

SECTION 122413

ROLLER WINDOW SHADES

CSI 3-PART GUIDE SPECIFICATION: EDIT TO SUIT PROJECT

PART 1 - GENERAL

1.1 SUMMARY

- A. Work of this Section includes manually and electrically operated, roll-up fabric opaque window shades including motor operator, controls, mounting hardware, low-voltage wiring, and other accessories to fit:

NOTE: Edit the following list to suit the project.

1. Windows
2. Curtainwall
3. Sidelights
4. Transoms
5. Glazed Doors
6. Skylights

- B. Provide roller window shades at exterior glazing, EXCEPT do not shade glazing located in the following areas:

NOTE: Edit the following list to suit the project.

1. Stairwells
2. Lobbies / Foyers
3. Vestibules
4. Bathrooms / Toilets
5. Curtainwall spandrel panels

- C. Related Documents and Sections: Examine Contract Documents for requirements that directly affect or are affected by Work of this Section. A list of those Documents and Sections include, but is not limited to the following:

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and DIVISION 01 General Requirements, Specification Sections, apply to this Section.
2. SECTION 061000, ROUGH CARPENTRY: Wood blocking for support of window shade brackets and pocket assemblies.

NOTE: Edit the following to suit the project.

NOTE: Coordinate references and scope between the related sections.

3. SECTION 111320, MOTORIZED PROJECTION SCREENS: Motorized projection screens to be interfaced with shade controls.
4. SECTION 111360, MOTORIZED PROJECTOR LIFTS: Motorized projector lifts and mounts to be interfaced with shade controls.
5. DIVISION 26, ELECTRICAL: Panel boxes, power, junction boxes, quick disconnect plug, outlets, and conduit.
6. DIVISION 27, COMMUNICATIONS: Control cabling.

1.2 REFERENCES

- A. Abbreviations and Acronyms per SECTION 011000, SECTION 014000, and as follows:

1. AHJ. Authority Having Jurisdiction from local, state and federal regulatory agencies.
2. GC. General Contractor.
3. Per. In accordance with.

B. Definitions per SECTION 011000, SECTION 014000, and as follows:

1. Light Transmittance. The fraction of radiant energy or incident light at a specified wavelength that passes through a material.
2. Shading Coefficient. Percentage of solar heat gain.
3. Torque is the rotary force within a mechanism and the product of a force and its perpendicular distance from a point about which it causes rotation or torsion. Torque = Load x Radius
4. Visual Opacity. The degree to which a material is transparent, allowing images or views behind to visually show through.

C. Referenced Standards per SECTION 014000 and as follows:

NOTE: Delete general references below that are noted in Section 014000.

1. AAMA. American Architectural Manufacturers Association; [www.aamanet.org](http://www.aamanet.org)
2. ANSI. American National Standards Institute; [www.ansi.org](http://www.ansi.org)
  - a. ANSI / WCMA A100.1
3. ASTM. ASTM International; [www.astm.org](http://www.astm.org)
  - a. ASTM A228: Standard Specification for Steel Wire, Music Spring Quality.
  - b. ASTM A666: Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
  - c. ASTM A1008: Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
  - d. ASTM A1010: Standard Specification for Higher-Strength Martensitic Stainless Steel Plate, Sheet and Strip.
  - e. ASTM D5034: Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)
  - f. ASTM D5035: Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method)
  - g. ASTM G21: Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
4. ATCC. American Type Culture Collection; [www.atcc.org](http://www.atcc.org)
5. CFR. Code of Federal Regulations; <http://www.gpoaccess.gov/CFR/INDEX.HTML>
6. NFPA. National Fire Protection Association; [www.nfpa.org](http://www.nfpa.org)
  - a. NFPA 701: Fire Tests for Flame-Resistant Textiles and Films
7. USGBC. United States Green Building Council; [www.usgbc.org](http://www.usgbc.org)
8. ISO/IEC. International Organization for Standardization, International Electrotechnical Commission; [www.iec.ch/](http://www.iec.ch/)
  - a. ISO 9001
9. USGBC. United States Green Building Council; [www.usgbc.org](http://www.usgbc.org)

1.3 ADMINISTRATIVE REQUIREMENTS

NOTE: Coordinate and edit to the correct Section number below.

A. Coordination per SECTION 013000 or 013100, and as follows:

1. SECTION 061000, ROUGH CARPENTRY

NOTE: Delete the following if all shades are manual only.

2. SECTION 019100, COMMISSIONING: Building energy management system.

3. DIVISION 26, ELECTRICAL
4. DIVISION 27, COMMUNICATIONS

NOTE: Coordinate and edit to the correct Section number below.

- B. Preinstallation Meetings per SECTION 013000 or 013100 and as follows: Review site conditions, installation requirements, schedules, coordination with other work, and warranty requirements.

NOTE: Coordinate and edit to the correct Section number below.

- C. Scheduling: Per SECTION 010000 or 011100, and SECTION 013000 or 013200, and as follows:
1. GC shall provide job elevator, lift, and scaffold access during construction up to Final Completion.

