

SECTION 11 61 43 - STAGE CURTAINS & RIGGING SYSTEM

PART 1 - GENERALs

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes the following:
 - 1. Fabrication, Furnishing, and Installing a complete theatrical system, including but not limited to:
 - a. Front curtain ensemble.
 - b. Cyclorama curtains.
 - c. Dead hung rigging and battens.
 - d. Tracks and battens.
 - 2. All material, equipment, and services shall be provided as specified herein and as indicated on Drawings.
 - 3. Fabricate, deliver, and install all work in accordance with Specifications and Drawings. Inspect and adjust the completed installation to comply with all Project requirements.
 - 4. The Theatrical Equipment Contractor (TEC) shall visit the site to check and verify all dimensions and to coordinate the equipment with the structure and work of all other trades prior to submitting Shop Drawings.
 - 5. TEC shall furnish all auxiliary steel and incidental items required for a complete installation, whether or not such items are specifically indicated.
 - 6. The TEC shall instruct representatives of the school in proper operation of all equipment furnished as part of its work.
- B. Related Sections:
 - 1. Division 01 Section "Coordination Drawings" for requirements to coordinate the work of this Section with the construction elements indicated as "Coordination Drawing Content" and as required by the other Prime Contractors for the Project Coordination Drawings.
 - 2. Division 02 Section "Selective Demolition" for work related to demolition.
 - 3. Division 05 Section "Metal Fabrications" for steel framing and supports for stage-curtain systems.
 - 4. Division 21 and 22 Sections for coordination with and accommodation of fire protection and plumbing systems.
 - 5. Division 23 Sections for coordination with and accommodation of HVAC systems and equipment.
 - 6. Division 26 Sections for connections with and accommodation of power and lighting related to this Section.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design stage-curtain systems, including comprehensive engineering analysis and attachments to building structure, using performance requirements.

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- B. Structural Performance: Stage curtain systems and attachments to structure shall withstand the effects of gravity and operational loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Design Loads: As indicated, or if not indicated in accordance with minimum requirements of jurisdiction where project is located.
 - 2. Safety Factor: An 8:1 safety factor shall be used in the suspension of all overhead rigging. The Installer shall provide documentation that all attachments meet or exceed these safety requirements.
 - 3. Cable Bending Ratio: Sheave 30 times the diameter of the cable.
 - 4. Maximum Fleet Angle: 1-1/2 degrees.
- C. The TEC shall design the layout and installation of the stage equipment so as to provide for a properly masked stage and one which best utilizes the specified and existing equipment and equipment provided by other Trades.
- D. Fire-Test-Response Characteristics: Provide stage curtains meeting the following requirements as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Flame-Propagation Resistance: Passes NFPA 701.
 - a. Permanently attach label to each fabric of curtain assembly indicating whether fabric is inherently and permanently flame resistant or is treated with flame-retardant chemicals and whether it requires retreatment after cleaning or after a designated time period of use.
 - b. Permanently attach 12-inch square swatch of same fabric and dye lot for each fabric of a curtain assembly to the back of assembly for use as fire-resistance test strip.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Include installation instructions and data substantiating materials comply with requirements.
 - 2. Fabric: Include data on flame-retardant chemicals used.
 - 3. For Stage-curtain system and components, include rated capacities and operating characteristics.
- B. Shop Drawings: Show fabrication and installation details for stage curtains. Include plans, elevations, sections, details, attachments to other work, and the following:
 - 1. Operating clearances and dimensions.
 - 2. Requirements for supporting curtains, track, and equipment. Verify capacity of each track and rigging component to support loads.
 - 3. Structural Analysis.
 - 4. Indicate construction and fabrication details of all equipment and curtains, end track and batten locations, width of platform opening, location of blocking for anchors, appurtenances and interferences, and support bracket details.
- C. Samples for Initial Selection: For each type of stage curtain indicated. Include color charts showing the full range of colors, textures, and patterns available, together with a 12-inch- square Sample (any color) of each type of fabric.
- D. Delegated-Design Submittal: For stage-curtain systems and attachments to structure, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer, Fabricator, and professional engineer.
- B. Product Certificates: For the following, from manufacturer:
 - 1. Fabric: Provide name of flame-retardant chemical used, identification of applicator, treatment method, application date, allowable life span for treatment, and details of any restrictions and limitations.
 - 2. Rigging: Compliance of suspended battens and tracks with requirements.
- C. Warranty: Sample of special warranty.
- D. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Structural members to which tracks, battens, and other stage-curtain equipment will be attached.
 - 2. Locations of lighting fixtures and cabling, ductwork, piping, and sprinklers.
 - 3. Rigging equipment for stage equipment.
 - 4. Access panels.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For stage curtains and rigging to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Firm with a minimum of 10 years' experience engaged in the installation of stage equipment and accessories.
- B. Contractor shall maintain and operate its own shop(s) and fabricate and assemble all components with the exception of standard hardware materials and equipment.
- C. All work done under this contract shall conform to applicable local, state, and national codes.
- D. Manufacturer/Contractor shall employ a Quality Program through all the of their manufacturing, installation, and management systems.
- E. Where specific requirements for rigging components are more stringent and require precautions, procedures, or refinements exceeding building codes or standards, such specific requirements shall supersede these codes and standards.
- F. Stage Curtain Fabricator Qualifications: Firm experienced in producing stage curtains similar to those indicated for this Project that have a record of successful in-service performance, and with sufficient production capacity to produce required units without causing a delay in the Work.
- G. Fire-Test-Response Characteristics: Provide stage curtains with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Flame-Resistance Ratings: Passes NFPA 701.

