SECTION 12 25 13 MOTORIZED WINDOW ROLLER SHADES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Roller shades, motorized operation and accessories.
   1. Intelligent encoded electronic drive system
   2. Motor controls, interfaces, and accessories.

B. Shade fabric.

1.2 RELATED SECTIONS

A. Section 06100 - Rough Carpentry: Wood blocking and grounds for mounting roller shades and accessories.

B. Section 09260 - Gypsum Board Assemblies: Coordination with gypsum board assemblies for installation of shade pockets, closures and related accessories.

C. Section 09510 - Acoustical Ceilings: Coordination with acoustical ceiling systems for installation of shade pockets, closures and related accessories.

D. Division 16 - Electrical: Electric service for motor controls.

1.3 REFERENCES

A. ASTM International (ASTM):
   1. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

B. Cradle to Cradle Products Innovation Institute (C2C):
   1. C2C (DIR) - C2C Certified Products Registry.

C. National Fire Protection Association (NFPA):
   1. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
   2. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.

D. Underwriters Laboratories (UL):
   1. UL (GGG) - GREENGUARD Gold Certified Products; Current Edition.
   2. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

E. Window Covering Manufacturers Association (WCMA):
   1. WCMA A100.1 - Safety of Window Covering Products; 2018.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Where motorized shades are to be controlled by control systems provided under other sections, coordinate the work with other trades to provide compatible products.

2. Coordinate the work with other trades to provide rough-in of electrical wiring as required for installation of hardwired motorized shades.

B. Preinstallation Meeting: One week prior to commencing work related to this section. Require attendance of all affected installers.

C. Sequencing:
1. Do not fabricate shades until field dimensions for each opening have been taken with finished conditions in place. "Hold to" dimensions are not acceptable.
2. Do not install shades until final surface finishes and painting are complete.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's catalog pages and data sheets for products specified including materials, finishes, dimensions, profiles, mountings, and accessories.
1. Preparation instructions and recommendations.
2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes , accessories, and operating instructions.
3. Storage and handling requirements and recommendations.
4. Mounting details and installation methods.
5. Manufacturer's Instructions: Include storage, handling, protection, examination, preparation, and installation.
6. Project Record Documents: Record actual locations of control system components and show interconnecting wiring.
7. Operation and Maintenance Data: Component list with part numbers, and operation and maintenance instructions.
8. Motorized Shades: Power requirements. Typical wiring diagrams including integration of EDU controllers with building management system, audiovisual and lighting control systems as applicable.

C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.
1. Prepare shop drawings on AutoCad or MicroStation format using base sheets provided electronically by the Architect.
2. Prepare control wiring diagrams based on zones, switching and operational requirements provided by the Architect in electronic format.
3. Include one-line diagrams, wire counts, coverage patterns, and physical dimensions of each item.
4. Provide location plan showing all switch and control zones as per the performance requirements of the specifications. All switches, sensors and other control accessories must clearly be shown and called out in a bill of materials.

A. Shade Automation Schedule: For all shade control zones, provide a detailed schedule of all shade movements throughout the year for a theoretical clear sky. This schedule shall clearly show the time of date, time of day and shade position.

B. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

C. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements.
5. Shadecloth Sample: Mark face of material to indicate interior faces.

a. Test reports indicating compliance with specified fabric properties.
b. Verification Samples: 6 inches (150 mm) square, representing actual materials, color and pattern.

D. Maintenance Data: Bill of materials for all components with part numbers. Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

E. Warranty: Manufacturer's warranty documents as specified in this Section.

D. Maintenance contracts.

1.6 QUALITY ASSURANCE

A. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

B. Manufacturer Qualifications: Obtain roller shades system through one source from a single manufacturer with a minimum of ten years experience and minimum of five projects of similar scope and size in manufacturing products comparable to those specified in this section.

C. Installer for Roller Shade System - Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.
1. Requirements for Roller Shade Installer/Contractor:
a. Roller Shade Hardware, shade fabric, motor, and all related controls shall be furnished and installed as a complete two-way communicating system and assembly.
b. Roller Shade Installer/Contractor shall list all components and systems included in their bid, including but not limited to, the prime manufacturer of the motor control and automated equipment and shall be financially responsible for any change orders and/or back charges required by the BMS, AV, or Lighting Control Systems contractors to interface with the automatic solar tracking system and the motorized roller shade system.

