

SECTION 12490.3
MOTORIZED ROLLER SHADES
IQ/MLC OR INTELLIGENT MOTOR CONTROL SYSTEM

PART 1 GENERAL

1.1 SUMMARY

!!! SPECIFIER NOTE: COORDINATE SHADE TYPE INFORMATION WITH DRAWINGS AND SCHEDULES. SELECT APPROPRIATE SHADE TYPE AND EDIT SCOPE INFORMATION ACCORDING TO PROJECT REQUIREMENTS!!!

- A. Section Includes:
1. Shade Type 1: Motorized interior roller screen solar shades in all exterior window openings [uno – see drawings] or as indicated in schedule at end of section.
- AND / OR**
2. Shade Type 2: Motorized interior roller-screen room darkening shades in all exterior window openings [uno – see drawings] or as indicated in schedule at end of section.

!!! SPECIFIER NOTE: COORDINATE THESE ITEMS WITH APPROPRIATE SPECIFICATIONS ELSEWHERE IN PROJECT MANUAL!!!

- B. Products Supplied But Not Installed Under This Section:
1. Metal shade pockets or housings recessed into ceiling system or assembly.
 2. Extruded aluminum ceiling pocket trim (closure) assemblies.
 3. Electrical control components including switches, relays, etc as necessary to provide control characteristics as specified elsewhere in this section.

NOTE TO SPECIFIER: WE SUGGEST THIS SECTION 1.1.C BE INCLUDED FOR ALL MOTORIZED SHADE PROJECTS UTILIZING 50 MOTORIZED SHADE BANDS OR MORE WITH THE MLC, IQ/MLC OR INTELLIGENT MOTOR CONTROL SYSTEM FOR SINGLE SOURCE RESPONSIBILITY.

- C. Turn-Key Single-Source Responsibility for motorized Window Shade Systems: To control responsibility for performance of window shade systems, assign the design, engineering, and installation of motorized window shade systems, motors, controls, low voltage control electrical wiring specified in this Section to a single manufacturer and their authorized dealer/installer. The Architect will not produce a set of electrical drawings for the installation or control wiring of the motors or controllers for the window shades. The Base Building Contractor (Main Contractor) shall coordinate the following with the window shade contractor: Power wiring shall be by the Base Building Contractor (Main Contractor) in accordance with requirements provided by the Window Shade Contractor.

1. The Base Building Contractor (Main Contractor) shall provide power and panel boxes of sufficient size to accommodate window shade manufacturer's requirements, as indicated on the Electrical Drawings.
2. The Base Building Contractor (Main Contractor) shall provide all conduit as required for window shade electrical wiring; coordinate requirements with window shade manufacturer before inaccessible areas are constructed.
3. The Base Building Contractor (Main Contractor) shall provide (duplex outlet) (junction box) within 6' (1820 mm) of each motor. (Shade contractor shall make final connection between motor and J-box, incorporating a quick disconnect plug).
4. The window shade manufacturer shall provide low-voltage wiring to all motors and low voltage wiring to a central-control location as indicated by the Architect. All above-ceiling and concealed wiring shall be plenum-rated or installed in conduit.
5. The Base Building Contractor (Main Contractor) shall provide conduit in all areas which might not be accessible to the window-shade contractor due to the building design or equipment location.

D. Related Sections:

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

1.2 PERFORMANCE REQUIREMENTS

- A. Fire: Provide shade fabrics tested in accordance with:
 - .1 1989 NFPA 701 small scale Vertical Burn Test and rated "PASS".
 - .2 1996 NFPA 701 small scale Vertical Burn (telephone booth test) and rated "PASS."
- B. Toxicity: Provide shade fabrics tested in accordance with University of Pittsburgh Toxicity Protocol including LC50 analysis and toxicity characteristics.
- C. Anti-microbial:

