/8-16 thumb screws
 - a. Fixed Heights: 4 inches and above (diagonal leg braces required at heights of 36 inches and over). Custom heights available upon request.
 - b. Adjustable Heights: 16 inches to 24 inches, 24 inches to 36 inches (diagonal leg bracing required), 36 inches to 56 inches (diagonal leg bracing required), 48 inches to 78 inches (diagonal leg bracing required)
 - c. Each leg terminates with a non-marring Neoprene leveling foot to allow for 2 inches of fine height adjustment.

- d. Each leg is capable of being erected without the use of tools
 - e. Finish: Mill(standard), powder coat and anodizing as options
- C. Diagonal Leg Brace (When Required): 1-1/4 inch square 6061 aluminum tube and 3/16 x 2 inch aluminum flat bar. Connect to leg supports with
- D. Wunderstructures:
1. For use with SD 5000 stage decks. Support system permits bridging of platforms between Wunderstructures. The structure meets the following specifications:
 - a. Adjustable heights: 24 inches to 36 inches, 36 inches to 56 inches, 48 inches to 78 inches, 78 inches to 108 inches
 - b. Adjust course height by 2 inch increments using hand-actuated steel plungers.
 - c. Adjust fine height over a span of 3 inches by use of integrated ACME thread adjustable screw foot. Adjustable screw foot mounted to bottom of vertical member
 - d. Capable of being erected without the use of tools
 - e. Finish: Mill (standard), powder coat and anodizing as an option
 2. Main vertical members: 2-1/2 inch 6061-T6 aluminum pipe
 3. Main horizontal members: 2 inch OD x 1/8 inch wall thickness 6061-T6 Aluminum square tubing
 4. Telescoping columns: 2 inch schedule 80 6061-T6 aluminum pipe – telescoping columns allow for independent control to use Wunderstructures in all terrain situations
 5. Support Arms: 1-1/2 inch schedule 40 6061-T6 aluminum pipe
 - a. Hand-actuated monkey claw structural fitting welded to each end of pipe

E. I-Beam Spanning Support System:

1. General: For use with SD 5000 stage decks. Compatible with the Wunderstructure support system. Used to improve access below stage and for larger spans. Support system meets the following:
2. Main support beams: Extruded 6061-T6 Aluminum bridging beams with locator plates for stage deck-to-beam connection. Plates attach with a 3/8-16 bolted connection to Wunderstructures and to decks via 1-1/4" diameter gray PVC rod

2.3 ACCESSORIES

A. Standard Guardrails:

- a. Material: 1-1/4" Sch 10 A36 steel pipe and 1"x2"x1/8" steel tube
- b. Finish: Black Wrinkle Powder-Coat Matte Finish
- c. Integration: Jaw-type clamp device ("Guardrail Clamp"). No tools required for assembly

- B. ADA Compliant Guardrails:**
 - a. Material: 1-1/4" Sch 40 6061 aluminum pipe and 2"x2"x1/8" aluminum tube
 - b. Finish: Mill (standard)
 - c. Integration: Jaw-type clamp device ("Guardrail Clamp")

- C. Ramps:**
 - a. Material: 6005-T5 Aluminum Extrusion, 9-Ply Marine Grade Douglas Fir Plywood, 6061-T6 aluminum sheet
 - b. Finish: consistent with deck finishes or mill finish (for starter ramp)
 - c. Integration: Dual Lock butt joint cam type coffin lock

- D. Stair Box:**
 - a. Material: 9-Ply Marine Grade Douglas Fir Plywood
 - b. Finish: same as deck surface options
 - c. Integration: "Teardrop" Cam locking system

- E. Stair Units**
 - a. Fixed Stair Unit
 - i. Material: A36 Steel sheet, 6061 Aluminum sheet, non-skid quad
 - ii. Finish: black powder-coat
 - iii. Integration: swing-type clamp system

 - b. Adjustable Stair Unit
 - i. Material: A36 steel and 6105/6005-T5 Aluminum
 - ii. Finish: black powder-coat
 - iii. Integration: swing-type clamp system

- F. Closure Panels**
 - a. Material: Black Luan or milk plexi
 - b. Finish: customer specified
 - c. Integration: Leg clamps and Velcro

- G. Leg Storage Clips**
 - a. Material: Nickel Plated Spring Steel, treated to a Rockwell of C42-46
 - b. Finish: mill
 - c. Integration: wood screw

- H. Chair Stops**
 - a. Material: 6061 Aluminum tube, A36 steel sheet
 - b. Finish: mill, black powder-coated
 - c. Integration: quick-release clamp

- I. Skirting**
 - a. Material: Encore, Wyndham, Velour,
 - b. Finish: shirred, flat, or box pleat
 - c. Integration: Velcro

- J. Transport Carts**
 - a. Vertical Deck Cart**
 - i. Material:** A36 Steel
 - ii. Finish:** Black powder-coat
 - iii. Integration:** A36 Steel, multi-position claw
 - b. Flat Deck Cart**
 - i. Material:** A36 Steel
 - ii. Finish:** Black powder-coat
 - iii. Integration:** Decks rest on top
 - c. Combo Cart for Guardrails and Decks**
 - i. Material:** A36 Steel
 - ii. Finish:** Black powder-coat
 - iii. Integration:** A36 Steel, multi-position claw

2.4 FINISHES

- A. Aluminum Framing: Mill Finish (standard). Powder coat or anodizing as an option
- B. Platform finish as determined by customer

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion
 - 1. Do not proceed until unsatisfactory conditions have been corrected
 - 2. Field verify dimensions for all units prior to fabrication is indicated by the owner, architect, or consultant

3.2 INSTALLATION

- A. comply with manufacturer's recommendations
 - 1. Install units in location as directed to verify components are complete and operational
 - 2. Train owner's personnel to adjust, operate, and maintain units
 - 3. Deliver operation and maintenance instructions to Owner

3.3 CLEANING

A. Haircell Polyvinyl, Painted Plywood and Non-Skid Quad Ripple can be cleaned by spraying with Simple Green, waiting 5 minutes and wiping off. A stiff bristle brush can be used on stubborn stains. Weather resistant decks can be cleaned by spraying with Simple Green, waiting 5 minutes and power-washing off. Standard spray carpet cleaner (Resolve, Woolite, etc..) can be used on carpeted decks. Standard hardwood floor cleaner can be used on tongue & groove wood decks. Windex can be used to clean clear acrylic "Clear Plexi" and natural polypropylene "Milk Plexi" decks. Magnum 44 or acetone can be used to clean grated aluminum and diagonal punch aluminum decks.

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

3.4 TRAINING

- A. Train owner's personnel to assemble, adjust, operate, and maintain theatre and stage system