D. Product Listing Organization Qualifications: Organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

E. Fire-Test-Response Characteristics: Passes NFPA 701 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

F. Electrical Components: NFPA Article 100 listed and labeled by either UL or ETL or other testing agency acceptable to authorities having jurisdiction, marked for intended use, and tested as a system. Individual testing of components will not be acceptable in lieu of system testing.

G. Requirements for Electronic Hardware, Controls, and Switches: Roller shade hardware, shade fabric, EDU, and all related controls shall be furnished and installed as a complete two-way communicating system and assembly.

H. ShadeCloth Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC9644, ATCC9645.

I. Environmental Certification: Submit written certification from the manufacturer, including third party evaluation, recycling characteristics, and perpetual use certification as specified. Initial submittals, which do not include the Environmental Certification will be rejected. Materials that are simply 'PVC free' without identifying their inputs shall not qualify as meeting the intent of this specification and shall be rejected.

J. Third Party Evaluation: Provide documentation stating the shade cloth has undergone third party evaluation for all chemical inputs, down to a scale of 100 parts per million, that have been evaluated for human and environmental safety. Identify any and all inputs, which are known to be carcinogenic, mutagenic, teratogenic, reproductively toxic, or endocrine disrupting. Also identify items that are toxic to aquatic systems, contain heavy metals, or organohalogens. The material shall contain no inputs that are known problems to human or environmental health per the above major criteria, except for an input that is required to meet local fire codes.

K. Recycling Characteristics: Provide documentation that the shade cloth can, and is part of a closed loop of perpetual use and not be required to be down cycled, incinerated or otherwise thrown away. Scrap material can be sent back to the mill for reprocessing and recycling into the same quality yarn and woven into new material, without down cycling. Certify that this process is currently underway and will be utilized for this project.

L. Perpetual Use Certification: Certify that at the end of the useful life of the shade cloth, that the material can be sent back to the manufacturer for recapture as part of a closed loop of perpetual use and that the material can and will be reconstituted into new yarn, for weaving into new shade cloth. Provide information on each shade band indicating that the shade band can be sent back to the manufacturer for this purpose.

M. Turn-Key Single-Source Responsibility for Wiring Motorized Interior Roller Shades: To control the responsibility for performance of motorized roller shade systems, assign the design, engineering, and installation of motorized roller shade systems, motors, controls, and low voltage electrical control wiring specified in this Section to a single manufacturer and their authorized installer/dealer. The Architect will not produce a set of electrical drawings for the installation of control wiring for the motors, or motor controllers of the motorized roller shades. Power wiring (line voltage), shall be provided by the roller shade installer/dealer, in accordance with the requirements provided by the manufacturer. Coordinate the following with the roller shade installer/dealer:
    1. Contractor shall provide power panels and circuits of sufficient size to accommodate roller shade manufacturer's requirements, as indicated on the mechanical and electrical drawings.
    2. Contractor shall coordinate with requirements of roller shade installer/dealer, before inaccessible areas are constructed.
    3. Roller shade installer/dealer shall run line voltage as dedicated home runs (of sufficient quantity, in sufficient capacity as required) terminating in junction boxes in locations designated by roller shade dealer.
    4. Roller shade installer/dealer shall provide and run all line voltage (from the terminating points) to the motor controllers, wire all roller shade motors to the motor controllers, and provide and run low voltage control wiring from motor controllers to switch/ control locations designated by the Architect. All above-ceiling and concealed wiring shall be plenum-rated, or installed in conduit, as required by the electrical code having jurisdiction.

5. Contractor shall provide conduit with pull wire in all areas, which might not be accessible to roller shade contractor due to building design, equipment location or schedule.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in Window Treatment Schedule.

B. Store and handle products per manufacturer's recommendations.

1.8 PROJECT CONDITIONS

Power and control wiring shall be complete and certified, fully operational with uninterrupted communication on the lines and minimal noise certified by a commissioning agent specified in other sections.

1. 485, ICON, Lonmark and Dry Contract Network: Noise on the line not to exceed shade manufacturer's limits.