1. ASTM G-22-80 results for ATCC6538 (*Staphylococcus aureus*) and ATCC13388 (*Pseudomonas aeruginosa*) indicating minimum 5mm (0.197 inches) 'No Growth Contact Area'.
 2. ASTM G-21-85 results for ATCC9642, ATCC9644, ATCC9348 and ATCC9645 indicating 'No Growth'.
- D. Electrical: Control systems and components approved AS A SYSTEM by either Underwriter Laboratories (UL) or Electronic Testing Laboratories (ETL).
- 1.3 SUBMITTALS
- A. Product Data: Manufacturer's product data sheets, performance data, and installation instructions for each item required.
- B. Shop Drawings:
1. Interior Elevations at [3/8" = 1'-0"] (1:32) scale min indicating shade layout, seam / batten locations and coordination with surrounding conditions.
 2. Floor plans or reflected ceiling plans showing overall arrangement of shades and control locations.
 3. Head, Jamb and sill details as necessary to coordinate work with surrounding conditions and construction.
 4. Shade schedule coordinating room number, window type, opening size(s), quantities and key to details.
 5. Complete wiring diagrams including connection details for all components supplied by this section for installation and connection by section 16000.
- C. Samples:
1. Selection samples:
 - a. 3" X 5" (76 mm x 127 mm) shadecloth fabric swatches for initial fabric color selection from manufacturer's full range of available fabrics.
 - b. Standard aluminum finish color samples from manufacturer's range of standard colors.
 2. Verification samples:
 - a. One fully operational window shade sample of each type required 30" X 30" (760 mm x 760 mm) complete with selected shadecloth including sample of seam / batten when applicable. Disassemble sample to demonstrating compliance with PART 2.
 - b. One complete set of all shade components, unassembled, demonstrating compliance with PART 2.
- D. Design Data, Test Reports, Certificates: Current reports from independent testing laboratories demonstrating compliance with article 1.2.
- E. Manufacturers' Instructions: Manufacturer's standard installation instructions.
- 1.4 QUALITY ASSURANCE
- A. Qualifications:
1. Manufacturer: 20 years minimum experience manufacturing products comparable to those specified in this section.

- 2. Installer: 5 years minimum experience installing products comparable to those specified in this section.
- B. Field Samples: Install large size sample of selected fabric for final verification of color, weave and density, in opening as directed by design professional.
- C. Do not fabricate shades without obtaining field dimensions for each opening. Coordinate construction of surrounding conditions to allow for timely field dimension verification.

!!!SPECIFIER NOTE: FOR MOTORIZED SHADE INSTALLATIONS OR COMPLICATED DETAILING SPECIFY ATTENDANCE AT PRE INSTALLATION / COORDINATION MEETINGS EARLY IN PROJECT SCHEDULE!!!

- D. Pre-installation Meetings:

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Protection:
- B. Do not deliver items to the project until all concrete, masonry, plaster, painting and other wet work has been completed and is dry.
- C. Deliver shades to project in labeled 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.
- D. Store materials in a dry secure place. Protect from weather, surface contaminants, corrosion, construction traffic and all other potential damage.

1.6 WARRANTY

- A. Special Warranty:
 - 1. Shade Motors and motor control system electrical components: Provide Manufacturer's warranty under provisions of Division 1 - General Requirements. Warranty period to be 5 years from Date of Substantial Completion for shade motors and two years for all other control components containing provisions that installation will remain operational without fault for the warranty period and include all operating parts.
 - 2. Shadecloth and all other components of shade system are warranted to be fit for the use intended for a minimum of 10 years.
 - 3. Installation: Provide Contractor's warranty under provisions of Division 1 - General Requirements that installation shall be free from defects for a period of not less than 1 year.
 - 4. In the event of a warranted product failure, the Shade Contractor will, at no cost to owner, facilitate acquisition and delivery of all necessary components to the owner.

!!!SPECIFIER NOTE: ADD ADDITIONAL INFORMATION IN THESE SECTIONS FOR VERY LARGE, OR TECHNICALLY DEMANDING INSTALLATIONS INCLUDING AUTOMATED SHADING SYSTEMS!!!

