

**SECTION 12490
INTERIOR ROLLER SHADES**

PART 1. GENERAL

1.01 SUMMARY

A. SCOPE

1. The following specifications detail the minimum performance and related criteria for an electronic shade control system used on this project
2. This specification covers electronic shading systems, controls, and materials as specified in locations indicated on architectural plans

1.02 RELATED SECTIONS AND DOCUMENTS

A. RELATED DOCUMENTS

1. Drawings and General provisions of the Contract, including General and Supplementary Conditions apply to this section

B. RELATED SECTIONS

1. Section 06100-- Rough Carpentry; blocking for support of window shade brackets or pocket assemblies.
2. Section 09250-- Substrate for window shade systems and installation of shade pockets, pocket closure, and/ or accessories supplied only under this section.
3. Section 09510-- Acoustical Ceilings; installations of shade pockets, pocket closure, and/or accessories supplied only under this section.
4. Section 16000 - Electrical; installation of and connections to electrical motor control system and lighting control system components supplied only by this section as required to accomplish control requirements specified elsewhere and as indicated in the drawings.

1.03 RESPONSIBILITY FOR WINDOW TREATMENT SYSTEM

A. The responsibility for the design, engineering, installation, and performance of motorized window shade systems specified in this section shall be assigned to a single manufacturer and their authorized dealers/installers.

B. The Base Building Contractor (Main Contractor) shall coordinate installation of the following items with the Window Shade contractor for all window treatment systems:

- a. Metal shade pockets recessed into ceiling system and ceiling trim (closure flap) or assembly.

C. The Base Building Contractor (Main Contractor) shall provide the following materials and services to the window shade contractor for electrically powered window treatments:

- a. Power wiring in accordance with requirements provided by the Window Shade Contractor.
- b. Low-voltage wiring as necessary for operation of shade control system. (Window Shade Contractor shall specify power needs to General Contractor)

1.04 SUBMITTALS

A. PRODUCT DATA

1. Submit manufacturer's descriptive literature for each product type specified. Details shall indicate materials, finishes, construction, and mounting requirements. Also include installation, wiring, and operating instructions.

B. SHOP DRAWINGS

1. Indicate Head, jamb, and sill details to aid Base Building contractor to coordinate work as well as relevant dimensions and mounting requirements for each product type and mounting condition.
2. Provide shade schedule coordinating room number, opening size(s), quantities and key to details.
3. System one-line wiring diagrams including connection details and overall arrangement of all shades and control locations supplied by this section for installation and connection by division 16.

C. SAMPLES

1. Selection Samples:
 - a. Portfolio of shade fabric swatches for initial fabric color selection from manufacturer's full range of available fabrics.
 - b. Material samples for color and finish selection of controls.
2. Verification samples:
 - a. One fully operational window shade sample of each type required complete with selected shade fabric including sample of seam / batten when applicable. Location of sample to be determined by specifier.
 - b. One complete set of all shade components demonstrating compliance with PART 2 of specification.

D. TEST REPORTS, CERTIFICATES, AND DEMONSTRATION

1. Current Certificates demonstrating all line voltage components of the system are either UL Listed or UL recognized. All low voltage components within the system shall be powered by UL listed or UL recognized class 2 transformers or power supplies and wired as NEC® Class 2 circuits.
2. Test Reports indicating compliance with Fabric test properties listed in Section 2
3. Manufacturer shall make available to project design team and project owner a tour of manufacturing operations to evaluate manufacturing processes and verify samples.

E. MANUFACTURER'S INSTRUCTIONS

1. Installation, Programming, and Maintenance instructions to be included in product packaging.
2. 24-Hour / 7-Day Technical support shall be available to aid with unforeseen installation difficulties.

1.05 QUALITY ASSURANCE

A. QUALIFICATIONS

1. Manufacturer shall have 15 years minimum experience manufacturing products comparable to those specified in this section.
 2. Manufacturer shall furnish all shading system and electrical control equipment for a complete installation and single source responsibility of shading and lighting control where applicable.
 3. The manufacturer, subsidiary, or licensed agent shall be approved to supply the products specified and to honor any claims against the product presented in accordance with the warranty.
1. Manufacturer Shall supply 24-Hour / 7-Day Technical support to troubleshoot system wiring and aid in system programming.

4. Installer shall be qualified to install the specified products by prior experience, demonstrated performance, and acceptance of any requirement of the manufacturer, subsidiary of the manufacturer, or licensed agent.