1.9 WARRANTY

A. Roller Shade Hardware and Chain Warranty: Manufacturer's standard non-depreciating warranty for interior shading.
   1. Shade Hardware: 10 years unless otherwise indicated.
      a. Mecho/5 with ThermoVeil, EuroVeil, EuroTwill, Soho, Equinox, Midnite, Chelsea, or Classic Blackout shade fabric: 25 years.
      b. ElectroShade with ThermoVeil, EuroVeil, EuroTwill, Soho, Equinox, Midnite, Chelsea, or Classic Blackout shade fabric: 25 years.
      c. Magnashade with ThermoVeil, EuroVeil, EuroTwill, Soho, Equinox, Midnite, Chelsea, or Classic Blackout shade fabric: 25 years.
   2. Standard Shadecloth: Manufacturer's standard twenty-five year warranty.
   3. Ecoveil Shadecloth: Manufacturer's standard ten year warranty.
   4. Roller Shade Motors, Motor Control Systems, and Accessories: Manufacturer's standard non-depreciating five year warranty.
   5. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas, which are deemed owners responsibility.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Mecho, which is located at: 42-03 35th St.; Long Island City, NY 11101; ASD Tel: 718-729-2020; Fax: 718-729-2941; Email: marketing@mechoshade.com; Web: www.mechoshade.com.

B. Requests for substitutions will be considered in accordance with provisions of Section 01 25 00.

2.2 ROLLER SHADES, MOTORIZED OPERATION AND ACCESSORIES

A. Shade System; General:
   1. Motorized Shades: Comply with NFPA 70.

2. Components capable of being removed or adjusted without removing mounted shade brackets or cassette support channel
3. Operates smoothly when raising or lowering shades.
4. Cradle-to-Cradle certified and listed in C2C (DIR).
5. Electrical Components: Listed, classified, and labeled as suitable for intended purpose. Test as total system. Individual component testing is acceptable.
    a. Components: FCC compliant where aplicable.

B. Basis of Design: MagnaShade. As manufactured by MechoShade Systems LLC. Single Roller, motor operated fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and accessories.
1. WhisperShade IQ2 EDU, line voltage (120 VAC)
2. RTS wireless controls.
3. Feature Requirements:
    a. Hardware: Allows removal and remounting of shade motor without removing shade roller tube or drive from cassette support channel.
    b. Shade Hardware System: Allow the following features.
        1) Field adjustment of EDU or replacement of operable hardware components without removal of installed cassette support channel.
        2) Allow access below motor head for setting or adjusting limits without disassembling the installed system.
        3) Factory assemble components to greatest extent possible.
1. Drop Position: Per details.
2. Mounting: Per details
3. Size: As indicated on drawings.
4. Fabric: As indicated under Shade Fabric article.
5. Mounting Hardware:
    a. Cassette Support Channel: Continuous channel attached to structure at manufacturer's recommended spacing; with bottom closure panel and end caps.
    b. Roller Shade Cradle: Prefabricated extruded aluminum cradle. Clips into cassette support channel. Fully supports shade assembly. Low friction and wear-free surface.
    c. Floating Hardware System: Manufacturer supplied device. Attaches to motor mounting plate and roller tube allowing tube to move horizontally and vertically as roll up diameter of shade system increases or decreases during operation. Floating design ensures roller tube is straight, with no deflection.
6. Roller Tubes:
    a. Size: 2-1/2 inch (63.5 mm) maximum diameter. Selected for suitability of installation conditions, span, and weight of shades.
    b. Fabric Attachment: Manufacturer's method for securing shade fabric to roller tube.
7. Hembars: Maintain bottom of shade straight and flat.
    a. Style: Exposed aluminum bottom bar with matching finials.
        1) Color: Manufacturer's standard coordinated with shade fabric selected.
8. MagnaShade, as specified.
9. Accessories:
    a. Fascia: Removable extruded aluminum. Size as required to conceal shade mounting. Attach to cassette support channel without exposed fasteners.
        1) Finish: Baked enamel.
            a) Color: as selected from full range

2.3 INTELLIGENT ENCODED ELECTRONIC DRIVE SYSTEM

A. Electronic Drive Unit (EDU) System General Requirements:
   1. A UL 325 listed solution.
      a. Component certification in lieu of system testing is not acceptable.
   2. Listing Label and Motor Rating: To be visible for inspection without dismounting of shade assembly to remove motor or EDU from shade roller tube.
   3. Size and Configuration: As recommended by manufacturer for type, size, and arrangement of shades.
   4. Conceal EDU inside shade roller tube.
   5. EDU Rated Speed: The same nominal speed for shades in the same room.
   6. Hanging Weight of Shade Band: 80 percent of rated lifting capacity of shade EDU and tube assembly.
   7. Capable of upgrading firmware from anywhere on network without touching the motor.