1.7 SYSTEM STARTUP

1.8 OWNER'S INSTRUCTIONS

1.9 COMMISSIONING

1.10 MAINTENANCE

- A. Extra Materials:
 - 1. Provide as a separate bid amount the cost to supply additional spare materials for storage by owner as follows:
 - a. Provide additional 5% of the total length of qualified stainless steel chain required on the project, not to exceed the quantity of one 500' spool.
 - b. Provide additional 5% of each type of shade mounting hardware or brackets, but not less than one pair of each type.
 - c. Provide a quantity of replacement shadebands completely fabricated and ready to attach to roller tubes equal to 5% of the total number of shadebands of each fabric and each color in the largest size required for each of those fabrics.
 - d. Provide additional 5% of each motor type used on project, but not less than quantity of one each.
 - e. Provide additional 5% of each motor control component used on project, but not less than quantity of one each.
 - 2. Clearly label all spare components and supply to Owner upon completion in original packaging for storage on site by Owner.
- B. Maintenance Service: Provide as a separate bid amount the cost for annual maintenance contract providing service 'on demand' for repair and maintenance as may be generally anticipated for the conditions of this project.

PART 2 PRODUCTS

!!!SPECIFIER NOTE: THIS SPECIFICATION IS WRITTEN AS A DESCRIPTIVE, OPEN PROPRIETARY SPEC – IT IS INTENDED TO ALLOW THE CONTRACTOR TO SUBMIT OTHER MANUFACTURER’S TO YOU FOR PRIOR APPROVAL IN THE EVENT THAT MULTIPLE MANUFACTURER’S ARE DESIRED IN EFFORTS TO PROMOTE COMPETITIVE BID SITUATIONS – PLEASE BE AWARE THAT MANUFACTURERS NOT MEETING THESE REQUIREMENTS SHOULD ONLY BE APPROVED AS VOLUNTARY ALTERNATES AND NOT AS ‘EQUAL TO’ OR ‘EQUIVALENT’ MANUFACTURERS. APPROVAL OF NON-COMPLIANT MANUFACTURERS AS EQUALS PUTS MECHOSHADE’S QUALITY PRODUCTS AT A COMPETITIVE DISADVANTAGE AND HAS THE REVERSE EFFECT ON BIDS FROM OTHER MANUFACTURERS!!! IF NON-COMPLIANT MANUFACTURERS BIDS ARE ACCEPTED, ALL BIDDERS SHALL HAVE THE RIGHT TO PROVIDE A VOLUNTARY ALTERNATE BID AND MUST BE SO NOTIFIED.

2.1 MANUFACTURERS

- A. Manufacturer: To establish a standard of quality, design and function desired, drawings and specifications are based on products by MechoShade Systems, Inc., Long Island City, NY., USA, Phone: 718-729-2020, Fax: 718-729-2941. Alternate products complying with the performance criteria detailed in Section 2.2. must be approved by the Design

Professional not less than ten days prior to bid date. Non-compliant alternates may be considered as Voluntary Alternate Deducts to Base Bid only and are subject to acceptance by the Design Professional. All proposed alternates (clearly delineated as such) must be submitted in writing for approval by the Design Professional a minimum of 10 days prior to bid date and must be made available to all bidders. See section 01630 for instructions regarding submittal requirements for alternate or substitute products. If voluntary alternates are accepted, each bidder shall submit a base bid on the specified product and an alternate bid on an equivalent to the voluntary alternate.

2.2 AUTHORIZED LICENSED DEALER

Brambier's South Florida
1616 NE 205 Terrace
Miami, FL 33179
Phone: 305.653.1712
Fax: 305.653.1714

Email: bob@brambiers.com

www.brambiers.com

Brambier's North Florida
1648 Taylor Road PMB 240
Daytona Beach, FL. 32128
Phone: 386.756.0101
Fax: 305.513.5866
Georgia Fax: 770.234.5505
Email: lyle@brambiers.com

A.