1.06 DELIVERY, STORAGE, AND HANDLING

A. STORAGE AND PROTECTION

1. Do not deliver items to the project until all concrete, masonry, plaster, painting and other wet work has been completed and is dry.
2. Deliver shades to project in protective packaging, uniquely labeled to identify each shade for each opening. Schedule delivery to prevent delays to completion of work, but to minimize on-site storage time.
3. Store materials in a dry, secure place. Protect from weather, surface contaminants, corrosion, construction traffic, and all other potential damage.

B. PROJECT / SITE CONDITIONS

1. Shade system shall not be installed until the building is operating in ambient temperature and humidity ranges consistent with that intended for buildings ultimate use.

C. SCHEDULING

1. Do not fabricate shades without obtaining field dimensions for each opening.
2. Coordinate construction of surrounding conditions to allow for timely field dimension verification.
3. Manufacturer's standard lead times apply. Reference submittal and schedule accordingly for project timeline.

D. EXTRA MATERIALS

1. The manufacturer shall make available to the end user a method of ordering new equipment for expansions, replacement, or parts to be used as spares twenty-four hours a day, seven days a week.
2. The manufacturer must make available new or remanufactured parts for a minimum period of ten years from the final date of commissioning.

PART 2. PRODUCTS

2.01 MANUFACTURERS

A. To establish the standard of quality, design, and function desired, drawings and specifications are based on products by:

1. Lutron Shading Solutions by VIMCO
11520 Sun Shade Lane
Ashland, Virginia 23005
United States of America
Web Site: www.vimco.com
Telephone (800) 446-1503, Fax (804) 752-336
2. Contact for installation:
AEC, Inc.
3360 Wiley Post Rd., Ste. #150
Carrollton, TX 75006
Web Site: www.aeccorp.com
Telephone (972) 488-1066, Fax (972) 488-0554

2.02 GENERAL SYSTEM SPECIFICATIONS

A. OPERATION

1. The Electronic Drive Unit shall operate without exceeding a 44dBA Sound Pressure Level (SPL) measured three (3) feet from the motor.
2. The system shall make no audible clicks when the motor starts or stops.
3. For systems with multiple Electronic Drive Units, Drive Units are electronically synchronized and will start, stop and move smoothly in unison at all times.
4. Each Electronic Drive Unit within the system shall store multiple intermediate presets positioned anywhere along the system travel and a full open and full close shade limit. Electronic Drive Unit shall position the shade fabric to $\pm 1/16$ " of preset positions.
5. Electronic Drive Unit and system controls shall have a 10 year power failure memory for preset positions, open and close limits, shade grouping, and system configuration.

B. CAPACITY

1. System shall allow for up to 96 devices per communication link including EDU's, controls and interfaces.

C. GROUPING

1. System groups and subgroups can be reconfigured at the point of control without rewiring or access to the Electronic Drive Unit
2. System keypads can control any Electronic Drive Unit, group, or subgroup without requiring Group Controls.

D. LIMITS AND INTERMEDIATE PRESETS

1. Limits shall be programmable and adjustable from the Electronic Drive Units, wall-mounted keypads, or hand-held infrared transmitters as applicable.
2. Open and Close limits may be recalled at the Electronic Drive Unit. Preset positions may be recalled by contact closure inputs, keypads, infrared receivers, and lighting control system interfaces.
3. Preset positions shall be user adjustable with a 5-second button "press and hold" from keypads, infrared transmitters, or contact closure boards. The user adjustment feature can be disabled at the keypad location

E. PROTECTION

1. System components shall provide appropriate (spike and brownout) overcurrent protection ($\pm 10\%$ of line voltage) for all devices in the system.
2. The Electronic Drive Unit shall be powered via a UL Listed or UL Recognized Class 2 Power Supply.

F. INTEGRATION

1. The Electronic Drive Unit(s) shall seamlessly integrate with Lutron lighting control systems including GRAFIK Eye, HomeWorks, RadioRA, and RadioTouch.
2. System shall integrate with A/V equipment such as timeclocks and security systems through contact closure inputs
3. Electronic Drive Unit shall be capable of receiving Infrared (IR) from hand-held transmitters through infrared receivers on a keypad, contact closure interface, or through an IR receiver wired directly to the Electronic Drive Unit.

