

Stage Curtain Specifications

LuXout

Stage Curtains

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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 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design rigging using performance requirements and design criteria indicated.
- B. Structural Performance: Rigging shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Design Loads: Weight of curtains and <Insert loads>.

1.4 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 square-inch Sample (any color) of each type of fabric.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified [**Installer**].
- 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: Minimum of 2 year warranty against manufacturing defects.

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: 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 in a location accessible from the floor, 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.
 - b. Permanently attach a 1-square foot piece of fabric from the same dye lot to the back of the curtain to be used as an FR test strip.
- 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.
- D. Preinstallation Conference: Conduct conference at [**Project site**] <Insert location>.to coordinate curtain and stage lighting location.

1.8 PROJECT CONDITIONS

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

1.9 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: **[One]** <Insert number> year(s) 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. Heavyweight Woven Cotton Velour <Insert drawing designation>: Napped fabric of 100 percent cotton weighing not less than 25 oz./linear yd. before flame-retardant treatment, with pile height not less than 79 mils; 54-inch minimum width.
 - 1. Products: Subject to compliance with requirements, **[provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:**
 - a. JB Martin Company; #2703 Overture
 - b. KM Fabrics, Inc.; Memorable.
 - c. Valley Forge Fabrics, Inc.; 2525 Velour.
 - d. <Insert manufacturer's name; product name or designation>.
 - 2. Color [, Texture, and Pattern]: **[As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range].**
- C. Medium Weight Woven Cotton Velour <Insert drawing designation>: Napped fabric of 100 percent cotton weighing not less than 20 oz./linear yd. before flame-retardant treatment, with pile height not less than 75 mils; 54-inch minimum width.
 - 1. Products: Subject to compliance with requirements, **[provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:**
 - a. JB Martin Company; #2603 Concertino.
 - b. KM Fabrics, Inc.; Marvel.
 - c. Valley Forge Fabrics, Inc.; 2020 Velour.

- d. <Insert manufacturer's name; product name or designation>.
 - 2. Color [, Texture, and Pattern]: [As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range].
- D. Lightweight Woven Cotton Velour <Insert drawing designation>: Napped fabric of 100 percent cotton weighing not less than 15 oz./linear yd. before flame-retardant treatment, with pile height not less than 59 mils; 54-inch minimum width.
- 1. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
 - a. JB Martin Company; #2503 Melody.
 - b. KM Fabrics, Inc.; Princess.
 - c. Valley Forge Fabrics, Inc.; 16 oz. Velvet.
 - d. <Insert manufacturer's name; product name or designation>.
 - 2. Color[, Texture, and Pattern]: [As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range].
- E. Heavyweight Polyester Velour <Insert drawing designation>: Napped fabric of 100 percent polyester weighing not less than 25 oz./linear yd., with pile height approximately 75 mils; inherently and permanently flame resistant; 54-inch minimum width.
- 1. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
 - a. JB Martin Company; Dante.(matte finish)
 - b. KM Fabrics, Inc.; Charisma (matte finish)
 - c. KM Fabrics, Inc.; Prestige (sheen finish)
 - d. <Insert manufacturer's name; product name or designation>.
 - 2. Color[, Texture, and Pattern]: [As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range].
- F. Mediumweight Polyester Velour <Insert drawing designation>: Napped fabric of 100 percent polyester weighing not less than 20 oz./linear yd., with pile height approximately 75 mils; inherently and permanently flame resistant; minimum of 54-inch minimum width.
- 1. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
 - a. KM Fabrics, Inc.; Crescent 20 oz.
 - b. Milliken; Encore 22 oz.
 - c. LuXout Prologue 22 oz.