#### 1.4 SUBMITTALS

NOTE: Coordinate and edit to the correct Section number below.

- A. Submit per SECTION 013000, or SECTION 013300, and as noted.
- B. Product Data: List of proposed products and manufacturer's printed information including:
1. Preparation instructions and recommendations
  2. Storage and handling requirements and recommendations
  3. Installation and maintenance instructions
  4. Fabric solar and optical performance
  5. Typical blocking detail requirements

NOTE: Delete the following if all shades are manual only.

6. Panel, power, wiring, cabling, j-box, outlet, and conduit requirements

NOTE: Edit the following if all shades are manual only.

- C. Shop Drawings: Submit indicating window rough openings, sill, jamb & head-frame section, details, shade type, location, dimensions, clearance requirements, attachment method, blocking requirements, and motor system housing.
1. Field Measurements: Verify actual measurements for openings prior to fabrication, and after finish work is complete including window, window frame, trim installation.
    - a. Coordinate field measuring just prior to finish painting.
    - b. Indicate verified field measurements on Shop Drawings or Schedule.
  2. Window Shade Schedule: Submit shade schedule coordinated with room numbers and window types, containing field verified window interior rough opening dimensions, shade type, controls, quantities, fabric, and color.
  3. Wiring Diagrams: Electrical and control systems including wiring, cabling, conduit, motors, and connections.
- D. Samples: Submit minimum 3 x 5 inch (76mm x 127mm) fabrics and metal finishes for initial and final selections by Architect.
1. Submit finish choices for each system component exposed to view including, but not limited to, wall switches, hand controls, fascias, shade pockets, side channels.
- E. Quality Assurance Submittals per SECTION 014000, and as follows:

1. Certificates: Submit a certificate with manufacturer's signature certifying that each product and/or system meets the requirements of the performance characteristics, physical criteria, and applicable standards specified.
  - a. Lead-free fabric products

NOTE: Delete the following if all shades are manual only.

- b. Motorized systems UL or ETL rated.
2. Qualification Statements: Submit a letter, on printed letterhead and signed by an officer of the firm, for each listed quality assurance qualification listed, attesting to meeting each requirement called out.

NOTE: Edit LEED Requirements below to suit project.

F. Sustainable Design (LEED) Submittals: Submit the following in accordance with the requirements of SECTION 018113, and as follows:

1. LEED Credit EA, Energy & Atmosphere. Submit completed LEED-NC 2.2 Submittal Templates and required paperwork as follows:
  - a. EA Prerequisite 1: Fundamental Commissioning of the Building Energy Systems (Lighting and daylighting controls; energy systems)
  - b. EA 1: Optimize Energy Performance (Building energy management system tied to operable shades)
  - c. EA 5: Measurement & Verification (Building energy management system tied to operable shades)

NOTE: Delete item MR 5.1 and 5.2 below if project site is not within 500 miles of fabrication plant.

2. LEED Credit MR, Materials & Resources. Submit completed LEED-NC 2.2 Submittal Templates in accordance with SECTION 017419, CONSTRUCTION WASTE MANAGEMENT, and other required paperwork as follows:

NOTE: Select MR 5.1 or MR 5.2 or delete both.

- a. MR 5.1: Regional Materials, Regionally Extracted, Processed & Manufactured Products, 10 Percent
  - b. MR 5.2: Regional Materials, Regionally Extracted, Processed & Manufactured Products, 20 Percent
    - 1). Submit product data indicating name of the manufacturer, product cost, distance between the project site and the manufacturer, and the distance between the project site and the extraction site for each raw material
3. LEED Credit EQ, Indoor Environmental Quality. Submit completed LEED-NC 2.2 Submittal Templates and required paperwork as follows:
  - a. EQ 6.1: Controllability of Systems. Lighting controls
    - 1). Submit proof of shading devices.
  - b. EQ 6.2: Controllability of Systems: Thermal Comfort
    - 1). Submit proof of building energy management system tied to operable shades.
  - c. EQ 8.1, Daylight and Views: Submit proof of daylight redirection and/or glare control devices; exterior and interior permanent shading devices; automatic photocell-based controls.)
  - d. EQ 8.2, Daylight and Views: Submit proof of interior shading devices, automatic photocell-based controls.

## 1.5 CLOSEOUT SUBMITTALS

NOTE: Coordinate and edit to the correct Section number below.

A. Closeout Submittals per SECTION 017000 or 017800, and as follows:

1. Operation & Maintenance Manuals
2. Executed Warranty Documentation.
3. Record Documents

NOTE: Edit LEED Requirements below to suit project.

4. Sustainable Design Closeout Documentation including completed USGBC LEED® Templates for the following credits:
  - a. EA Prerequisite 1, EA Credit 1, EA Credit 5

NOTE: Select MR 5.1 or MR 5.2 or delete both.