2.3 COMPONENTS

!!!SPECIFIER NOTE:

THIS SECTION MUST BE EDITED TO MATCH PROJECT REQUIREMENTS. MAKE NOTE OF 'OR' CHOICES AND DELETE ALL INAPPROPRIATE ITEMS. WHEN COMBINATIONS OF FABRIC OR COMPONENTS ARE BEING SPECIFIED ie MOTORIZED ROOM DARKENING SHADES AND MANUAL SOLAR SHADES PLEASE TAKE CARE TO COORDINATE COMPONENT SPECS FOR APPROPRIATE SHADE TYPE – YOUR MECHOSHADE SALES PROFESSIONAL MAY BE OF ASSISTANCE IN EDITING THIS DOCUMENT FOR YOU!!!

!!!SPECIFIER NOTE:

PLEASE REVIEW SHADECLOTH SELECTION GUIDELINES [attached and on disk] CAREFULLY PRIOR TO SELECTING FABRIC. MECHOSHADE SYSTEMS WILL BE PLEASED TO OFFER OUR PROJECT SPECIFIC SHADECLOTH RECOMMENDATIONS WHEN PROVIDED THE NECESSARY GLAZING INFORMATION. Shadecloth selection shall be compatible with glazing characteristics, visible light transmittance and solar orientation, and intended occupancy requirements.] Recommended shadecloth densities based on visible light transmittance of the glass: 60-90% visible light transmittance, 0-2% Openness; 35-55% visible light transmittance, 3-6% Openness; 22-30% visible light transmittance, 5-10% Openness; less than 20% visible light transmittance, 10-15% Openness.

- A. Shadebands: Construction of shadeband includes the fabric, the hembar and hempocket, and the attachment of the shadeband to the roller tube:
1. Visually Transparent Single-Fabric Shadecloth: MechoShade Systems, Inc., ThermoVeil group, single thickness non-raveling 0.030-inch (.762 mm) thick vinyl fabric, woven from .018-inch (.457 mm) diameter extruded vinyl

yarn comprising of 21% polyester and 79% reinforced vinyl, in colors selected from manufacturer's available range.

a Open Linear Weave: "1800 series", 15% open, linear-weave pattern.

OR

b Medium Linear Weave: "1600 series", 6% open, medium linear-weave pattern.

OR

c Dense Linear Weave: "1000 series", 3% open, dense linear-weave pattern.

OR

d Extra - Dense Linear Weave "0900 series", 0-1% visually translucent linear weave pattern.

OR

e Open Basket Weave: "2100 series", 10% open, 2 x 2 open basket-weave pattern.

OR

f Dense Basket Weave: "1300 series", 5% open, 2 x 2 dense basket-weave pattern.

OR

g Dense Satin Twill Weave: 2% open at 90-degree view and 6% open at 45-degree view. "3000 series" Satin Texture group, "3200 series" Diamond Pastel group, and "3300 series" Diamond Earthtone group; 2% open in the 90-degree-view zone with higher 6% visible light transmittance in the 45-degree-view zone. Multi-color construction has a two-color effect with one color dominating on each side.

OR

2. Visually Transparent Single-Fabric Shadecloth: MechoShade Systems, Inc., EuroVeil "5300" Series: .010 diameter (0.254 mm) non-raveling vinyl/polyester yarn, fabric thickness .025 inches (0.635 mm)

OR

3. Visually Transparent Single-Fabric Shadecloth: "0600 Series", Insulating-film Shadecloth: MechoShade Systems, Inc., Microfilm group, 0.005-inch-thick (.127 mm) transparent and laminated mylar film and weighing 0.13 pounds (596 grams) per square yard, in tints with reflective-low-"E" coatings selected from manufacturer's available range.

OR

4. Vinyl Room darkening Shadecloth (single-fabric): MechoShade Systems, Inc., "0700 series", Blackout material, washable and colorfast laminated and embossed vinyl coated fabric, .012 inches thick (.30 mm) blackout material and weighing .81 lbs. per square yard, with a minimum of 62 threads per square inch in colors selected from manufacturer's available range.