B. Line Voltage EDU (120 VAC):
   1. Basis of Design: MechoShade Systems LLC; WhisperShadeIQ2 System. Tubular, asynchronous, integral AC motor and reversible capacitor. 120 VAC, single phase, 60 Hz; temperature Class B, thermally-protected, totally enclosed, maintenance-free. Powered by line voltage power supply connection equipped with locking disconnect plug assembly furnished with EDU.
   2. Audible Noise: 46 dBA measured 3 ft (914 mm) from motor unit, depending on motor torque.
   3. Nominal Speed: 34 RPM. Not to vary due to load/lift capacity.
   4. Isolated, low voltage power supply for powering external accessories connected to either the dry contact or network port.
      a. Products requiring accessories to be powered by a plug-in or externally-supplied power supply are not acceptable.

C. Low Voltage EDU (24 VDC):
   1. Basis of Design: MechoShade Systems LLC; WhisperShade IQ2-DC System. Tubular, asynchronous, integral DC motor. 24 VDC; temperature Class B, thermally-protected, totally enclosed, maintenance-free. Powered by low voltage power supply connection equipped with disconnect plug assembly furnished with EDU.
   2. Audible Noise: 38 dBA measured 3 ft (914 mm) from motor unit, depending on motor torque.
   3. Nominal Speed: 10 to 28 RPM. Configurable. Speed managed such that it does not vary due to load/lift capacity.
   4. Low voltage power supply for powering external accessories connected to either the dry contact or network port.
      a. Products that require accessories to be powered by a plug-in or externally-supplied power supply are not acceptable.
   5. Override Mode: Place motor into Override Mode when local switch commands shade to new position.
      a. Local switch command sources:
         1) Keypad connected to EDU dry contact inputs.
         2) Third-party system connected to EDU dry contact inputs.
         3) Network keypad or other device that serially communicates with EDU and configured to issue override commands as if it were a local switch connected to EDU dry contact inputs.
      b. Entering Override Mode: Monitor and log positioning commands from automation devices. Do not act until exiting Override Mode.

c. Return from Override Mode: Position shade to last commanded position in log.
d. Automated Return from Override Mode:
1) Override Return Timer: When Override Mode is entered by changing shade position with local switch as described above, Enable override return timer to make these changes temporary such that automation can regain control of shade after configurable time duration (default of 60 minutes).
2) Pocket temperature sensor integral to EDU to track pocket temperature.
a) When shade is in Override Mode and Heat Gain Sensing is Enabled: Sensor determines when direct sunlight and associated solar heat gain has left the window.
1) When this condition occurs, after the shade has been overridden to cover the window, EDU to return from Override Mode if Override Return Timer has not done so already in order for automation controllers to once again optimize shade position for exposure to daylight.

6. Preventative Maintenance:
a. Internally monitor important operating parameters to ensure motor and its shade assembly are functioning properly.
b. Performance Degradation: Provide visual indication via feedback LED and communicate warnings on repetitive basis through its serial port.
c. Warning Conditions: Logged and queryable. Allow sending of multiple warnings until condition is acknowledged.
d. Stop shade rotation for parameters of critical concern until reset by trained technician after being serviced.
e. Devices capable of receiving warnings include SolarTrac automated solar-evaluation control system.
f. Tracked Parameters to include:
1) Operating life (cycles, hours).
2) Pocket temperature.
3) Internal motor temperature.
4) Vibration.
5) Stall.
6) Power reset.
7) Maintenance Mode.
8) Speed regulation.
9) Position targeting.
10) Movement without command.
11) One Bus availability.
g. Detectable Potential Warning Conditions to Include:
1) Assembly vibration/bearing wear warning.
2) Tube/shade assembly drop.
3) Fabric hung-up/telescoping.
4) Motor mount warning.
5) Lifecycle replacement warning.
6) Brake/limit failure.
7) Network warning.
8) Motor internal temperature warning.
9) Pocket temperature warning.

D. Modes of Operation:

1. Uniform Mode: Shades move to defined intermediate stop positions in order to maintain aesthetic uniformity.
2. Normal Mode: Shades move to defined intermediate stop positions and any position between defined upper and lower limits.
3. Maintenance Mode: Prevents shade from moving via dry contact or network control commands mode has been cleared/disabled.