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- a. Permanently attach label to each fabric of curtain assembly indicating whether fabric is inherently and permanently flame resistant or treated with flame-retardant chemicals, and whether it requires retreatment after designated time period or cleaning.

- H. Products and installation shall meet ANSI standards as it pertains to rigging or specification standards, whichever is more stringent. Where specific requirements for rigging components are more stringent and require precautions, procedures or refinements exceeding building codes or standards, such specific requirements shall supersede these codes and standards.

1.8 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review specification requirements.
 - 2. Review installation procedures.
 - 3. Inspect project conditions.

1.9 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings and construction contiguous with stage curtains and rigging by field measurements before fabrication and indicate measurements on Shop Drawings.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of stage-curtain and rigging that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, faulty operation of rigging equipment.
 - 2. Warranty Period: Three (3) years from date of Substantial Completion.
- B. The Work shall be fully guaranteed, with exception of normal wear, for the period indicated above. Any items showing evidence of defective materials or workmanship including installation workmanship shall be corrected or replaced withing thirty (30) days after notification, and without cost to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis of Design: Subject to compliance with requirements, stage curtains and theater system and equipment incorporated into the project shall be based on products and systems as follows:
 - 1. Pittsburgh Stage, Inc.
- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from manufacturers that meet or exceed the published data of the specified Basis of Design products and systems and that are approved in advance by the Architect.

2.2 FABRICS

- A. 24.5-ounce 100% polyester velour.
- B. Lining where specified shall be 100% polyester (black in color).
- C. 16-ounce 100% polyester (black in color).
- D. All fabrics of their various kinds and colors shall each be from one and the same dye lot. When materials of one color exceed limit of one dye lot, the balance must be identically matched with the original lot. "Run of the mill" usage of colors will not be acceptable.
- E. All combustible fabrics shall be chemically flameproofed by immersion for compliance with all applicable codes. Spray method of flameproofing is unacceptable. Contractor shall furnish flameproofing certificates, giving name of flameproofing chemical used, identification of flameproofing chemical, method of flameproofing used, and date.
- F. All polyester fabrics shall be designated as inherently flame retardant by the manufacturer.