OR

5. Lined Insulated Shades: MechoShade Systems, Inc., Dual Shade System. Dual shade: Two fabrics (shade cloths) on one roller with an insulating air

space. Allows for two selected fabrics for an aesthetic and functional effects.

a Face fabric: [Cut and paste in fabric selection from above in this location.]

b Film Liner: ThermoVeil Mirrofilm "0600 series"; transparent laminated polyester film, in tints selected from manufacturer's available range.

OR

c Blackout Liner: ThermoVeil "0700 series"; vinyl-coated fabric in colors selected from manufacturer's available range.

6. Hembars and hempockets:

a Fabric hempocket with RF - welded seams (including welded ends) and concealed hemweights. Hemweights must be of appropriate size and weight for shadeband and must be continuous inside a sealed hempocket. Match hempocket construction for all shades in same rooms.

OR

b Exposed (Blackout) Hembar: 3/8 x 1-1/2 inches with vinyl seal and concealed attachment to shadecloth. Bevel top and bottom of hembar to smoothly travel up and down inside side channels. Extend shadeband and hembar into side channel as a single element where side channels are required.

B. Motorized Shade Hardware and Shade Brackets:

1. Provide shade hardware constructed of minimum 1/8" thick (3.175 mm) cadmium plated steel or thicker as required to support 150% of the full weight of each shade.
2. Provide shade hardware system that allows for removal of shade roller tube from brackets without removing hardware from opening or without requiring end or center support brackets to be removed.
3. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
4. Provide shade hardware system that allows for field adjustment of motor or replacement of any operable hardware component without requiring removal of brackets regardless of mounting position (inside or outside mount).
5. Provide shade hardware system that allows for removable regular roll fascia(s) to be mounted continuously across two or more shades without requiring exposed fasteners.
6. Provide shade hardware system that allows for operation of multiple shadebands offset by a maximum of (12°) (45°) from the motor axis between shadebands, (6°) (22.5°) on each side of the radial line, by a single motor (Multi-banded shades) subject to manufacturer's design criteria.

7. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connections for drive mechanism to shade roller tube shall not be acceptable.
 8. Use only Delrin engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics are not acceptable: polyester or reinforced polyester shall not be acceptable.
- C. Shade roller and shadecloth attachment:
1. Use extruded aluminum shade roller tube of diameter and wall thickness required to support shade fabric without (excessive) deflection. Roller tubes less than 2.55" (65 mm) in diameter are not acceptable.
 2. Provide for positive mechanical engagement with drive / brake mechanism.
 3. Provide for positive mechanical attachment of shadeband without requiring use of adhesives, adhesive tape, staples or rivets. Two sided pressure sensitive adhesive tape is not acceptable, shade bands stapled to roller tube shall not be acceptable.
 4. Attach shadebands to tube such that removal and replacement of a shadeband can be accomplished without removing either the tube from the brackets or without removing shade brackets or the drive operator. Shadebands must be replaceable on site.
- D. Shade Motors and Motor Control System [IQ/MLC System]: [Hard-wired system] Specifications and Design are based on the IQ/MLC motor control system as manufactured by MechoShade Systems, Inc. Other systems may be acceptable provided that all of the following performance capabilities are provided. Motor control systems not in complete compliance with these performance criteria shall not be accepted AS EQUAL TO OR EQUIVALENT SYSTEMS.
1. Shade Motors:
 - a Tubular, asynchronous (non-synchronous) motors with built-in reversible capacitor operating at 110V AC (60hz), single phase, temperature Class A, thermally protected, totally enclosed, maintenance free with line voltage power supply equipped with locking disconnect plug assembly furnished with each motor.
 - b Conceal shade motors inside shade roller tube.
 - c Each shade motor draws a maximum current of 2.3 amps.
 - d Use motors rated at the same nominal speed for all shades in the same room.
 - e Total hanging weight of shadeband shall not exceed 80% of the rated lifting capacity of the shade motor and tube assembly.
 2. Wall Switches
 - a 3 button architectural flush mounted switches with metal cover plates and no exposed fasteners.
 - b Connect local wall switches to control system components via low voltage (12V DC) 4 conductor modular cable equipped with RJ-11 type connectors supplied, installed and certified under Section 16000.