2. Color[, **Texture, and Pattern**]: [As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range].
- G. Lightweight Polyester Velour <Insert drawing designation>: Napped fabric of 100 percent polyester weighing not less than 13oz./linear yd., with pile height approximately 75 mils; inherently and permanently flame resistant; 54-inch minimum width.
1. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
 - a. JB Martin Company; Volcano 13.5 oz.
 - b. KM Fabrics, Inc.; Plateau 13 oz.
 - c. Milliken; Encore 15 oz.
 - d. LuXout 13-oz Epilogue.
 2. Color[, **Texture, and Pattern**]: [As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range].
- H. Cotton Lining <Insert drawing designation>: Yarn-dyed denim cloth of 100 percent cotton; woven in a warp-faced twill; 54-inch minimum width; [black] <Insert color>.
- I. Ranger Lining <Insert drawing designation>: 100 percent cotton fabric weighing not less than 13 oz./linear yd.; 54-inch minimum width; [beige] [black].
- J. Polyester Lining <Insert drawing designation>: 100 percent polyester fabric; inherently and permanently flame resistant; 54-inch minimum width; [beige] [black].
- K. Commando <Insert drawing designation>: 100 percent cotton, short-napped fabric weighing not less than 16 oz./linear yd. [12 oz./linear yd.] before flame-retardant treatment; twill weave with soft uniform texture; 54-inch minimum width; [black] <Insert color>.
1. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
- L. Repp, Atlas Oxford <Insert drawing designation>: 100 percent heavyweight cotton woven fabric weighing not less than 17 oz., herringbone weave; 54-inch minimum width.
1. Colors [, **Textures, and Patterns**]: [As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range].
- M. Chevron <Insert drawing designation>: 100 percent [heavyweight cotton] [polyester] woven fabric weighing not less than 14 oz., chevron weave; 54-inch minimum width.

1. Products: Subject to compliance with requirements, **[provide the following]** **[provide one of the following]** **[available products that may be incorporated into the Work include, but are not limited to, the following]**:
 2. Colors [, Textures, and Patterns]: **[As indicated by manufacturer's designations]** **[Match Architect's samples]** **[As selected by Architect from manufacturer's full range]**.
- N. Synthetic Boucle **<Insert drawing designation>**: 100 percent synthetic blend; diagonal weave; inherently and permanently flame resistant; 48-inch minimum width.
1. Products: Subject to compliance with requirements, **[provide the following]** **[provide one of the following]** **[available products that may be incorporated into the Work include, but are not limited to, the following]**:
 - a. Doral
 - b. **<Insert manufacturer's name; product name or designation>**.
 2. Colors [, Textures, and Patterns]: **[As indicated by manufacturer's designations]** **[Match Architect's samples]** **[As selected by Architect from manufacturer's full range]**.
- O. Polyester **<Insert drawing designation>**: 100 percent polyester yarn woven fabric weighing not less than 13 oz./linear yd.; inherently and permanently or durably flame resistant; 72-inch minimum width.
1. Products: Subject to compliance with requirements, **[provide the following]** **[provide one of the following]** **[available products that may be incorporated into the Work include, but are not limited to, the following]**:
 - a. Dazian LLC; **[PD Cloth]** **[Poly Muslin]**.
 - b. Frankel/Fabric One; Cyc-Clone.
 - c. Valley Forge Fabrics, Inc.; Wiz Key.
 - d. **<Insert manufacturer's name; product name or designation>**.
 2. Colors [, Textures, and Patterns]: **[As indicated by manufacturer's designations]** **[Match Architect's samples]** **[As selected by Architect from manufacturer's full range]**.
- P. Sharkstooth Scrim **<Insert drawing designation>**: Open-weave, seamless, lightweight gauze fabric.
1. Fabric: 100 percent cotton or 95 percent cotton/5 percent polyester weighing not less than 29 oz./linear yd.; **[30-foot]** **[35-foot]** **<Insert dimension>** minimum width.
 2. Fabric: 100 percent cotton weighing not less than 32 oz./linear yd.; three-thread construction; **[30-foot]** **[35-foot]** **<Insert dimension>** minimum width.
 3. Fabric: 100 percent polyester weighing not less than 37 oz./linear yd.; inherently and permanently flame resistant; **[35-foot]** **<Insert dimension>** minimum width.
 4. Fabric: 100 percent polyester/modacrylic blend weighing not less than 40 oz./linear yd.; inherently and permanently flame resistant; three-thread construction; suitable for all weather applications; **[36-foot]** **<Insert dimension>** minimum width.

5. Color: [White] [Black] [Gray] [Blue] <Insert color>.

Q. Muslin <Insert drawing designation>: Sheer, plain-woven fabric.

1. Fabric: 100 percent cotton weighing not less than 16 oz./linear yd.; [100-inch] <Insert dimension> minimum width.
2. Fabric: 100 percent polyester weighing not less than [11.75 oz./linear yd.] <Insert value>; inherently and permanently flame resistant; [106-inch] <Insert dimension> minimum width.
3. Color: [White] [Black] [Gray] [Blue] <Insert color>.