E. Control Methods: Local isolated dry contact input and network control.
   1. Local Isolated Dry Contact Inputs:
      a. Local switch control, third party system integration without separate interface.
      b. Moving EDU/shade to upper and lower limits and local switch preset positions.
      c. Configuration of upper and lower limits, custom presets, and key modes of operation without a PC or microprocessor-based tools.
      d. Configuration under protected sequences to prevent changes by casual user.
      e. Switch Personalities: Configuration of dry contact control port over network such that any type of dry contact keypad/third-party interface and actuation methodology (maintained and/or momentary actuation) can be used to operate shade.
      f. Dry Contact Control Connection Options to Include:
         1) One-button.
         2) Two-button.
         3) Three-button. Able to support configuring limits, presets, and key operating modes (default).
         4) Three-button. No configuration capability to prevent accidental changes in settings.
   2. Network Control:
      a. Bi-directional network communication to enable commanding operation of large groups of shades over a common backbone.
      b. Each EDU:
         1) Support eight network addresses capable of being employed for various levels of group control.
         2) Dry Contact Ports: Assigned its own local switch address which can be matched by other EDUs within eight network addresses in order to support group control when dry contact commands are received.
            a) The EDU receiving dry contact commands may or may not be configured to operate based on commands coming through its own dry contact input port.
         3) To have an independent unique identifier address (UID) enabling EDU to be independently controlled and configured over network via handheld configurator and/or PC controller.
      c. Network Communication Card: Integral with tubular EDU assembly.
      d. Support configuration of upper and lower limits using either a handheld removable program module/configurator or a local switch.
      e. Support configuration of addresses using a handheld removable program module/configurator.

F. Alignment Positions:
   1. Repeatable and precisely aligned shade positions and limits.
      a. Support positioning commands from 0 to 100 percent in 1 percent increments.
      b. Customizable Presets: 32.
      c. Include three intermediate dry contact presets

2. Shades on same switch circuit or same network group address with same opening height, to align at each intermediate stopping position when traveling from any position, up or down.
3. Shades of differing heights: Capable of custom, aligned intermediate stop positions when traveling from any position, up or down.
4. Alignment of shade bands mechanically aligned on same EDU: Plus or minus 0.125 inch (3 mm).
5. Alignment of standard shades on adjacent EDUs: Plus or minus 0.25 inch (6 mm) when commanded to same alignment position.

G. Local Switch Presets:
1. Minimum of three customizable preset positions accessible over the local dry contact control inputs and over the network connection.
2. Preset positions: Customizable to any position between and including defined upper and lower limits (initially defaults to 25, 50, and 75 percent of shade travel).
3. Configuration of Custom Preset Positions: A handheld removable program module/configurator or a local switch.

H. Network Presets:
1. Minimum of 32 customizable preset positions (including the three local switch presets) accessible via network commands.
2. Preset positions: Customizable to any position between and including defined upper and lower limits (initially defaults to defined lower limit).
3. Configuration of Custom Preset Positions: A handheld removable program module/configurator or a local switch.

2.4 MOTOR CONTROLS, INTERFACES, AND ACCESSORIES

A. Unless indicated to be excluded, provide required equipment as necessary for a complete operating system providing the control intent specified. Provide components and connections necessary to interface with other systems as indicated.

B. Digital Network Controls:
1. Basis of Design: MechoShade Systems LLC; MechoNet. Low-voltage network utilizes standard Category 5/6 UTP cable; maximum of 4,000 feet (1,219 m), 250 nodes.
2. Reprogram control without requiring wiring modifications.
3. Ten-year non-volatile power failure memory for system configuration settings.
4. Network Interface Components:
a. MechoNet Network Interface; MNI Series: Four configurable motor/EDU ports (models available for RJ45 or terminal block wiring); four configurable switch ports; one infrared (IR) remote control port; one configurable serial port for RS232/RS485 communication.
b. IQ2 Dual Splitter: Two motor/EDU ports; two switch ports.
c. IQ/MLC2 Motor Group Controller: Four ports for line-voltage standard (non-intelligent) motors (120 or 230 VAC; 600 W, 1/4 HP maximum).
d. IQ Gateway; one for each floor where controlling across multiple floors.

OR

C. Low-Voltage Wall Controls; IQ Switch:
1. Momentary dry contact switch enables manual local control or network control of any individual shade motor or shade group/sub-group on MechoNet network.
2. Control Functions:

a. Open: Automatically open controlled shades to fully open position when button is pressed.
b. Close: Automatically close controlled shades to fully closed position when button is pressed.
c. Presets: For selection of predetermined shade positions.
d. Dual Stations: For individual control of two shades/groups.