- c Connect master wall switches to control system components via low voltage (12V DC) 6 conductor modular cable equipped with RJ-12 type connectors supplied, installed and certified under Section 16000.
3. Motor Control System:
- a Provide power to each shade motor via individual 3 conductor line voltage circuits connecting each motor to the relay based Intelligent controllers (IQ/MLC).
 - b Control system components provide appropriate (spike and brown out) over-current protection (+/- 10% of line voltage) for each of the four individual motor circuits and shall be rated by UL or ETL as a recognized component of this system and tested as an integrated system.
 - c Motor control system allows each group of four shade motors **in any** combination to be controlled by each of four local switch ports, with up to fourteen possible “sub-group” combinations via local 3 button wall switches and all at once via a master 3 button switch. System shall allow for overlapping switch combinations from 2 or more local switches.
 - d Multiple “sub-groups” from different IQ/MLC control components may be combined to form “groups” operated by a single 3 button wall switch, from either the master port or in series from a local switch port.
 - e Each shade motor shall be accessible (for control purposes) from up to four local switches and one master switch.
 - f Control system shall allow for automatic alignment of shade hembars at 25%, 50% and 75% of opening heights, or up to three user defined intermediate stopping positions in addition to all up / all down positions regardless of shade height, a total of 5 positions. Control system shall allow shades to be stopped at any point in the opening height, however, shade hembars may not be in alignment at these non-defined positions.
 - g Control system shall have two standard operating modes: Normal Mode allowing the shades to be stopped anywhere in the window's opening height and Uniform Mode allowing the shades to only be stopped at the predefined intermediate stop positions. Both modes shall allow for all up/all down positioning.
 - h Control system components shall allow for interface with low voltage Audio Visual system components via a dry contact terminal block.
 - i Control system components shall allow for interface with external analog input control devices such as solar activated controllers, wind activated controllers, 24 hour timers, etc. via a dry contact terminal block.
 - j Reconfiguration of switchable groups [as specified in ...3.d above] shall not require rewiring of the hardwired line voltage motor power supply wiring or the low voltage control wiring. Reconfiguration of

switch groups shall be accomplished within the motor control device (IQ/MLC).

!!!SPECIFIER NOTE: MAKE APPROPRIATE NOTATIONS IN SECTION 16000 ALERTING CONTRACTOR TO THIS WORK AND REQUIREMENTS OF CONTINUITY FOR THIS SECTION!!!

OR

E. Shade Motors and Control System [Intelligent Motor Control System]: (Software, two way communication).

Specifications and Design are based on the IMC motor control system as manufactured by MechoShade Systems, Inc. Other systems may be acceptable provided that all of the following performance capabilities are provided. Motor control systems not in complete compliance with these performance criteria shall not be accepted AS EQUAL TO OR EQUIVALENT SYSTEMS.

1. Shade Motors:

- a Motors shall be asynchronous (non-synchronous), line voltage (115VAC) (220 V - 230 V), tubular motors with built-in reversible capacitor operating at 110V AC (220 V - 230 V) (60hz) (50 hz), single phase, temperature Class A, thermally protected, totally enclosed, with internal encoder and microprocessor, maintenance free. Intelligent Motor Control [IMC]system motors will draw a maximum of 2.3 amps per motor. Line voltage power supply for each motor shall be located between 6" and 24" (150 mm - 600 mm) of the motor.
- b IMC motors shall respond to low voltage (12VDC) control inputs via a low voltage digital Bus Line connection to a Bus Interface Module [BI]. BI's shall also be located between 6" and 24" (150 mm - 600 mm) of the motor. BI shall be mounted to a face plate for a 4 11/16" X 4 11/16" x 2 1/8" (119mm x 119 mm x 54 mm) deep junction box (installation of BI and j-box by electrical contractor).
- c All shades in the same room shall be operated by motors rated at the same nominal speed.
- d Total shade weight shall not exceed 80% of the rated lifting capacity of the shade motor and tube assembly.
- e Upper and lower stopping points [Operating Limits] of Shadebands shall be programmed into motors via a hand held removable Program Module / Configurator.
- f Intermediate stopping positions for shades shall be at 1/16 increments of the shade opening height or at 4 predefined intermediate positions, for a total of 6 defined and aligned position. All shades on the same switch circuit with the same opening height shall align at each intermediate stopping position.
- g Motors shall be addressable through their respective Bus Interface Module via a hand-held removable program module and shall be capable of responding to a minimum of (7) seven different user defined stored addresses including multiple overlapping sub groups