2.03 ROLLER SHADES

A. MOUNTING

1. Roller shade brackets shall allow for symmetrical light gaps as small as $\frac{1}{8}$ " on each side of shade.
2. System shall have a roller shade leveling adjustment that allows level adjustment while the roller shades are mounted to the brackets.
3. System shall allow a side-to-side adjustment of up to $\pm 3/8$ " on each side while the shade is mounted to the bracket to properly center shade over the window.
4. System shall have a projection adjustment of up to $1/2$ " allowing the shade to clear the trim or move the shade closer to the window in order to have a tighter seal between the fabric and the window.
5. System dual brackets shall be provided to permit two shades rollers to be mounted in the same opening

B. COUPLING

1. A single EDU shall be capable of driving multiple shades with a coupling pin. This pin shall allow the adjustment of the hem bar levels without removing the roller from its installed point or removing fabric from the roller tube.

C. SHADE TUBE

1. 2.5" aluminium extrusion
2. Fabric shall be connected to the tube with double-sided adhesive strip applied for exact and firm mounting of the fabric and for easy adjustment of fabric to prevent telescoping.
3. A minimum of one turn of fabric will be placed on the roller before the working section of fabric starts, to protect the fabric and smooth out the starting seam.

D. FABRICS

1. QUALIFICATIONS

- a. Fire – Provide shade fabrics tested in accordance with:
 - i 1989 NFPA 701 small scale Vertical Burn Test and rated "PASS."
 - ii 1996 NFPA 701 small scale Vertical Burn (telephone booth test) and rated "PASS."

2. MANUFACTURING

- a. Where applicable, shade fabric will be ultrasonically cut and friction sealed to minimize fraying.
- b. Woven yarn fabrics will be interlocking and heat-treated so that all material is securely bonded.
- c. Shade Fabric panels shall be 100% visually inspected for defects using a light box integrated into the manufacturing line.
- d. 100% visual inspections shall be performed on each shade seam and hem bar welds and compared to strict aesthetic standards.
- e. Shade seam weld strength process shall be tested on a daily basis to ensure controlled consistency of weld quality.
- f. Shade panels shall be 100% checked for squareness ($\pm 1/16$ ")
- g. Shade panels shall be 100% visually inspected to ensure there are no frayed edges or defects in the cut.

3. FABRIC SELECTION

a. TOTAL BLACKOUT FABRICS

E. HEM BAR

1. Standard Sealed Hem Bar shall be a 1" wide by .1875" thick extruded aluminum bar enclosed on all sides in a thermally sealed pocket across the bottom of the shading fabric.
2. Exposed Hem Bar shall be a 1.375" high by .375" wide aluminum extrusion containing a spline groove at the top to receive and secure the fabric and a "T" slot at the bottom for wool-pile light seal, if desired. Black end caps will be furnished.

2.04 CONTROLS

A. WALL MOUNTED CONTROLS

1. Keypad(s) shall be able to electronically set and reconfigure shade open and close limits, shade preset positions, system groups, and system subgroups at the control without rewiring and without access to the Electronic Drive Unit.
2. Wallplate shall attach using no visible means of attachment.
3. Any engraved artwork specified for controls, such as borders and logos, shall be applied in a method designed to resist removal by scratching, cleaning, etc.
4. Manufacturer shall ensure the following items regarding product color:
 - a. Product color matches NEMA standard WD1, Section 2, and the maximum color deviation from this standard shall not exceed $D E=1$, CIE L^*a^*b color space units. For non-NEMA colors, color match coordination shall be provided on request.
 - b. Color variation of any control in the same product family shall not exceed $D E=1$, CIE L^*a^*b color units.
 - c. Visible parts shall exhibit ultraviolet color stability when tested with multiple actinic light sources as defined in ASTM D4674-89. Manufacturer to submit proof of testing upon request.
5. Keypad(s) shall mount in standard U.S. backboxes in either single-gang or multi-gang installations. Keypad(s) shall be available in "Insert" and "No Insert" models. Manufacturer to supply appropriate wallplate based on ganging options and insert options specified.
6. Keypad(s) shall provide an immediate local LED response upon button activation to indicate that a system command has been sent from the keypad. LED will remain lit contingent upon receiving system confirmation of the successful completion of the command.
7. Keypad(s) shall have removable button assemblies that can be replaced in the field to change colors, button configurations, and engraving.
8. Keypad(s) shall have a backlighting option.
9. Keypad(s) shall be capable of simultaneously controlling one or more shades, up to the maximum number of shades in the system.
10. Keypads shall be of type:
 - a. Two-Button Keypad
 - i Keypad will provide buttons for selecting the following for one group of shades: full-open and full-close.
 - b. Three-Button Keypad
 - i Keypad will provide buttons for selecting the following for one group of shades: full-open, full-close, and one programmable preset position.