- b. MR 5.1, MR 5.2
- c. EQ 6.1, EQ 6.2, EQ 8.1, EQ 8.2

B. Maintenance Material Submittals

1. Spare Parts: Submit no less than one (1) percent additional clutches, brackets, motors, remotes, controls and other furnished items, plus two (2) percent additional for each fabric band type on prepared tubes, with each item wrapped and labeled.

1.6 QUALITY ASSURANCE

NOTE: Coordinate and edit to the correct Section number below.

A. Qualifications per 014000 or 014300 and as follows:

1. Manufacturer Qualifications: Firms experienced a minimum ten (10) years in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance.
2. Fabricator / Installer Qualifications: A firm certified by manufacturer and experienced a minimum two (2) years in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
  - a. Installation shall be performed with skilled, experienced and trained workmen supervised by trained personnel who shall have a minimum two (2) years successful experience in installations of similar size and scope.
  - b. Fabricator shall be a subsidiary or licensed agent of the manufacturer approved to supply products specified and honor claims against product presented in accordance with warranty.
3. Testing Agency: An independent testing agency with the experience and capability to conduct the testing indicated, meeting requirements of ISO/IEC (International Organization for Standardization / International Electrotechnical Commission) Standard 17025 or ASTM E699 and ASTM E329.

B. Certifications: Provide textile mill qualifications indicating shade cloths are manufactured by a company with one of the following current certifications:

NOTE: Edit to suit project. Delete if not used.

1. ISO-9001

NOTE: Coordinate and edit to the correct Section number below.

C. Field Samples per SECTION 014000 or 014300, and as follows: Provide field samples of each different roller shade fabric selected by the Architect to demonstrate aesthetic effects of materials in situ, assisting in making final selections prior to fabrication.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. General: Strictly follow manufacturer's recommendations, per SECTION 016000, and as follows:
1. Delivery and Acceptance Requirements
    - a. Do not deliver window shades until building is enclosed and construction within spaces where shades will be installed is substantially complete.
    - b. Deliver products in original, unopened, clean, dry and undamaged containers with labels intact.
    - c. Label containers and shades according to Window Shade Schedule and approved Shop Drawings.
  2. Storage and Handling Requirements
    - a. Store and dispose of solvent-based materials, and materials to be used with solvent-based materials, in accordance with requirements of local AHJ.
  3. Packaging Waste Management
    - a. Request that manufacturers, fabricators, suppliers and shippers provide least amount of packaging that adequately and properly protects, supports and contains the items shipped, and is reusable, returnable or recyclable.

## 1.8 WARRANTY

- A. Manufacturer's Warranty per SECTION 016000, and as follows:
1. Material Warranties. Provide manufacturer's and/or fabricator's material warranty as follows:
    - a. Hardware and Shade Fabric: Provide twenty-five (25) year limited warranty.
    - b. Motors: Provide five (5) year limited warranty.
    - c. Controls: Provide two (2) year limited warranty.
    - d. Roller Shade Components: Manufacturer's limited lifetime warranty against defects in materials and workmanship.
  2. Installation Warranty: Provide two (2) year manufacturer's and/or fabricator's installation warranty from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Roller Shade Manufacturer / Fabricator List:

1. Gordon's Window Décor; Essex Junction, VT;  
[http://commercial.gordonswd.com/roller\\_shades.html](http://commercial.gordonswd.com/roller_shades.html)

NOTE: When bidding public work requiring a minimum three equivalent products, add the following two manufacturers:

2. MechoShade; 718.729.2020; [www.mechoshade.com](http://www.mechoshade.com)
3. Castec; 800.828.2500; [www.castec.com](http://www.castec.com)

B. Roller Shade Motor & Controls Manufacturer List:

1. Somfy Systems; 800.64 SOMFY; 609-395.1300; <http://www.somfy.com/nam/index.cfm>

C. Substitution Limitations: Manufacturers of equivalent products shall be considered when submitted in accordance with SECTION 013000 or SECTION 013300, and SECTION 016000.

D. Product Options:

NOTE: Select options and edit below as needed, deleting irrelevant options.

1. Shadecloth
  - a. Material Type
    - 1). PVC-free polyester
    - 2). Vinyl coated polyester
    - 3). Vinyl coated fiberglass
  - b. Weave
    - 1). Openness factor, transparency or opacity that controls views and privacy
      - a). Percent opening of weave allowing shaded light and view penetration
      - b). Room darkening
    - 2). Weave pattern
    - 3). Color finish with a specularly reflecting exterior face (White or Silver metallic) and same or different interior color.
2. Roller mechanism
  - a. Manual: Chain drive operation, spring-assisted when required for oversized or heavy shades.
    - 1). Side guiderail tracks for light and air sealing
  - b. Motorized
    - 1). Controls
      - a). Single control station (podium or wall)
      - b). Remote control (radio hand-held unit)
      - c). Remote control (Internet or intranet)
    - 2). Controllers
      - a). Gang relay/controller for universal action
      - b). Separate relay/controller for each roller shade window unit
    - 3). Building management software (incorporates charted annual sun path, weather station sensor information, automated command logic, tie-in to HVAC controls)
    - 4). Sensors
    - 5). Timer
3. Multiple windows
  - a. Ganged rollers, single operation
  - b. Individual operation for each shade
  - c. Multiple sets of ganged rollers with each ganged set operating individually
4. Shadecloth finish treatments
  - a. Antimicrobial treatment
  - b. Antistatic treatment