and 3 reserved control input addresses for use by building management systems, life safety systems and other emergency inputs.

- h Motors and BI system shall have the capability of two way communication. Each BI and motor shall allow for a unique address message to be sent to the hand held configurator and/or a PC controller
2. Bus Line:
- a All shade motor control components [Bus Interfaces, Wall Switches, Bus Supplies, auxiliary control input devices, etc.] shall be connected in series via a low voltage (12VDC) two way digital communication bus line.
 - b The bus line itself shall consist of two shielded twisted pairs [BELDEN #XXXXXX] supplied and installed by the electrical contractor in accordance with electrical diagrams provided by shade contractor.
 - c The low voltage (12VDC) digital Bus Line shall be powered by a Bus Supply transformer requiring 115VAC (220 - 230 VAC) input drawing a maximum current of 1 amp. A minimum of one Bus Supply shall be required for every 400 linear feet of Bus Line. Final Bus Supply spacing shall be reviewed with the system manufacturer after the number of nodes per 400 ft (121.9 meters) run of bus line has been determined.
3. Wall Switches:
- a Shades shall be operated via low voltage programmable Intelligent Switches [IS]. Each IS shall be capable of storing one control level address. IS shall provide for interface with other low voltage input devices via a set of dry contact terminals located on the switch. {One IS shall be required for each control group (specified elsewhere)}.
 - b IS may be a local sub-group or group controller in accordance with its address in each motor/BI unit.
 - c IS may be daisy chain wired in series to control different groups of motors. A separate run to the bus line is not required.

2.2 ACCESSORIES

A. Regular Roll Fascia:

- 1. Continuous removable extruded aluminum fascia (Design Professional to select color from manufacturer's standards) that attaches to shade mounting brackets without the use of adhesives, magnetic strips or exposed fasteners.
- 2. Fascia shall be able to be installed across two or more shadebands in one piece.
- 3. Fully conceal brackets, shade roller and fabric on the tube.
- 4. Chain drive shall fall behind the bottom return edge of the fascia without requiring notching of the fascia.

OR

B. Regular Roll Fascia:

- 1. Provide continuous regular roll fascia fully concealing brackets, shade roller and fabric on the tube. Fit fascia tight to room darkening side channels

when present. Chain drive to fall through slotted holes in the bottom return edge of the fascia. [Required for room darkening shades with side channels.]

AND / OR

C. Reverse Roll Fascia:

1. Provide continuous reverse roll fascia fully concealing shade roller and fabric on the tube.

OR

D. Shade Pockets for recessed mounting in Acoustical, Plaster or Drywall Ceilings:

!!!SPECIFIER NOTE: COORDINATE INSTALLATION OF MATERIAL SUPPLIED UNDER THIS SECTION WITH APPROPRIATE SECTION ELSEWHERE IN PROJECT MANUAL!!!

1. Provide extruded aluminum shade pocket with exposed flush mounted extruded aluminum removable closure panel to provide access to shades and an exposed flush mounted tile support (MechoShade 4123 pocket supplied in manufacturer's standard painted finish) for adjacent acoustical tile or drywall soffits and ceilings.

OR

2. Provide extruded aluminum shade pocket with exposed flush mounted extruded aluminum removable closure panel to provide access to shades (MechoShade 4133 pocket supplied in manufacturer's standard painted finish).

OR

3. Provide formed steel shade pocket (sized to accommodate shades) with exposed flush mounted extruded aluminum removable closure panel (supplied in manufacturer's standard painted finish) to provide access to shades and an exposed tile support for acoustical tile ceilings.