3. Finish: White.
4. Single Station: 5-button (open, close, and three intermediate stop positions).

OR

D. Wireless Controls:
1. MechoNet Wireless Controllers:
a. Serves as gateway, router, and controller between EnOcean wireless devices and MechoNet network.
b. Communicates with EnOcean wireless devices via 902 MHz RF. Supports wireless daylight sensors, occupancy/vacancy sensors, and switches.
c. Controller to manage up to 16 EnOcean wireless devices.
d. Controller to be configurable to one of two modes of operation:
1) SolarTrac Mode: Relays EnOcean wireless sensor and control information to SolarTrac automatic solar-evaluation control system.
2) Solar Activated Control Mode: Utilizes EnOcean wireless sensor and control information for internal automation algorithms to adjust shade positions.
a) Adjusts shade positions based daylight sensors input optimizing visual comfort. Enables five shade positions; full-up, full-down, and three configurable intermediate preset stop positions. Default of three positions; full-up, full-down, and preset number two.
b) Configurable daylight thresholds for shade positions. Includes configurable hysteresis setting, default of 20 percent, preventing frequent cycling of shades during fluctuating daylight conditions.
c) Configurable delay timers inhibit shade position changes due to short duration changes in daylight conditions. Default of 300 seconds delay for up, 60 seconds delay for down.
d) Night Mode: Configurable night time shade position to support light pollution, privacy, and/or energy conservation requirements. Configurable daylight threshold. Default of 18.6 footcandles (200 lux), Duration: Default of 60 minutes to enter night mode, 30 minutes to exit night mode.
e) Occupancy/Vacancy: Where wireless occupancy/vacancy sensors are specified, enables configurable unoccupied/vacant mode shade position (default of full-down) to optimize energy conservation. Configurable timers for detection of unoccupied and occupied states.
f) Manual Override: Where local switches are specified. Enables manual temporary override of shade positions for configurable duration. Default of 60 minutes.
g) Retract Mode: Manages changes to light level based on shade position for comfort and increasing exposure of occupant to daylight. Shades move up in stepped one-position increments as daylight levels drop. Each step is maintained for one minute while

controller retests daylight conditions before authorizing the next step until target is reached.

e. Capable of being powered by a dedicated low-voltage power supply or through certain MechoNet devices without additional power supplies.
f. Multiple sensors to be configurable to automate the same shade control zone in order to ensure operation based on worst case comfort conditions across the zone.
g. Sensors to be configuralbe to automate multiple shade control zones.
h. Maintain a circular log of previous 48 hours of data received from each of 16 possible wireless devices. Data to be capable of being downloaded and stored for record keeping, performance optimization, or troubleshooting purposes.

2. Wireless Daylight Sensors:
   a. Monitors daylight through curtainwall and communicates with MechoNet Wireless Controller. Adjusts shade position based on user-defined light thresholds.
   b. Powered by integral photovoltaic cells. No batteries or external power supplies.
   c. Data Transmission:
      1) Provide the following data with each message:
         a) Charge level.
         b) Illuminance: 0 to 6,100 footcandles (0 to 65,656 lux). Plus or minus 5 percent accuracy.
      2) Transmit message when daylight level changes by three percent.
      3) Transmit "heartbeat" message once per minute during daylight and once per hour at night for determining when maintenance/support is required.
   d. Mountable horizontally, vertically, and upside-down on mullion without screws.
3. Wireless Occupancy Sensors:
   a. Monitor room/area occupancy. Communicate with MechoNet Wireless Controller optimizing shade positions.
   b. Solar-powered with battery backup.
   c. Passive infrared (PIR) sensing.
   d. Ceiling-mounted with 360 degree angle of detection optimized for ceiling height between 8 and 10 feet (2.4 and 3.0 m).
4. Wireless Switches:
   a. Communicates with MechoNet Wireless Controller. Adjusts shade positions based on switch operation.
   b. Enables manual local control or network control of any individual shade motor or shade group/sub-group on MechoNet network.
   c. Self-powered via rocker switch operation.
   d. Finish: White.