2.2 CURTAIN FABRICATION <Insert drawing designation>

A. 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 wide, [**and not less than 4 inches wide at borders, valance, teasers, and tormentors,**] with not less than a 1-inch tuck, and machine sew, [**trim all selvage, serge and overcast all seams,**] [**with no selvage material visible from front of curtain.**] Sew open ends of hems closed.
2. Leading and Trailing Edge Turnbacks: Provide turnbacks formed by folding back not less than [12 inches] of face fabric, with not less than a 1-inch tuck.
3. Top Hems: Reinforce top hems by double-stitching [**triple-stitching**] 3-1/2-inch- wide, [**inherently flame retardant synthetic webbing**] [**heavy jute**] to top edge on back side of curtain with not less than 2 inches of face fabric turned under.
4. Flat: Provide zero percent fullness in curtains.
5. Pleats: Provide 50 percent fullness in curtains, exclusive of turnbacks and hems, [**by grommeting, not sewed. Six inches of material shall be gathered into a pleat every 12 inches and secured with a 2 1/8" S-hook or a tie line, whichever is appropriate, to make a round pleat**] [**by sewing additional material into 3-inch double-stitched box pleats sewn flat and spaced at 12 inches o.c. along top hem reinforcement.**]
6. Pleats: Provide 100 percent fullness in curtains, exclusive of turnbacks and hems, [**by grommeting, not sewed. Six inches of material shall be gathered into a pleat every 6 inches and secured with a 2 1/8" S-hook or a tie line, whichever is appropriate, to make a round pleat**] [**by sewing additional material into 6-inch double-stitched box pleats sewn flat and spaced at 12 inches o.c. along top hem reinforcement.**]
Grommets: Brass, No. 3 or No. 4.
 - a. Black Curtains: Provide brass or aluminum grommets with black finish.
 - b. Flat Curtains: Place 12 inches o.c. and 1 inch from corner of curtain; for ties, snap hooks, or S-hooks.
 - c. Flat Curtains: Provide blind grommet top finish to mask battens using hidden pairs of grommets; place 12 inches o.c. and 1 inch from corner of curtain; for ties.
 - d. Pleated Curtains: [**with two grommets spaced 6" apart every 12"**] [**Centered on each box pleat**] and 1 inch from corner of curtain; for snap hooks or S-hooks.
7. Bottom Hems: For flat curtains without fullness.

- a. Provide a 4-inch lined hem with a pocket that allows the sliding of a pipe or conduit stiffener into the bottom of the curtain [, **and provide a concealing flap of same fabric in front of pocket and made 2 inches longer than the bottom edge of the pocket**].
8. Bottom Hems: For curtains with fullness.
- a. For curtains that do not hang to the floor, provide hems not less than 3 inches deep. Sew open ends of hems closed.
 - b. For floor-length curtains, provide hems not less than 6 inches deep with manufacturer's standard series of individual weights in individual closed pockets sewn above the finished bottom edge of curtain. Sew open ends of hems closed.
 - c. For floor-length curtains, provide hems not less than 6 inches deep with separate, interior, 100 percent cotton, heavy canvas chain pockets equipped with proof coil chain. Stitch chain pockets so chain rides 2 inches above finished bottom edge of curtain. Sew open ends of hems closed.
9. Velour Curtains: Fabricate with the fabric nap down.
10. Lining: Provide lining for each curtain in same fullness and fabric type, cotton or polyester, as face fabric and finished 2 inches shorter than face fabric. Sew or otherwise securely attach lining to top hem of face fabric. Attach lining to face fabric along **[bottom and]**side seams with 4-inch- long strips of heavy woven cotton tape.[**Sew lining to bottom edge of curtain allowing sufficient lining fabric for tucking to prevent shrinkage.**
- B. Scrim: Fabricate from scrim curtain fabric, sewn flat. Provide a continuous 6-inch pipe pocket at bottom with a 6-inch flap of same fabric in front of pocket. Provide double-stitched **[triple-stitched]**, 3-1/2-inch**[inherently flame retardant synthetic] [jute]**webbing at top with not less than No. 2 brass grommets spaced at 12 inches o.c. and 1 inch from corner of curtain. Provide not less than a 2-inch side hem and a 4-inch bottom hem.
- C. Drop: Fabricate from muslin fabric, sewn flat, with either horizontal or vertical seams to suit project and selvage to the rear. Provide 6-inch pipe pocket at bottom with a 6-inch flap of same fabric in front of pocket. Provide double-stitched, 3-1/2-inch **[inherently flame retardant synthetic] [jute]**webbing at top with not less than No. 2 brass grommets spaced at 12 inches o.c. and 1 inch from corner of curtain. Provide not less than a 2-inch side hem and a 4-inch bottom hem.
- D. S-Hooks: **[Track]** Manufacturer's standard heavy-duty plated-wire hooks, not less than **[2 inches]** **<Insert dimension>** long.
- E. Tie Lines: No. 4 or No. 4-1/2 cord or braided soft cotton tape, black or white to best match curtain; not less than 5/8 inch wide by 36 inches long, **[threaded through grommets]** **[sewn to top hem of curtain]**.
- F. Snap Hooks: Track manufacturer's standard heavy-duty hooks [, **sewn to top edge of curtain]** **[, blind sewn to top hem of curtain]** [, **attached to top hem with nylon strap secured by rivets]** **<Insert method>**.

