SECTION 116143 - STAGE CURTAINS

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.

1.2 SUMMARY

A. Section includes stage curtains, draw-curtain tracks, and rigging accessories.

B. Related Sections:

1. Section 055000 "Metal Fabrications" for steel framing and supports for stage-curtain systems.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. For draw-curtain machines, include rated capacities, operating characteristics, and electrical 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.
2. Requirements for supporting curtains, track, and equipment. Verify capacity of each track and rigging component to support loads.
3. Locations of equipment components, switches, and controls. Differentiate between manufacturer-installed and field-installed wiring.
4. Wiring Diagrams: For power, signal, and control wiring.

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- (300-mm-) square Sample (any color) of each type of fabric.

D. Curtain Fabric Samples for Verification: Full width by 36-inch- (900-mm-) long section of fabric from dye lot to be used for the Work, with specified treatments applied. Show complete pattern repeat. Mark top and face of fabric.

E. Delegated-Design Submittal: For rigging indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer licensed in Delaware responsible for their preparation.

1.4 CLOSEOUT SUBMITTALS

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

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of stage curtains.

B. 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.

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.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 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.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of rigging equipment 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: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CURTAIN FABRICS

A. General: Provide fabrics inherently and permanently flame resistant or chemically flame resistant by immersion treatment to comply with requirements indicated. Provide fabrics of each type and color from same dye lot.

B. Polyester Velour: Napped fabric of 100 percent polyester weighing not less than 22 oz./linear yd. (683 g/linear m), with pile height approximately 75 mils (1.9 mm); inherently and permanently flame resistant; 54-inch (1372-mm) minimum width.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Dazian LLC; Angelo.
b. JB Martin Company; Dante.
c. J. L. de Ball America, Inc.; Diablo.
d. KM Fabrics, Inc.; Prestige.
e. Rose Brand; Encore.

2. Color: As selected by Architect from manufacturer's full range.

C. Muslin: Sheer, plain-woven fabric.
1. Fabric: 100 percent polyester weighing not less than 11.75 oz./linear yd. (364 g/linear m); inherently and permanently flame resistant; 106-inch (2692-mm) minimum width.
2. Color: White.

2.2 CURTAIN FABRICATION

A. A. Description and Sizes: New draperies shall be as made in accordance with the following schedule and as shown in the drawings, proscenium opening size (28'-0" wide by 14'-0" high):

Description	Qty	Width	Height	Fullness	Fabric Type	Lining
Main Valance	1	38'-0"	5'-0"	100%	1	No
Main Curtain	2	20'-0"	15'-0"	100%	1	No

B. General: Affix permanent label, stating compliance with requirements of authorities having jurisdiction, in accessible location on curtain not visible to audience. Provide vertical seams unless otherwise indicated. Arrange vertical seams so they do not fall on faces of pleats. Do not use fabric cuts less than one-half width.

1. Vertical Hems: Provide vertical hems not less than 2 inches (50 mm) wide, and not less than 4 inches (102 mm) wide at borders, valance, teasers, and tormentors, with not less than a 1-inch (25-mm) tuck, and machine sew with no selvage material visible from front of curtain. Sew open ends of hems closed.
2. Leading Edge Turnbacks: Provide turnbacks formed by folding back not less than 12 inches (300 mm) of face fabric, with not less than a 1-inch (25-mm) tuck, and secure by sewing turnbacks vertically.
3. Top Hems: Reinforce top hems by double-stitching 3-1/2-inch- (89-mm-) wide, heavy jute webbing to top edge on back side of curtain with not less than 2 inches (50 mm) of face fabric turned under.
4. Pleats: Provide 100 percent fullness in curtains, exclusive of turnbacks and hems, by sewing additional material into 3-inch (75-mm) double-stitched box pleats sewn flat and spaced at 12 inches (300 mm) o.c. along top hem reinforcement.
5. Grommets: Brass No. 4.
   a. Pleated Curtains: Centered on each box pleat and 1 inch (25 mm) from corner of curtain; for snap hooks or S-hooks.

6. Bottom Hems: For curtains with fullness.
   a. For floor-length curtains, provide hems not less than 6 inches (150 mm) deep with separate, interior, 100 percent cotton, heavy canvas chain pockets equipped with proof coil chain. Stitch chain pockets so chain rides 2 inches (50 mm) above finished bottom edge of curtain. Sew open ends of hems closed.

      1) Proof Coil Chain: Grade 30, No. 8, zinc plated, 3/16 inch (4.7 mm), ASTM A 413/A 413M.

C. Scrim: Fabricate from scrim curtain fabric, sewn flat. Provide a continuous 6-inch (150-mm) pipe pocket at bottom with a 6-inch (150-mm) flap of same fabric in front of pocket. Provide double-stitched, 3-1/2-inch (89-mm) jute webbing at top with not less than No. 2 brass grommets spaced at 12 inches (300 mm) o.c. and 1 inch (25 mm) from corner of curtain. Provide not less than a 2-inch (50-mm) double-folded side hem and a 4-inch (100-mm) bottom hem.

D. Drop: Fabricate from muslin fabric, sewn flat, with either horizontal or vertical seams to suit Project and selvage to the rear. Provide 6-inch (150-mm) pipe pocket at bottom with a 6-inch (150-mm) flap of same fabric in front of pocket. Provide double-stitched, 3-1/2-inch (89-mm) jute webbing at top with not less than No. 2 brass grommets spaced at 12 inches (300 mm) o.c. and 1 inch (25 mm) from corner of curtain. Provide not less than a 2-inch (50-mm) double-folded side hem and a 4-inch (100-mm) bottom hem.

