

# SECTION 12492 – Automated RB 500 Roller Shade – Standard Motor with Centralized Intelligence ICG 4N1

1. GENERAL
	* + 1. RELATED DOCUMENTS

Retain or delete this article in all Sections of Project Manual.

* + - * 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
			1. SUMMARY
				1. Section Includes:

Hunter Douglas Architectural RB 500 Motor-operated roller shades with [**single**] [**double**] rollers with [**wired-**][**radio-**][**and** ][**networked-**]controls.

Hunter Douglas Architectural RB 500 Motor-operated roller shades with [**wired-**][**radio-**][**and** ][**networked-**]controls for skylights.

* + - * 1. Related Requirements:

Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

Section [**061000 "Rough Carpentry"**] [**061053 "Miscellaneous Rough Carpentry"**] for wood blocking and grounds for mounting roller shades and accessories.

Section 079200 "Joint Sealants" for sealing the perimeters of installation accessories for light-blocking shades with a sealant.

Section107113 "Exterior Sun Control Devices" for exterior shade systems.

Section122200 "Curtains and Drapes" for wired-, radio-, and networked-motor-operated soft window coverings.

Section122509 "Window Treatment Motors, Controls, and Networked Automation Systems" for other motor operators and motor controls.

Section260519 "Low-Voltage Electrical Power Conductors and Cables" for power cables.

Section260523 "Control-Voltage Electrical Power Cables" for balanced twisted pair cabling.

Section260943.16 "Addressable-Luminaire Lighting Controls" for lighting integration into digital shading systems.

Section260943.23 "Relay-Based Lighting Controls" for lighting integration into digital shading systems.

Section262726 "Wiring Devices" for accessory electrical wiring devices.

* + - 1. DEFINITIONS

Retain terms that remain after this Section has been edited for a project.

ac motors are available by special order; contact Somfy Systems for additional details.

* + - * 1. AC Line Voltage Motors: A tubular, asynchronous motor, 120Vac (60 Hz) single-phase motor, with an integral capacitor, and a thermally protected, permanently lubricated and maintenance free gearbox with a torque range lifting capacity from a minimum of 35.2 in-lbf (4 Nm) to a maximum of 885 in-lbf (100 Nm). Motor to fit into a tube with an inside diameter of 1.875 inches (48 mm). Minimum audible noise equal between 38 and 60 dBA according to the standards of ISO3741NF31022 in dBA ref.1pW at nominal torque without end product. Controller to be embedded microprocessor type or bus connection using RJ9/RJ45 (Radio and Digital motors). Standard, mechanical limit-switching motors are available through hardwired or plug-in connections.

Battery Operated, WireFreeTM DC Low-voltage FCC Certified Radio Technology Somfy® (RTS) Motor by Somfy Systems.

* + - * 1. Battery Operated, Wire-Free, DC Motors: A tubular or roll-up motor, permanently lubricated gearbox, maintenance free, maximum of 9.7 in-lbf (1.1 Nm) torque lifting capacity, must fit in a minimum tube inside diameter of 1.46 inch (37 mm). Motors must have embedded radio frequency microprocessor-based controller. Solar powered adaptable.

DC Low-voltage Sonesse® 30 Intelligent (RS485-SDN) Motor by Somfy Systems.

* + - * 1. Small Diameter (30 mm - inside end product tube diameter) DC Low-Voltage Motors: A tubular, thermally protected, permanently lubricated gearbox, maintenance free, minimum of 17.7 in-lbf (2 Nm) torque lifting capacity, must fit in a minimum tube inside diameter of 1.46 inch (37 mm). Motors must have embedded microprocessor-based controller and onboard serial communications port.

DC Low-voltage Sonesse® ULTRA 50 Intelligent (RS485-SDN) Motor by Somfy Systems.

* + - * 1. Large Diameter (50 mm - outside end product tube diameter) DC Low-Voltage Motors: Tubular, runtime protected, permanently lubricated gearbox, maintenance free, with a minimum 35.4 in-lbf (4 Nm) torque lifting capacity, and fits in a minimum tube inside diameter of 1.875 inches (48 mm). Motor speed adjustable between 10 and 25 RPM. Motors with a head that allows for a 3/4 inch (19 mm) light gap, three buttons for setup, and LED for feedback, status, and troubleshooting. Minimum audible noise equal to or less than 38 according to the standards of ISO3741NF31022 in dBA ref.1pW at nominal torque without end product. Motors with embedded microprocessor-based controller and onboard serial communications port (Radio or Digital Motors).
				2. DCT: Dry Contact Technology; dry contact (mercury-free) input for basic low-voltage switches via data (communication) cable switching.
				3. IP Rating: International (or Ingress) Protection Rating is defined by IEC60529 and classifies the degrees of protection provided against the intrusion of solid objects (including body parts like hands and fingers), dust, accidental contact, and water in electrical enclosures. The first digit classifies protection against solids (0 to 6) and the second digit (0 to 8) against liquids. The higher the number, the more protected.
				4. PA: Progressive Limit Adjustment motor head style. Ability to set various shade heights.
				5. RA: Rapid Adjustment motor head style. Ability to move between set heights quickly.

Radio Technical Somfy® (RTS) is Radio Technology.

* + - * 1. RT: Radio Technology; wireless radio control of motorized applications.
				2. Radio Technology Tubular Motor: Motor equipped with built-in radio receiver and concealed inside roller tube with 3-wire drive unit inside roller, instantly reversible, and lifetime lubricated.
				3. Roller Shades: Solar, thermal and blackout type shades that roll into a coil and unroll flat.

SDN 2.0 is "Somfy" Digital Network version2.0 of bus distribution devices.