2.3 STAGE DRAPERY FABRICATION

- A. Front curtain ensemble shall contain no less than 50 percent sewn-in fullness.
- B. Cyclorama setting shall contain no less than 50 percent sewn-in fullness.
- C. No smaller than half widths shall be used in construction of curtains.
- D. Knife pleats shall be at 12-inch centers with heavy 3-inch polypropylene webbing at heading. Headings shall be finished with grommets and "S" hooks; grommets and tie lines; or plain as required. Grommet shall pass through three full layers of face fabric. All vertical seams shall be hidden within the fold of the pleats. "Round pleats" formed by hanging two grommets from one "S" hook is not acceptable. Knife pleats shall be directional and "point" off-stage.
- E. Salvages shall be scissor-clipped on 24-inch centers to relieve puckering at vertical seams.
- F. Grommets shall be black. No smaller than #3 toothed grommet shall be used. Plain washer grommets are not acceptable.
- G. Tie lines shall be black 5/8" polyester braid.
- H. All Traveler curtains shall have one-half width turn-back at on and off-stage edges in addition to specified fullness.
- I. On-stage and off-stage leading edges of all traveler curtains and front curtain shall contain 12-inch x 3-inch heavy polypropylene webbing reinforcement from the heading to 12 inches beneath the heading, concealed within the side hem/turn-back of the curtain.
- J. Valance and/or teaser shall have 4-inch bottom and side hems. Front curtain shall have 6-inch bottom hems.
- K. Cyclorama curtains shall have 4-inch bottom hems with a #10 jack chain encased in a separate pocket suspended 2 inches from the bottom of the curtain. The use of galvanized lead weights is not acceptable.

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- L. All other hems are to be 2 inches.
- M. There shall be no horizontal seams unless indicated.
- N. A separate 3-inch x 54-inch flameproof strip shall be sewn to the off-stage bottom hem of each type of curtain fabricated from a cotton fabric for the purpose of removing samples for testing. IFR fabrics shall not have a flame proof strip.
- O. Thread shall be glazed, left twist, #24.
- P. Curtains shall have tags sewn to off stage side hems at eye level. Acoustical curtains shall have tags located at headings. Tag information shall include requisite flame resistance information, date of manufacture, fabric identification, and curtain type.

2.4 FINISHED DIMENSIONS

- A. Dimensions shown on Drawings are approximate. It shall be the responsibility of Contractor to properly mask the stage for optimum functionality. Refer to paragraph 2.2 "Fabrics" for material requirements.

<u>ITEM</u>	<u>MATERIAL</u>
Valance	A
Front Curtain	A
Side Legs	C
Ceiling Borders	C
Traveler Curtains	C

- B. All other stage curtain dimensions shall be as shown on drawings.

2.5 CURTAIN TRACKS AND BATTENS

- A. Traveler Tracks: Silent Steel Model #280 CWANA with ball bearing carriers, as manufactured by Automatic Devices Company. RWL to be not less than 25 pounds per linear foot. Lengths to suit traveler curtains. Curtain tracks (Model 2800) shall be of 14-gauge galvanized steel construction, entirely enclosed except for slot in bottom, each half to be in one continuous piece except where splicing clamps are required. Each curtain carrier (Model 2801) shall be spaced at 12-inch centers and shall be of steel construction with two nylon-tired ball bearing wheels held to steel body by rustproof nickel-plated rivet, and such wheels rolling on two separate parallel treads. Each curtain carrier shall consist of a free-moving plated swivel and sufficient trim chain to accommodate curtain snap hook or s-hook. Live-end pulley (Model 2803) and Dead-end pulley (Model 2804) blocks shall be adjustable and shall be equipped with 5-inch diameter sleeve-bearing wheels adequately guarded. A rubber bumper shall be inserted between each curtain carrier to function as spacer and noise reducer. The manufacturer shall furnish two end stops for placement at each track end. Stretch-resistant operating cord (Model 2828) shall have synthetic or wire center. Aluminum tracks are not acceptable. Tracks and components shall be from single manufacturer; using components from multiple manufacturers is expressly not permitted.
- B. Side Leg Track: #2800 channel complete with end stops and #28 Rotodrapeer pivoting devices as manufactured by Automatic Devices Company. Tracks and components shall be from single manufacturer; using components from multiple manufacturers is expressly not permitted.
- C. Dead-Hung Battens: 1 ½-inch Schedule 40 premium black pipe with 18-inch long 1-9/16-inch OD x 1/4-inch thick wall structural tubing internal splices bolted in place. Clear lacquer finish. Aluminum battens are not acceptable. Battens shall be finished with a coating of clear lacquer.

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- D. Dead-hung Items: Provide battens, chains, beam clamps and supports for all dead-hung items as specified. All terminations to battens shall be made using properly sized batten clamps as specified.