E. Snap Hooks: Track manufacturer's standard heavy-duty hooks , blind sewn to top hem of curtain.

2.3 STEEL-CURTAIN TRACK

A. Steel Track: Fabricate of roll-formed, galvanized, commercial-quality, zinc-coated steel sheet; complying with ASTM A 653/A 653M; G60 (Z180) coating designation with continuous bottom slot and with each half of track in one continuous piece; black paint finish.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Automatic Devices Company; Besteel 170 series.
b. H & H Specialties Inc.; 200 series.

2. Thickness: 0.064 inch (1.63 mm).

B. Suspended Track: NPS 1-1/2 (DN 40) steel pipe stiffener for supporting both sections of suspended curved tracks.

C. Clamp and Bracket Hangers: Manufacturer's steel clamps and brackets of sufficient strength required to support loads for attaching track to overhead support.

D. Track Lap Clamp: Metal to match track channel for attaching double-sectioned track at center overlap.

E. Fold Guide: Equip carriers with rear-fold or backpack guide and rubber spacers to permit offstage curtain folding; sized for use with operating line if any.

F. Heavy-Duty Track System: Equip track with heavy-duty components. Provide end stops for track.

1. Curtain Carriers: Standard carriers of plated steel with a pair of nylon-tired ball-bearing wheels riveted parallel to body. Equip carriers with rubber or neoprene bumpers to reduce noise, and heavy-duty, plated-steel swivel eye and manufacturer's standard trim chain for attaching curtain snap or S-hook. Provide quantity of curtain carriers sufficient for track length, to suit curtain fabrication.

a. Master Curtain Carriers: One master carrier, for each leading curtain edge, of plated steel with two pairs of nylon-tired ball-bearing wheels and with two line guides per carrier.

2. End Pulleys and Floor Block: One dead-end, single-wheel pulley; one live-end, double-wheel pulley; and one adjustable, floor block; each with not less than 5-inch (125-mm) molded-nylon- or glass-filled-nylon-tired ball-bearing sheaves enclosed in steel housings. Provide pulleys with steel housing finished to match track and with bracket for securing off-stage curtain end. Provide an adjustable floor block to maintain proper tension on operating line with steel housing painted black.

2.4 DRAW-CURTAIN MACHINE

A. General: Provide operating machine of size and capacity recommended and provided by track manufacturer for curtain specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, and remote controls. Coordinate wiring requirements and electrical characteristics with building electrical system.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Automatic Devices Company; Autodrape Model No. 1454.
b. H & H Specialties Inc.; Atlas Silk Model No. 454.

B. Operator Type: Cable drum with grooved drum and cable tension device to automatically take up cable slack and retain cable in grooves.

C. Operator Type: Traction drive.

D. Motor Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds within installed environment and with indicated operating sequence, and without exceeding nameplate rating or considering service factor. Comply with NEMA MG 1 and the following:

1. Voltage: [**120 V**] [**208-220 V**] [**NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected**] <**Insert voltage**>.
2. Horsepower: [**1/3**] [**1/2**] <**Insert value**>.
3. Enclosure: Manufacturer's standard.
4. Duty: Continuous duty at ambient temperature of 105 deg F (40 deg C) and at altitude of 3300 feet (1005 m) above sea level.
5. Service Factor: 1.15 for open dripproof motors; 1.0 for totally enclosed motors.
6. Phase: [**One**] [**Polyphase**].

E. Limit Switches: Fully closed and fully opened preset stops.

2.5 CURTAIN RIGGING

A. Curtain Battens: Fabricate battens from steel pipe with a minimum number of joints. As necessary for required lengths, connect pipe with a drive-fit pipe sleeve not less than 18 inches (450 mm) long, and secure with four flush rivets, plug welds, threaded couplings, or another equally secure method. Shop-paint completed pipe battens with black paint and with a 1-inch- (25-mm-) wide yellow stripe at the center of each.

1. Steel Pipe: ASTM A 53/A 53M, Grade A, standard weight (Schedule 40), black, NPS 1-1/2 (DN 40) nominal diameter unless otherwise indicated.

B. Supports, Clamps, and Anchors: Sheet steel in manufacturer's standard thicknesses, galvanized after fabrication according to ASTM A 153/A 153M, Class B.

C. Trim and Support Cable: 1/4-inch- (6-mm-) diameter, 7x19 galvanized-steel cable with a breaking strength of 7000 lb (3175 kg). Provide fittings complying with cable manufacturer's written recommendations for size, number, and method of installation, including a drop-forged galvanized turnbuckle to allow for leveling.

D. Inserts, Bolts, Rivets, and Fasteners: Manufacturer's standard corrosion-resistant units.

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's and curtain fabricator's written instructions.

3.3 TRACK INSTALLATION

A. Ceiling-Mounted Tracks: Drill track at intervals not greater than manufacturer's written instructions for spacing, and fasten directly to structure.

B. Beam-Mounted Tracks: Install tracks by suspending from manufacturer's special beam clamps securely mounted to I-beam structure at spacing, according to manufacturer's written instructions.

C. Wall-Mounted Tracks: Install tracks by suspending from manufacturer's special bracket clamps securely mounted to wall construction at spacing, according to manufacturer's written instructions.

D. Spacing: Do not exceed the following dimensions between supports:

1. Heavy-Duty Track: 72 inches (1829 mm).

E. Install track for center-parting curtains with not less than 24-inch (600-mm) overlap of track sections at center, supported by special lap clamps.

3.4 CURTAIN INSTALLATION

A. Track Hung: Secure curtains to track carriers with snap hooks.

3.5 DRAW-CURTAIN-MACHINE INSTALLATION

A. Install draw-curtain machines by securely mounting to wall construction, according to manufacturer's written instructions.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain stage curtains, draw-curtain machines, and tracks.

END OF SECTION 116143