- c. Two-Button Keypad with Raise/Lower
 - i Keypad will provide buttons for selecting the following for one group of shades: full-open, full-close, and raise/lower.
- d. Three-Button Keypad with Raise/Lower
 - i Keypad will provide buttons for selecting the following for one group of shades: full-open, full-close, one programmable preset position, and raise/lower.
- e. Four-Button Keypad with Raise/Lower and Infrared Reception
 - i Keypad will provide buttons for selecting the following for one group of shades: full-open, full-close, two programmable preset positions, and raise/lower.
 - ii Keypad shall provide an infrared receiver. Remote controls shall be able to electronically set and reconfigure shade open and close limits, shade preset points, system groups, and system subgroups through the infrared receiver at the keypad without rewiring and without access to the Electronic Drive Unit.
- f. Four-Button Keypad for Dual-Mount or Two-Group Applications
 - i Keypad will provide control for two separate groups of shades.
 - ii Keypad shall take one system address and wire as one keypad.
 - iii Keypad will provide buttons for selecting the following for each of the shade groups: full-open and full-close.
- g. Six-Button Keypad for Dual-Mount or Two-Group Applications
 - i Keypad will provide control for two separate groups of shades.
 - ii Keypad shall take one system address and wire as one keypad.
 - iii Keypad will provide buttons for selecting the following for each of the shade groups: full-open, full-close, and one programmable preset position.
- h. Five-Button Keypad with Raise/Lower
 - i Keypad will provide buttons for selecting the following for one group of shades: full-open, full-close, three programmable preset positions, and raise/lower.

B. IR TRANSMITTERS AND RECEIVERS

1. IR Receiver shall be available on system keypad, as an attachment to the Electronic Drive Unit, or on the system contact closure input board.
2. IR Receiver connected to Electronic Drive Unit
 - a. IR Receiver shall interface to the Electronic Drive Unit with no additional tools or interfaces
 - b. IR Receiver shall include circuitry to reduce degraded performance from ambient interference such as electronic ballast noise or sunlight.
 - c. White IR Receiver with white wiring.
 - d. Royal Plum IR Receiver with black wiring.
 - e. IR Receiver to have a range of up to 30 feet line-of-sight.
- f. Through use of IR extensions, the receiver may be mounted on any flat surface up to 50 feet from the Electronic Drive Unit.
3. System Remote Controls shall be of type Lutron Sivoia QED Hand-held Infrared Transmitters.
 - a. Remote Controls shall be able to electronically set and reconfigure shade open and close limits, shade preset points, system groups, and system subgroups at the control without rewiring and without access to the Electronic Drive Unit.

- b. Open/close, Infrared hand-held transmitter shall provide OPEN/CLOSE and momentary raise and lower functions with a 30-foot range.
- c. 3-preset, Infrared hand-held transmitter shall provide OPEN/CLOSE, three preset stop points and momentary raise and lower functions with a 30-foot range.
- d. Multi-function Hand-Held Infrared Transmitter shall provide both individual and group control of shades for open, close, and momentary raise/lower functionality with a 30-foot range. Control shall operate up to 4 window groupings. Control shall be able to operate both light filtering and blackout shades on the same window.
- e. Multi-function Lights and Window Treatment Hand-Held Infrared Transmitter shall provide individual control of up to 2 shades and preset lighting from the same remote. Shade operation shall allow for open, close, and momentary raise/lower functionality with a 30-foot range. Lighting functions include presets 1,2,3,4, and off.

C. INTERFACES

4. CONTACT CLOSURE INPUT FROM A/V SYSTEM

- a. Shade system shall interface to control system by others Via dry contact closure input (CCI) device
- b. CCI shall accept up to eight dry contact closure inputs providing OPEN/CLOSE, three preset stop points, STOP and momentary raise and lower shade functions.
- c. CCI inputs can be configured to accept momentary or maintained closures
- d. CCI shall have the capacity to operate as an IR receiver.
- e. CCI shall have diagnostic LED indicators to verify input contact closures have been received.
- f. CCI shall have manual override test buttons to ensure that received closures initiate the correct function.