## 2.2 DESCRIPTION

- A. General System Description: Roller shade systems shall operate with a spring wrap mechanism, capable of accommodating a wide variety of shade sizes and fabric types. System shall be chain operated with spring assist when required to reduce pull force to lift heavy or large shades. Provide quality tubular motors for automatic motorized operation in conjunction with roller shade system.
  1. Provide a no sew, no glue, no tape, no weld roller shade that uses a spline system to attach the fabric to the tube with a wrapped bottom-bar.
  2. Tubular head-rail made from aluminum alloy 6063-T5.
  3. Tubular bottom bar made from aluminum alloy 6063-T5 or plastic.
  4. Components: Made with UV stabilized plastics.
  5. Brackets: Color coordinated with safety shade fabric locking feature.
- B. Regulatory Requirements
  1. Flame Retardance: Passes NFPA 701 Small Scale vertical burn. Materials installed must be identical in composition and comparable structure to those tested.
  2. Shadecloth Total Lead Content per 16 CFR 1303: Below limits.

3. Control systems and electrical components approved as a system by Underwriter Laboratories (UL) or Electrical Testing Laboratories (ETL).

NOTE: Edit below to suit project.

C. Sustainability Characteristics

1. Sustainable design requirements per AHJ.
  - a. State and municipal Energy Codes
2. Owner designated sustainable design requirements.
  - a. This is a USGBC LEED® registered project. Comply with requirements of:

NOTE: Select one of the following Ratings

NOTE: Each LEED Version requires a different credit total to achieve the desired LEED Rating.

- b. Rating: Certified
- c. Rating: Silver
- d. Rating: Gold
- e. Rating: Platinum

NOTE: Select one of the following Versions

- f. Version: (New Construction) NC v. 2.2
- g. Version: (Existing building) EB v. 2.0
- h. Version: (Core & Shell) C&S v. 2.0
- i. Version: (Commercial Interiors) CI v. 2.0
- j. Version: Homes v. 1.1a

NOTE: LEED Credits below are the most commonly used. Edit to suit project.

NOTE: Most relevant LEED credits are tied to sensor controlled motorized shading systems.

NOTE: If LEED for Homes is selected edit below to the proper and different LEED for Homes Credit designations.

3. LEED NC v. 2.2 Credits: Meet the performance requirements of the following LEED Categories and Credits:
  - a. Energy & Atmosphere (EA):
    - 1). EA Prerequisite 1: Fundamental Commissioning of the Building Energy Systems (Lighting and daylighting controls; energy systems)
    - 2). EA Credit 1: Optimize Energy Performance (Building energy management system tied to operable shades)
    - 3). EA Credit 5: Measurement & Verification (Building energy management system tied to operable shades)
  - b. Materials & Resources (MR):
    - 1). MR Credit 5.1, Regional Materials, 10% Extracted, Processed & Manufactured Regionally (within 500 miles of project site)

NOTE: Select MR 5.1 or MR 5.2 deleting 5.1 or both if not applicable.

- 2). MR Credit 5.2, Regional Materials, 20% Extracted, Processed & Manufactured Regionally (within 500 miles of project site)
- c. Indoor Environmental Quality (EQ):
  - 1). EQ Credit 6.1, Controllability of Systems: Lighting (Building energy management system tied to operable shades)
  - 2). EQ Credit 6.2: Controllability of Systems: Thermal Comfort (Building energy management system tied to operable shades)
  - 3). EQ Credit 8.1, Daylight and Views: Daylight 75% of Spaces (Daylight redirection and/or glare control devices; exterior and interior permanent shading devices; automatic photocell-based controls.)

- 4). EQ Credit 8.2, Daylight and Views: Views for 90% of Spaces (Interior shading devices, automatic photocell-based controls.)

## 2.3 PERFORMANCE / DESIGN CRITERIA

### A. Performance Requirements

NOTE: Review and set performance requirements below to suit each shaded opening and material specified.

1. Stretch Certification: Shadecloth materials shall be tested in accordance with UFS (Woven Upholstery Fabric Standards) 1979-12 at 27 pounds of no greater than 2.0 percent on the warp and 2.2 percent on the fill.
2. UV Stability Xenotest on each shadecloth color shall be a minimum "6" passing rating on a grade scale of 1-8.
3. Shadecloth Dimensional Stability tolerance shall be under 0.5 percent to ensure long-term stability.
4. Shadecloth Anti-Microbial Characteristics Per:
  - a. ASTM G21: 'No Growth' results for fungi per ATCC 9642, ATCC 9644, ATCC 9645.
  - b. ASTM G22: Minimum 5mm (0.197 inches) 'No Growth Contact Area' results for ATCC6538 (*Staphylococcus aureus*) and ATCC13388 (*Pseudomonas aeruginosa*).