2.3 ALUMINUM-CURTAIN TRACK <Insert drawing designation>

- A. Aluminum [**Curved**] Track: Fabricate of extruded aluminum; complying with ASTM B 221; alloy and temper recommended by manufacturer for strength and corrosion resistance, [**0.080 inch**] [**0.125 inch**] thick; [**mill**] [**black paint**] finish.
1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:
 - a. Automatic Devices Company; [**Flex-I-Track 130 series**] [**Rig-I-Flex 140 series**] [**Curvit-Sure 340/350 series**] [**Patriarc 500 series**].
 - b. H & H Specialties Inc.; [**300 series**] [**500 series**] [**600 series**] [**700 series**].
 - c. Tru-Roll, Inc.; Tru-Roll Model No. 2300.
 - d. <Insert manufacturer's name; product name or designation>.
 2. Shop-fabricate curved portions of track. [**Field-curve curved portions of track**]
 3. Outside Idlers, Spindles, and Guides: Manufacturer's standard; quantity sufficient for configuration of curve(s) and length of track.
- B. Curtain Rails: [**Single**] [**Double**] curtain capacity. Provide end stops for track rails.
- C. Curtain Carriers: Standard carriers with a pair of [**nylon**] <Insert material>-tired ball-bearing wheels riveted parallel to plated-steel body. Equip carriers with rubber or neoprene bumpers and nylon glide strips to reduce noise, and heavy-duty, plated-steel swivel eye for attaching curtain snap or S-hook. Provide quantity of curtain carriers sufficient for track length, to suit curtain fabrication.
1. Master Curtain Carriers: One master carrier, for each leading curtain edge, with two pairs of [**nylon-tired**] <Insert tire type> ball-bearing wheels riveted parallel to plated-steel body.
- D. Suspended Track: NPS 1-1/2 steel pipe stiffener for supporting both sections of suspended curved tracks.
- E. Clamp and Bracket Hangers: Manufacturer's steel clamps and brackets of sufficient strength required to support loads for attaching track to overhead support.
- F. Track Lap Clamp: Metal to match track channel for attaching double-sectioned track at center overlap.
- G. 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.
- H. Walk-Along Manual Operation: Fabricate curtain track without cord, cable, pulleys, or floor block.
- I. Manual Operation: Fabricate curtain track with cord, pulleys, and floor block.

1. Operating Line: Manufacturer's standard [**1/4-inch**] [**3/8-inch-**] <Insert dimension> diameter, stretch-resistant operating cord consisting of braided synthetic-fiber jacket over solid, synthetic-fiber, linear filaments.
 2. End Pulleys: One single dead-end and one double live-end pulley. Provide sheave(s) with shielded ball bearing(s) housed in plated-steel body finished to match track. Provide with bracket for securing off-stage curtain end.
 3. Floor Block: Sheave with shielded ball bearing housed in plated-steel body finish painted black. [**Spring-tensioned type.**] [**Adjustable, with detachable base plate**]
- J. Motorized Operation: Fabricate curtain track with cord and pulleys.
1. Operating Line: Manufacturer's standard [**1/4-inch-**] <Insert dimension> diameter, stretch-resistant operating cable consisting of braided synthetic-fiber jacket over galvanized wire cable.
 2. End Pulleys: One single dead-end and one double live-end pulley. Provide sheave(s) with shielded ball bearing(s), housed in plated-steel body finished to match track. Provide with bracket for securing off-stage curtain end.
 3. Floor Block: Sheave with shielded ball bearing housed in plated-steel body finish. [**Spring-tensioned type.**] [**Adjustable, with detachable base plate.**] [**painted black**]

2.4 STEEL-CURTAIN TRACK <Insert drawing designation>

- A. Steel Track: Fabricate of roll-formed, galvanized, commercial-quality, zinc-coated steel sheet; complying with ASTM A 653/A 653M; G60 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 the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:
 - a. Automatic Devices Company; [**Besteel 170 series**] [**Silent Steel 280 series**].
 - b. H & H Specialties Inc.; [**200 series**] [**400 series**].
 - c. <Insert manufacturer's name; product name or designation>.
 2. Thickness: [**0.064 inch**] [**0.079 inch**].
- B. Suspended Track: NPS 1-1/2 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] [molded nylon]** with a pair of **[nylon] [neoprene]**-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] [neoprene]**-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] <Insert dimension>** 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.