5. INTERFACE WITH LUTRON GRAFIK EYE SYSTEM

- a. Shade system shall interface to Lutron Grafik eye lighting system to provide single system control of the natural and artificial light in the space.
- b. Interface shall provide buttons for selecting the following for one group of shades: full-open, full-closed, three programmable preset positions, and raise/lower. Pressing any button (other than Raise or Lower) while the shades are moving will stop the movement of the shades.
- c. Interface(s) shall provide an immediate local LED response upon button activation to indicate that a system command has been sent from interface. LED will remain lit contingent upon receiving system confirmation of the successful completion of the command.
- d. Interface(s) shall be capable of simultaneously controlling one or more electronic shade, up to the maximum number of shades in the system, without affecting the lighting control system.
- e. Interface(s) wallplate shall attach using no visible means of attachment.
- f. Interface(s) shall have removable button assemblies that can be replaced in the field to change colors, button configurations, and engraving.
- g. Interface(s) shall mount in standard U.S. backboxes in either single-gang or multigang installations. Interfaces shall be available in "Insert" and "No Insert" models. Manufacturer to supply appropriate wallplate based on ganging options and insert options specified.

- h. Interface(s) functions shall be configured through the lighting control system.
- i. Interface(s) shall have a backlighting option.

6. OPERATION THROUGH HOMEWORKS LIGHTING CONTROL SYSTEM

- a. Shade system shall interface to Lutron Homeworks lighting system to provide single system control of the natural and artificial light in the space.
- b. Control shall provide two-way communication between Electronic Drive Unit and Homeworks lighting control system so that system software shall display actual shade position.
- c. System groups and subgroups can be setup or changed without rewiring the system.

7. OPERATION THROUGH RADIORA LIGHTING CONTROL SYSTEM

- a. Shade system shall interface to Lutron RadioRA lighting system to provide single system control of the natural and artificial light in the space.
- b. Interface(s) will provide buttons for selecting the following for one group of shades: Fully Open, Preset 1, Preset 2, Preset 3, Fully Closed, Raise while held, and Lower while held. Pressing any button (other than Raise or Lower) while the shades are moving will stop the movement of the shades.
- c. Interface(s) shall provide an immediate local LED response upon button activation to indicate that a system command has been sent from Control. LED will remain lit contingent upon receiving system confirmation of the successful completion of the command.
- d. Interface(s) functions shall be configured through the lighting control system.

2.05 TRANSFORMERS

D. POWER PANEL

- 1. Panels shall be UL Listed Class 2 power supply
- 2. Panels shall accept 120VAC hardwired connections and provide centralized, power and communication landing terminals for up to 10 Electronic Drive Units.
- 3. Panels shall provide protection to each Electronic Drive Unit with an independent circuit breaker.
- 4. Panels shall provide diagnostic LED status indicators to indicate that power and control wiring for Electronic Drive Unit is correct and functioning.

E. J-BOX MOUNTED TRANSFORMER

- 1. Transformer shall be UL Listed
- 2. Transformer shall accept 120VAC hardwired connections and provide power for one Electronic Drive unit
- 3. Transformer Shall Provide circuit breaker for each EDU

F. PLUG IN TRANSFORMER 100VA

- 1. Transformer shall be UL Listed
- 2. Transformer shall provide line cord to connect directly to standard 120VAC grounded outlets

G. PLUG IN TRANSFORMER 50VA

- 1. Transformer shall be UL Listed
- 2. Transformer shall provide integral 3 prong connector to mount directly to a standard 120VAC outlet

PART 3. EXECUTION

3.01 EXAMINATION

- A. Refuse delivery of any damaged packaging.
- B. Ensure all parts match specified bill of materials and purchase order.

3.02 INSTALLATION

- A. Install shades in windows level and plumb to provide smooth operation.
- B. Install in accordance with manufacturer's product data and approved shop drawings
- C. Field measurement and installation shall be performed by a factory-trained technician.

3.03 FIELD QUALITY CONTROL

A. SITE TESTS / INSPECTION

1. Examine substrate and conditions for installation. Do not commence installation until conditions are satisfactory. Commencement of installation indicates acceptance of site conditions by Contractor. Notify the Design Professional upon inspection when the project conditions are unacceptable for shade installation. "Beginning of installation" means acceptance of substrate and project conditions.

3.04 ADJUSTING

- A. Adjust fabric on tube to prevent telescoping of fabric over time.

3.05 CLEANING

- A. Touch up damaged finishes and repair minor damage in order to eliminate evidence of repair. Remove and replace work that cannot be satisfactorily repaired.
- B. Clean exposed surfaces, including metal and shade fabric, using non-abrasive materials and methods recommended by the Shade Fabric Manufacturer. Remove and replace work that cannot be satisfactorily cleaned.

3.06 DEMONSTRATION

- A. Demonstrate operation method and instruct Owner's personnel in the proper operation and maintenance of the window shade systems.

3.07 SCHEDULES

END OF SECTION