NOTE: Determine performance criteria below with Mechanical Engineer's input.

5. Shadecloth Performance Criteria
  - a. Solar Transmittance:  percent
  - b. Solar Reflectance:  percent
  - c. Light Reflectance Value (LVR):  percent
  - d. Solar Absorptance:  percent
  - e. Shading Coefficient Ratio: SHGC ≤ 0.40

NOTE: Click on [Shading](#) link below for a design criteria overview PDF of shading strategy.  
NOTE: Document takes a minute to download.

### B. Design Criteria: [Shading](#)

NOTE: Edit criteria below to suit each shade opening.

1. Roller Shade Applications for each exterior window of rooms and spaces shown on the Drawings with related mounting systems and accessories.
  - a. Shade Type 1: Manual operating, chain drive, sunscreen roller shades.
  - b. Shade Type 2: Manual operating, chain drive room darkening roller shades with blackout fabric.
  - c. Shade Type 3: Manual operating, chain drive "double" solar and room darkening blackout roller shades, operating independently of each other.
  - d. Shade Type 4: Motorized sun screen roller shades, and related motor control systems.
  - e. Shade Type 5: Motorized room darkening roller shades, and related motor control systems.
  - f. Shade Type 6: Motorized "double" solar and room darkening roller shades, operating independently of each other, and related motor control systems.

## 2.4 MANUAL CHAIN CONTROL SYSTEM

### A. Basis of Design Manufacturer / Product: Louvolite /

NOTE: Select product system number(s), deleting system numbers not chosen.

1. System 32

2. System 40
  3. System 45
  4. System 45+
- B. Roller Tube: Fabricated from 6063-T5 extruded aluminum with diameter, wall thickness, and material required to accommodate shade size.
1. Fabric connected to roller tube with spline system.
  2. Tape attachment to minimize fabric laddering.
- C. Brackets: Powder-coated zinc-plated stamped steel suitable for ceiling, wall or jamb mounting. Provide size compatible with roller.
1. Bracket cover made from nylon 6.
  2. Color: White, Silver or Bronze as selected by Architect.

NOTE: Fascia or Pocket, select one and delete the other.

- D. Fascia or Headbox: Extruded 6063-T5 aluminum, painted shade assembly finish cover.
- E. Ceiling Shade Pocket: Rectangular pocket designed for recessed ceiling installation of window shades.

NOTE: Cassettes provide structural support and physical protection for long spans interfacing with both fascia and pocket arrangements.

NOTE: Select cassettes or delete as needed.

- F. Cassette Housing: Extruded 6063-T5 aluminum, shade assembly case.
- G. Accessories:
1. Provide with roller idler assembly of molded nylon and zinc-plated steel pin.
  2. Locking pin, locking collar, center pin locating body, universal connector coupling, spring connector shell and spring charge end coupling made from impact-modified nylon 6.
  3. Control End Unit: 15 percent glass filled nylon / acetal.
  4. Plunger end made from nylon 6.
  5. Right and left hand fitting springs made from spring steel.
  6. Wrapped bottom shade bar made from painted or unpainted extruded aluminum or UPVC.
    - a. Bottom bar end caps made from nylon/polypropylene or nylon.
  7. Operating Chain: Stainless steel, #10; rated to 90 lbs. (41 kg).

## 2.5 MOTORIZED WINDOW SHADE SYSTEM

- A. Window Shade System: Manual system modified with an electrically operated tubular motor, controls, sensor & timer low voltage inputs, cabling (by others), software, PC (by others), controllers, and hand-held transmitters.
1. Product: Louvolite mechanical shade systems with various shade fabrics modified with Somfy tubular motors as fabricated by Gordon's Window Décor to accommodate each window shade application.
- B. Shade Motor System: UL rated tubular motor concealed inside each shade roller tube made for intermittent use.
1. Manufacturer: Somfy
  2. Motor: Sonesse 30 RTS; instantly reversible, lifetime lubricated, and equipped with internal thermal overload protector, electric brake, and pre-set accessible limit switches.
  3. Transformers: Plug-in or wired 24 VDC of amperage required.

4. Motor Connector: ST30
5. Power Panel: Class 2, 10 motor with snap-tracks, power input, LED power indicators, fuses and connectors as needed.
6. Quiet Standard Motor: Motor operates at 44 Db measured 3 feet (1m) from the motor and shall make no audible clicks when motor stops or starts.
7. Coupling System: Provide couplings as required to join multiple motorized shade rollers to allow operation by single motor. Provide compatible material end-caps to receive couplers and support multiple shades.