2.6 RIGGING

- A. Dead-Hung Chain Supports: Chain shall be ¼-inch grade 30, zinc plated weld link proof coil chain in continuous un-spliced lengths with a WLL of no less than 1,300 pounds.
- B. Shackles: Shackles shall be drop forged galvanized screw-pin anchor shackles. Shackles shall have a WLL of no less than 1,000 pounds at trim chains terminations and 1,500 pounds at arbor terminations. Shackle pins shall be moused with seizing wire or other approved device to positively prevent unscrewing. Shackles shall meet or exceed federal specification RR-C-271D Requirements.
- C. Beam Clamps: Beam clamps shall be used at all dead hung supports connecting to structural steel beams. Beam clamps shall encompass both sides of the beam flange and shall have a minimum RWL of 750 lbs. PSI model #BC or Coffing BC Series.
- D. Pipe Clamps: 1 ½-inch Pipe clamps shall be used at all dead hung supports connecting to the pipe battens. Pipe clamps shall encompass the pipe and shall include two 3/8-inch grade 5 bolts and nylock nuts. Third hole at top of clamp shall receive termination hardware as required. Pipe clamp shall have rounded edges and a minimum RWL of 750 lbs. Use appropriately sized pipe clamps for the suspension of all dead-hung tracks and battens and at all track splice locations.
- E. Spans: Appropriately load rated strut channel or structural steel welded in place or attached using the manufacturers' recommended clips. Spans shall be chemically coated to prevent corrosion. Furnish and install spans as necessary for a proper installation.
- F. Bridles: Bridles shall be in conformance with ANSI standard E1.4-2009 Part 3.
- G. Finishes: Provide all items with manufacturer's standard plating or coating to prevent corrosion unless otherwise specified.
- H. Weldments: Required weldments within equipment and in field shall conform to ANSI/AWS D1.1 Structural Welding Code and be performed by welder certified to this code.

2.7 SIGNAGE AND LABELING

- A. Signs: Provide signage at operating areas that indicate recommended working load limits of rigging equipment and structural steel. Two 11" x 17" signs required. Language of sign shall be submitted and as approved by owner and shall contain: Project name, component capacities, system capacities, loading capacities and the name, address, and phone number of the primary system contractor, manufacturer, and supplier of the system equipment. Safety instructions shall be included on sign information. Signs shall be professionally made with white lettering using an uppercase Calibri font on a red background. Signs shall be cast print on red laminate. Permanently affix signs to walls upstage and downstage of locking rail and loading bridge in conspicuous locations.
- B. Certificate of Inspection: Provide certificate of rigging inspection upon completion dated and signed by an ETCP Certified Theater Technician. Install in a tamperproof sign holder as specified.
- C. Sign Holder: Steel enclosure with tempered glass locking door as distributed by McMaster Carr to house certificate of rigging inspection. Furnish and permanently affix one sign holder to house the certificate of inspection in a conspicuous area on the stage wall. McMaster Carr Part #112T61.

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- D. Labeling and Marking: Label and mark all equipment per ANSI standard E1.4-2009 Part 4.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for supporting members, blocking, installation tolerances, clearances, and other conditions affecting performance of stage-curtain work. Examine inserts, clips, blocking, or other supports required to be installed by others to support tracks and battens.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install stage-curtain system according to track manufacturer and curtain fabricator's written instructions.
- B. Perform all required cutting, drilling, tapping, and fitting to properly install and secure work in place. Cutting or drilling existing structural work shall have prior approval of the Architect/Engineer.
- C. The equipment schedule, design and locations of all stage equipment excluding the lighting are the sole responsibility of this Contractor. Install all equipment in accordance with manufacturer's published instructions.
- D. Coordinate installation of stage equipment with all other trades so as not to impact and to avoid conflict with the location and design of the stage equipment.
- E. Provide all miscellaneous fittings and equipment required for a complete system.

3.3 TESTING, INSPECTION, AND ADJUSTMENTS

- A. The completed installation of all equipment shall be tested and demonstrated for the benefit of the Owner.
- B. The completed stage equipment installation shall be inspected by an ETCP Certified Theater Technician to ensure the quality and safety of the installation. A certificate of inspection installed in a tamperproof sign holder shall be furnished.
- C. Any workmanship or materials found to be defective, improperly placed, not in strict conformity with the Specifications, or defaced or damaged by the Contractor or its employees, or from any other cause shall be removed immediately from the premises and replaced at no additional cost as directed by the Owner/Architect.

END OF SECTION 11 61 43