G. Medium-Duty Track System: Provide end stops for track.

1. Curtain Carriers: Standard carriers of plated steel with a pair of **[nylon] [neoprene]** wheels riveted parallel to body. Equip carriers with plated-steel swivel eye 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] [neoprene]** wheels and with two line clamps 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 containing guarded 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.

H. Manual Operation: Provide with cord operating line consisting of manufacturer's standard **[3/8-inch-] <Insert dimension>** diameter, stretch-resistant operating cord consisting of braided synthetic-fiber jacket over solid, synthetic-fiber, linear filaments.

I. Motorized Operation: Provide with cable operating line consisting of manufacturer's standard **[3/16-inch-] [1/4-inch-] <Insert dimension>** diameter, stretch-resistant operating cable consisting of braided synthetic-fiber jacket over galvanized wire cable.

2.5 DRAW-CURTAIN MACHINE **<Insert drawing designation>**

- A. General: Provide **[floor mounted] [track mounted]** 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 the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:**
 - a. Automatic Devices Company; [**Autodrape Model No. 1454**][Autodrape Model No. 934] [Hercules Model 6504] [**Silver Service Model No. 2904**][Silver Service Model No. 2928][Silver Service Model No. 2917][Silver Service Model No. 2950]
 - b. H & H Specialties Inc.; Atlas Silk Model [**No. 454**] [**No. 459**].
 - c. Tru-Roll, Inc.; Tru-Roll Traction Drive.
 - d. **<Insert manufacturer's name; product name or designation>**.

- 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: [**Open dripproof**] [**Totally enclosed**] [**Manufacturer's standard**].
 4. Duty: Continuous duty at ambient temperature of 105 deg F and at altitude of 3300 feet above sea level.
 5. Service Factor: 1.15 for open dripproof motors; 1.0 for totally enclosed motors.
 6. Phase: [**One**] [**Polyphase**].

- E. Remote-Control Station: Provide momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."
 1. Provide key-operated switches, keyed alike, with one key per switch plus one extra key.
 2. Provide key-accessed control enclosures, keyed alike, with one key per switch plus one extra key.

- F. Limit Switches: Fully closed and fully opened preset stops.

- 2.6 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 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- 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 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- diameter, 7x19 galvanized-steel cable with a breaking strength of 7000 lb. 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. Trim and Support Chain: Grade 30 Proof coil chain
- E. 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 BATTEN INSTALLATION

- A. Install battens by suspending at heights indicated with trim and support spaced to support load, but do not exceed [**10 feet**] <Insert dimension> o.c.
 1. Cable Trim and Support: Secure cables either directly to structures or to inserts, eye screws, or other devices that are secure and appropriate to substrate and that are not subject to deterioration or failure with age or elevated temperatures. Attach other cable end to pipe clamps with turnbuckles, housed or fixed with nuts after adjustment, to prevent loosening.
 2. Chain Trim and Support: Secure chain with load-rated terminations.

3.4 TRACK INSTALLATION (choose one as applicable)

- 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. **Batten-Hung Tracks:** Install track by suspending from pipe batten with manufacturer's track clamp hangers attached to batten pipe clamps at spacing, according to manufacturer's written instructions.
- E. **Suspended:** Install track by suspending from structural beams with manufacturer's track clamp hangers at spacing according to manufacturer's written instructions.
- F. **Spacing:** Do not exceed the following dimensions between supports:
 - 1. Heavy-Duty Track: 84 inches.
 - 2. Medium-Duty Track: 72 inches.
 - 3. Curved Walk-Along Track: 48 inches. Provide additional supports at curves and splices.
- G. Install track for center-parting curtains with not less than 24-inch overlap of track sections at center, supported by special lap clamps.

3.5 CURTAIN INSTALLATION

- A. **Track Hung:** Secure curtains to track carriers with [**S-hooks**] [**snap hooks**].
- B. **Batten Hung:** Secure curtains to pipe battens with [**ties**].

3.6 DRAW-CURTAIN-MACHINE INSTALLATION

- A. Install draw-curtain machines by securely mounting to [**floor**] [**track**], according to manufacturer's written instructions.

3.7 DEMONSTRATION

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

END OF SECTION 116143