C. Low Voltage Inputs

1. Switches: Appropriate low voltage switch to provide control via bus cable, dry contacts, wireless remote control.
  - a. Switches shall be local wall switches, 3-button and 6-button programmable network switches as indicated.
2. Sun Sensor: Allows one group per sensor to automatically move up and down at programmed sun levels via bus cable.
3. Timer: Allows one (1) group per timer to automatically move up or down at programmed times via bus cable.

D. Individual and Group Control

1. Individual Controls: Hand-held and/or wall switch units.
  - a. Hand Held Control Unit. Battery-powered radio frequency remote control with digital read-out using:

NOTE: Select number of channels for digital read-out and delete those not selected.

- 1). One (1) channel
  - 2). Five (5) channel
  - 3). Sixteen (16) channel
- b. Wall Switch Control Unit: Hard wired
2. Automation Controls: Software running on a standard personal computer. Software computes sun angles through global positioning, interfaces with remote sensors, as applied to window size, location and angle. System can be maintained and updated remotely. Automatic function reads sensor and preprogrammed data every second, resetting shades as needed for conditions.
  - a. Solar Activated Automation Control Software: PILOTpc automation by ESI / Electronic Solutions Inc.
  - b. AC Motor Controller: UL rated.
  - c. Somfy IP interface web server
  - d. 9V DC power supplies
  - e. ILT (intelligent network motor) tap controlled by switches, IR receiver or RTS receiver connected to shade motors by Rj9 3-way splitters.
3. Shade Configurations: 16 customizable pre-set conditions

- E. Cabling per DIVISION 27, COMMUNICATIONS: Cat 5, Dry Contact or RS-232/RS-485 Cabling and connectors allowing for full control of shades via interface. RS-232 bridge connects to controls via bus cable.

2.6 MATERIALS – SHADECLOTH FABRIC

NOTE: Edit below to suit project.

NOTE: Shade cloth composition varies enormously but typically includes fabrics manufactured from man made fiber for stability such as polyester and fiberglass.

NOTE: Openness of fabrics vary depending on requirement but screen fabrics can be as high as 27% openness and as low as 0%

A. General Performance Characteristics:

1. Absorbency: None
2. Stain Resistance: To grease, oil, grass, pop, coffee, chocolate, ketchup, shoe polish
3. Total Lead Content per 16 CFR 1303: Below limits
4. Fire Rating: FR Rated meeting or exceeding NFPA-701, 1006-Test 1 or CAN/ULC-S109

NOTE: Delete microbial requirement if not desired.

5. Microbiological: No fungal growth per ATCC 9642, 15233, 6205, 11797 and 9645.

NOTE: To select the proper Shadecloth for each opening determine the needed Performance Criteria, balancing your selection with the desired level of screened visible view (transparency) and the material preference.

NOTE: Use material samples and field sample to make final selections.

NOTE: Selected products will determine the weight and thicknesses required for bidding equivalents.

NOTE: Delete items not selected.

B. Light-Filtering Fabrics / Screen

1. Louvolite: Louvoscreen + Range
  - a. Materials: 75 percent PVC and 25 percent Polyester
  - b. Width: 2.49m (98 inch) roller blind
  - c. Length: 30m (33 yd) roller blind
  - d. Color Fastness: Tested in accordance with BS EN ISO 105-B01:1999

NOTE: Select openness factor and delete the one not used.

- e. Openness Factor: 3 percent or 5 percent
- f. Weight: Min. 455 g/m<sup>2</sup> (13.4oz/sy)
- g. Thickness: 0.55mm (0.0217 inch)
- h. Color: Same both sides, as selected by Architect from manufacturers standard range (6 color choices)

2. Louvolite: Screentex Range
  - a. Material: 100 percent Trevira CS
  - b. Opacity / Openness: 10 percent
  - c. Width: 2.34m (92 inch)
  - d. Weight: 190 g/m<sup>2</sup> (5.6 oz/sy)
  - e. Thickness: 0.38mm (0.0150 inch)
  - f. Color: Same both sides, as selected by Architect from manufacturers standard range (6 color choices)
  - g. Green Certification: Oeko-Tex

C. Room Darkening Fabrics:

1. Louvolite: Nocturne Range
  - a. Material: 100 percent woven polyester with 3-coat blackout foam coating with dyed fabric face
  - b. Opacity / Openness: None, 0 percent
  - c. Width: 2.79m (110 inch)
  - d. Weight: 320g/m<sup>2</sup> (9.4 oz/sy)
  - e. Thickness: 0.43mm (0.0169 inch)
  - f. Color: As selected by Architect from manufacturers standard range (3 color choices) with white backing

D. Dim-Out Fabrics

1. Louvolite: Montana, Corduroy, Madison Ranges
  - a. Material: 100 percent polyester microfiber-faux suede
  - b. Opacity / Openness: None, 0 percent
  - c. Width: 2.24m (88 inch)
  - d. Weight: min. 260 g/m<sup>2</sup> (7.6 oz/yd<sup>2</sup>)
  - e. Thickness: 0.40mm (0.0157 inch)
  - f. Color: As selected by Architect from manufacturers standard range (6 color choices) with white backing