2.5 ROLLER SHADE FABRICATION

A. Field measure finished openings prior to ordering or fabrication.

B. Dimensional Tolerances: Fabricate shades to fit openings within specified tolerances.
   1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch (13 mm) [_____] space between bottom bar and window stool [finished floor] [window stool] [_____].
   2. Horizontal Dimensions: Inside Mounting.
      a. Fill openings from jamb to jamb.
      b. Symmetrical Light Gaps on Both Sides of Shade: 3/4 inch (19.05 mm) total.

C. Openings Requiring Continuous Multiple Shade Units with Separate Rollers: Locate roller joints at window mullion centers; butt rollers end-to-end.

2.6 SHADE FABRIC

A. Basis of Design: Shade fabric as manufactured by MechoShade Systems LLC.
   1. Solar Shadecloths:
      a. Color: Selected from manufacturer's standard colors.
      b.
   2. Blackout Shadecloths:
      a. Color: Selected from manufacturer's standard colors.
   3. Fabric Properties: Non-flammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
      a. Shade Type: Light filtering shades.
      b. Shade Type: Room darkening shades.
   4. Material Certificates and Product Disclosures:
      a. Low-Emitting Material Certification: Greenguard Gold certified and listed in UL (GGG).
   5. Roll Width (in/mm): field measure
   6. Color: As selected by Architect from manufacturer’s full range of colors.
   7. Welded Zipper Edge: Full height on both sides of fabric ensuring smooth operation within ShadeLoc channels.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Start of installation shall be considered acceptance of substrates.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.

C. Coordinate with window installation and placement of concealed blocking to support shades.

3.3 INSTALLATION

A. Install shades level, plumb, square, and true per manufacturer's instructions and approved shop drawings. Locate so shade band is at least 2 inches (51 mm) from interior face of glass. Allow proper clearances for window operation hardware. Use mounting devices as indicated.

B. Replace shades exceeding specified tolerances at no extra cost to Owner.

C. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range. Adjust level, projection, and shade centering from mounting bracket. Verify there is no telescoping of shade fabric.

D. Clean roller shade surfaces after installation, per manufacturer's written instructions.

E. Demonstrate operation and maintenance of window shade system to Owner's personnel.

F. Manufacturer's authorized personnel are to train Owner's personnel on operation and maintenance of system.
   1. Use operation and maintenance manual as a reference, supplemented with additional training materials as required.

3.4 SYSTEM STARTUP

A. Motorized Shade System: Provide services of a manufacturer's authorized representative to perform system startup.

B. Turn-Key Single-Source Responsibility for Motorized Interior Roller Shades: Design, engineering, and installation of motorized roller shade systems, motors, controls, and low voltage electrical control wiring specified is to be performed by a single manufacturer and their authorized installer/dealer.
   1. The Architect will not provide a set of electrical drawings for installation of control wiring for motors, or motor controllers of motorized roller shades.
   2. Power wiring (line voltage), to be provided by roller shade installer/dealer, per requirements provided by manufacturer. Coordinate following with roller shade installer/dealer:
   3. Contractor To Provide the Following:
      a. Power Panels and Circuits: Size to accommodate roller shade manufacturer's requirements, as indicated on mechanical and electrical drawings.
      b. Coordinate with requirements of roller shade installer/dealer, before inaccessible areas are constructed.
      c. Line voltage as dedicated home runs, of sufficient quantity, and capacity as required. Terminate in junction boxes at locations designated by roller shade installer/dealer.
      d. Run line voltage from terminating points to motor controllers. Wire roller shade motors to motor controllers. Run low voltage control wiring from motor controllers to switch/control locations designated by Architect.
         1) Above-ceiling and concealed wiring to be plenum-rated, or in conduit, as required by the electrical code having jurisdiction.
      e. Use conduit with pull wire in areas, not accessible to roller shade contractor due to building design, equipment location or schedule.

3.5 PROTECTION AND CLEANING

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.
   1. Clean soiled shades and exposed components as recommended by manufacturer.
   2. Replace shades that cannot be cleaned to "like new" condition.

3.6 MAINTENANCE

A. Provide Owner a proposal as an alternate to the base bid and at no extra cost, a separate renewable maintenance contract for service and maintenance of motorized shade system.
   1. Include a complete description of preventive maintenance, systematic examination, adjustment, parts and labor, cleaning, and testing, with a detailed schedule.
      a. Contract Duration: Two year from date of Substantial Completion.

END OF SECTION 12496

CONTENTS

DIVISION 21 - FIRE SUPPRESSION
DIVISION 22 - PLUMBING
DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)