OR

4. Provide formed steel shade pocket (sized to accommodate shades) with exposed flush mounted extruded aluminum removable closure panel (supplied in manufacturer's standard painted finish) to provide access to shades, and an exposed flush mounted tile support for acoustical tile or drywall soffits or ceilings.

OR

5. Provide extruded aluminum pocket closure assembly(ies) for use with Drywall or other framed shade pocket construction as shown in the drawings. Closure panel shall be 2" wide **OR** 3" wide **OR** 5" wide **OR** custom width as indicated in the drawings.

E. Room darkening light resistant side and / or sill channels: Extruded aluminum channels with polybond edge seals (Design Professional to select color from manufacturer's standards). Side and / or sill channels shall be mounted with concealed fasteners.

2.3 FABRICATION

- A. Fabricate units to completely fill existing openings from head to sill and jamb to jamb, unless specifically indicated otherwise. Comply with Manufacturer's edge clearance standards and recommendations.
- B. Fabricate shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch in either direction per 8 feet of shade height due to warp distortion or weave design.
- C. Provide battens in non-railroaded shades as required the by Manufacturer to assure proper tracking and uniform rolling of the shadebands, in accordance with the manufacturer's published width x height fabricate guide and standards.
- D. For railroaded shadebands, provide seams or battens in railroaded multi-width shadebands as required by Manufacturer to meet Width:Height ratios and size requirements. Unless specified elsewhere, manufacturer's published standard seam / batten placements are acceptable to Design Professional. If custom placement of seams / battens is required, coordinate these locations with design requirements. **!!!SPECIFIER NOTE: PLEASE SPECIFY NON-STANDARD BATTEN PLACEMENT REQUIREMENTS HERE...ie: "Horizontal battens to align with horizontal window mullions."!!!**
- E. Provide batten pockets utilizing self-colored fabric front and back, RF welded into the shadecloth. Provide a self-colored opaque liner front and back to eliminate any see through of the batten pocket and shall not exceed 1-1/2 inches (38 mm) high and be totally opaque. A see-through moiré effect which occurs with multiple layers of transparent fabrics are not acceptable. Reinforce batten pockets using coil coated, roll formed spring steel to insure flatness of shadebands in accordance with manufacturer's standards. concave formed profile of batten stiffeners to be compatible with diameter of shade roller tube.

2.4 FINISHES

- A. Aluminum Components: Design Professional shall select from Manufacturer's standard [PPG Duracron baked enamel colors] **OR** [Anodized aluminum finish in selected colors]. **OR** [Powder coat in Manufacturer's standard RAL approved finishes.]
- B. Steel Components: Cadmium-plated, satin-finished, or bonderized prior to painting with Manufacturer's standard baked-enamel finish.

PART 3 EXECUTION

3.1. EXAMINATION

- A. 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.

3.2. INSTALLATION

- A. Install units to comply with the Manufacturer's instructions for the type of mounting and operation required. Provide units plumb, true, and securely anchored in place with recommended hardware and accessories to provide smooth operation without binding.
 - B. Install units within the following tolerances:
 - 1. Maximum variation of gap at window opening perimeter: 1/4 inch, per 8 feet (+/- 1/8 inch) of shade height (6.35 mm per 2438 mm +/- 3.2 mm).
 - 2. Maximum offset from level: 1/16 inch per 5 feet of shade width (1.587 per 1524 mm of shade width).
- 3.3. ADJUSTING
- A. Adjust drive / brake mechanism of units for smooth operation. Adjust shade and shadecloth to hang flat without buckling or distortion. Replace any units or components which do not hang properly or operate smoothly.
- 3.4. 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 shadecloth, using non-abrasive materials and methods recommended by the Shadecloth Manufacturer. Remove and replace work which cannot be satisfactorily cleaned.
- 3.5. DEMONSTRATION
- A. Demonstrate operation method and instruct Owner's personnel in the proper operation and maintenance of the window shade systems.
- 3.6. SCHEDULES

END OF SECTION