E. Antimicrobial Dim-Out Fabrics

1. Louvolite: Carnival
  - a. Material: 100 percent Polyester
  - b. Opacity / Openness: None, 0 percent
  - c. Microbial Treatment: Ultrafresh
  - d. Width: 2.08m (82 inch)
  - e. Weight: 170 g/m<sup>2</sup> (5.0 oz/sy)
  - f. Thickness: 0.25mm (0.0098 inch)
  - g. Color: Same both sides, as selected by Architect from manufacturers standard range (33 color choices)
  - h. Green Certification: Oeko-Tex
2. Louvolite: Contex SPC (Solar Protective Coating)
  - a. Material: 100 percent glass fiber
  - b. Opacity / Openness: None, 0 percent
  - c. Microbial Treatment: Ultrafresh
  - d. Width: 1.98m (78 inch)
  - e. Weight: 240 g/m<sup>2</sup> (7.1 oz/sy)
  - f. Thickness: 0.27mm (0.0106 inch)
  - g. Color: As selected by Architect from manufacturers standard range (5 color choices) with SPC / silver metallic backing

2.7 MOTORIZED SHADE FABRICATION

A. General: Fabricate using field dimensions as noted on approved Shop Drawings.

B. Tube Preparation

1. Cut tube to required length, to fit installation width, motor end clearance, and idler end clearance.
2. Remove each burr from tube ends and ensure tube interior is clean.
3. For all round tube sizes up to 3.35 inches (85mm) inclusive, notch tube on motor end to manufacturer's recommended dimensions.

C. Tubular Motor Preparation

1. Fit drive wheel onto motor output shaft.
2. Remove 'brown' Soft Clip drive wheel by physically pulling it off motor shaft.
3. Or Remove 'black' Hard Clip drive wheel shaft by pressing the two clips inward at the same time. Motor must be out of tube in order to have access to 'black' clips.

D. Fit Motor Into Tube

1. Secure drive wheel to tube using four 7/32 inch (5.56mm) steel pop rivets or four 1/4 inch (6.35mm) dia. screws.

- a. Use only fasteners with steel grades SAE 5 or higher. Metric fasteners shall be grade 8.8 or higher.
2. Fit end plug into other side of tube and secure.

E. Supply Cable Output

1. Axial Output: Pass supply cable through center hole of yellow motor head cover.
2. Radial Output: Pass supply cable through groove in motor head.

## 2.8 ROLLER SHADE FABRICATION

- A. Fabricate units to fill existing openings in their entirety, from top to bottom and from side to side, with proper deductions to protect walls and sills from abrasion and to protect shade cloth from abrasion, unless specifically indicated otherwise.
- B. Fabricate unguided shade cloth to roll true and straight without shifting sideways more than 1/8 inch (3.2mm) in either direction per 8 feet (2.44m) of shade height due to warp distortion or weave design.
- C. Fabricate shade cloth to hang flat without buckling, distortion, waves, cupping, or warps. Shade edges shall not fray, curl or unravel. Fabricate as follows:
  1. Wrapped Bottom Bar: Attach fabric to roller tube and bottom bar using spline locking tape inserted into the roller tube and bottom bar. Bottom bar shall be fabric wrapped. Welded wrapped steel bottom bar not accepted
- D. When seams are required, locate as per instructions and acceptance of Architect.
- E. Provide battens in standard shades to assure proper tracking and uniform rolling of the shade bands.
  1. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shade cloth within specified standards.
  2. Battens shall be roll-formed stainless steel or tempered steel, as required.
- F. For railroaded shade bands, provide seams in railroaded multi-width shade bands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect.
  1. Seams shall be properly located.
  2. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards.
  3. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shade bands.

## 2.9 FINISHES

- A. Metal Finishes: Provide manufacturer's standard finish.

Select from one of the following choices, deleting those not chosen.

1. Acrylic Coatings (Baked Enamel) per AAMA 2603: Wet-sprayed method.
  - a. Color: As selected by Architect from manufacturers standard range.
2. Acrylic Coatings (Baked Enamel) per AAMA 2603: Powder coat method.
  - a. Color: As selected by Architect from manufacturers standard range.

3. Color Anodize per AAMA 611: Class I; AA-M12-C22-A44 per AAMA 606.1 and 608.1
  - a. Color: As selected by Architect from manufacturers standard range.
4. Clear Anodize per AAMA 611: Class II; AA-M12-C22-A31 per AAMA 607.1
  - a. Color: As selected by Architect from manufacturers standard range.

B. Field Finishing

1. Field Touch-up: Provide matching touch-up paint for minor touch-up of small scratches, abrasions, and fasteners.
  - a. Paint shall be applied with an artist brush and never spray applied.

2.10 SOURCE QUALITY CONTROL

A. Tests and Inspections:

1. Manufacturer shall perform batch-to-batch random ten (10) year cycle tests on roller shade system to confirm complete compliance with manufacturer's operating matrix and to ensure longevity of use in application.
2. Electrical Components Testing: Per NFPA Article 100 listed and labeled by UL, ETL or other testing agency acceptable to AHJ, marked for intended use, and tested as a system.

PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

Edit and coordinate the correct SECTION reference.

- A. Field Measurements: Per SECTION 017000 or 017100 or 017123.

3.2 EXAMINATION

Edit and coordinate the correct SECTION reference.

- A. Examination per SECTION 017000 or 0171000 or 017116, and as follows: Carefully examine installation areas with Installer present, for compliance with requirements affecting Work performance.
1. Verification of Conditions: Verify that field measurements, surfaces, substrates, structural support, utility connections, tolerances, levelness, plumbness, humidity, moisture content level, cleanliness and other conditions are as required by the manufacturer, and ready to receive Work.
    - a. Verify each roller shade assembly will fit within its corresponding window shade pocket.
  2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

NOTE: Coordinate and edit to the correct Section numbers below.

- A. Preparation per SECTION 017000 or 017100, and as follows:
1. Coordinate requirements for wood blocking structural support, and construction of properly sized shade pockets to ensure proper shade system installation.
  2. Coordinate installation of recessed shade pockets with ceiling construction.
  3. Where applicable coordinate interface and installation of window shades with provisions of HVAC system, lighting system, motorized projection screens, motorized projector lift, or video projector.

4. Prior to installation, verify type and location of power supply. Coordinate requirements for panels, power supply, conduit, j-boxes, outlets, and wiring required for window shade motors and controls.
  - a. Wire consecutive shades in parallel from shade to power source (transformer / controller.)
5. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions. Clean surfaces thoroughly prior to installation.
6. Shade Pockets: GC shall install shade pockets prior to or in conjunction with installation of suspended ceiling system.
  - a. Install securely, plumb, level, in alignment with pockets, and with smooth, uninterrupted operation.
  - b. After interior construction is complete, install shade and operating mechanism in pocket.

### 3.4 INSTALLATION

NOTE: Coordinate and edit to the correct Section number below.

- A. Installation per manufacturer's written instructions, approved submittals, SECTION 017000 or 017300 or 017316, and the following:
  1. Install window shades at locations indicated on Drawings, approved Shop Drawings and Window Shade Schedule.
    - a. Window treatment shall be installed plumb, square, level and within allowable tolerances.
      - 1). Maximum variation of gap at window opening perimeter: 1/4 inch, per 8 feet +/- 1/8 inch (6.35mm, per 2438mm +/- 3.2mm) of shade height.
      - 2). Maximum offset from level: 1/16 inch per 5 feet (1.587mm per 1524mm) of shade width.
    - b. Allow proper clearances for window hardware and operation.
  2. Install closure panels to conceal roller and operating mechanism. Do not use exposed fasteners.
- B. Adjust each unit drive and brake mechanism for smooth operation.
  1. Adjust shade and shadecloth to hang flat without buckling or distortion.
  2. Replace each unit or component that does not hang properly or operate smoothly.

### 3.5 FIELD QUALITY CONTROL

NOTE: Coordinate and edit to the correct Section number below.

- A. Field Tests, Inspection: Per SECTION 014000 or 014500 or 014523, and as follows:
  1. Test each motorized window shade to verify that controls, limit switches, interface to other building systems, and other operating components to function as required. Adjust and correct each deficiency.

NOTE: Coordinate and edit to the correct Section number below.

- B. Correction of the Work per SECTION 017000 or 017500 or 017513, and as follows:
  1. Remove, Repair and Reinstall or Restore in Place damaged items.
    - a. Finish touch-up damaged surface finishes.
  2. Replace damaged materials or items with New if repair not acceptable to Architect.

### 3.6 CLEANING AND PROTECTION

- A. Provide initial maintenance for shade assemblies, and protect from damage during construction operations as recommended by manufacturer.
  - 1. Remove temporary coverings and protection of adjacent work areas.
  - 2. If damage occurs, remove and replace damaged components or entire unit as required to provide units in their original, undamaged condition.
  - 3. Touch-up, during roller shade installation, each exposed damaged surface.
  - 4. Clean up debris that resulted from shade installation

### 3.7 CLOSEOUT ACTIVITIES

NOTE: Coordinate and edit to the correct Section numbers below.

- A. Substantial Completion Requirements per SECTION 017000 or 017700, and as follows:
  - 1. Provide Final Cleaning immediately prior to Substantial Completion inspection per SECTION 017000 or 017400 or 017423.
    - a. Protection: Remove fabricator's and other installed protection immediately prior to Substantial Completion inspection, unless manufacturer requires otherwise.
  - 2. Perform required Demonstration and Training with Owner's designated staff per SECTION 017900.
    - a. Demonstrate operation of each shade system, proper adjustment, programming, usage, cleaning and maintenance procedures.

END OF SECTION