Somfy Digital Network™ (SDN) is Somfy’s intelligent wired shading network. An SDN system is comprised of bus distribution devices that create a network for user interfaces, motorized applications and sensors to be connected. SDN is scalable, and suitable for both small and large projects, and the same components are used whether an SDN system remains standalone, integrated into third-party automation systems, or with Somfy’s animeo® IP automated total solar management system.

* + - * 1. Digital Network (DN); RS485 wired, bi-directional, bus control technology; integrated network automation system protocol allowing communication between devices and building management systems or stand-alone building automation systems.
				2. Tubular Motor: Motor equipped with disconnect plug concealed in aluminum tube; and connected to drive shaft through a reduction box.
				3. WireFree™: A battery-powered motor-operator with plug-in option for window treatments including shades, blinds, and draperies.
				4. WT: Wired Technology; control through standard AC (alternating current) or DC (direct current) via power or polarity switching.

For more Z-Wave® information, see https://www.somfysystems.com/products/controls-integration/z-wave and http://www.z-wave.com/.

* + - * 1. Z-Wave®: An interoperable, two-way RF mesh networking technology used for both residential and light commercial automation applications.

For more ZigBee® information, see https://www.somfysystems.com/products/controls-integration/zigbee and http://www.zigbee.org/.

* + - * 1. ZigBee®: The ZigBee® protocol is a low-powered RF mesh networking technology that uses a 2.4 Ghz standard for both residential and commercial applications.
			1. ADMINISTRATIVE REQUIREMENTS

Retain "Preinstallation Conference" Paragraph below if Work of this Section is extensive or complex enough to justify a conference. Refer to Section122509 for additional preinstallation conference requirements for motors and controls.

* + - * 1. Pre-installation Conference: Conduct conference at [**Project site**] <**Insert location**>.
			1. ACTION SUBMITTALS
				1. Product Data: For each type of product.

Include construction details, material descriptions, dimensions of individual components and profiles, features, finishes, and operating equipment and instructions for roller shades.

Include motor operator and controls assembly details, material descriptions, dimensions of individual components and profiles, features, finishes, operating equipment, control systems, power and signal types, electrical and communications requirements and connections, wiring diagrams, and installation instructions.

Sustainable design credits can be achievable when using motorized shades, blinds, windows, skylights, and other sun-control devices with networked automation controls, and potentially include LEED 2009, LEEDv4, Green Globes, IgCC, or ASHRAE189.1 credits during design and postconstruction using the following:

LEED v2009 EAc1 Credit: Optimize Energy Performance (1-19 points). Use whole-building energy simulation or calculations using ASHRAE Advanced Energy Design Guide and climate zone to analyze efficiency measures that include applying building management system sensor controlled and networked automation controlled motor-operated solar and thermal shade systems.

LEED v2009 EQ8.1 Credit: Daylight and views - daylight (1 point). Use option 1 "computer simulations" or option 2 "prescriptive" daylighting zone or option 3 "12 consecutive monthly measurements" showing illuminance levels are between 300 lux and 3,000 lux for 9 a.m. and 3 p.m., both on a clear-sky day at the equinox for regularly occupied floor areas, or option 4 "combination" of above methods to document the minimum daylight illumination of applicable spaces.

LEEDv4 EA Credit: Optimize Energy Performance (1-20 points). Use whole-building energy simulation or calculations using ASHRAE Advanced Energy Design Guide and climate zone to analyze efficiency measures that include applying building management system sensor controlled and networked automation controlled motor-operated solar and thermal shade systems.

LEEDv4 EQ Credit: Daylight (1-3 points). Use option 1 "computer simulations" or option 2 "computer modeling" or option 3 "12 consecutive monthly measurements" showing illuminance levels are between 300 lux and 3,000 lux for 9 a.m. and 3 p.m., both on a clear-sky day at the equinox for regularly occupied floor areas.

Green Globes v1.4: 3.3.1 Energy Performance. Meet requirements of Energy Star (0-100 points) or ASHRAE bEQ (30-125 points).

Green Globes v1.4: 3.7.3.1 Daylighting (1-3 points). Shading devices used to eliminate direct sunlight from reaching task areas; percentage of daylit areas with photo-sensors to maintain consistent lighting levels using shading and solar control devices.

IgCC v2.0, November 2010: 602 Energy Performance, Peak Power and Reduced Co2e Emissions.

IgCC v2.0, November 2010: 604: Energy Metering, Monitoring and Reporting. 604.3.3 Energy used for building operations (motorized shading systems).

IgCC v2.0, November 2010: 605: Automated Demand Response (AUTO-DR) Infrastructure.

IgCC v2.0, November 2010: 606 Building Envelope Systems; 606.1.1.1 Permanent shading devices for fenestration.

IgCC v2.0, November 2010: 612 Energy Systems Commissioning and Completion; 612.3.3 Automatic daylight controls.

IgCC v2.0, November 2010: 808 Daylighting; 808.3.2 Daylight performance requirements.

ASHRAE189.1-2014: 7 Energy Efficiency; 7.4.2.5 Permanent Projections, Exception (2) Vertical Fenestration with automatically controlled shading devices.

ASHRAE189.1-2014: 8.4.1 Daylighting; 8.4.1.3 Office Space Shading, a. Shading devices; Exception (3) Vertical Fenestration with automatically controlled shading devices.

ASHRAE 189.1-2014: 10.3.1.1.3 Systems, d. Fenestration control systems, Automatic controls for shading devices.

Sustainability submittals required for bidding/procurement in contract documents include shade control product data for interior lighting and daylighting.

* + - * 1. Sustainable Design Submittals:

Product Data: For interior lighting, submit data sheets for window shade [**and** **building management system interface and networked automation**] controls, including [**stand-alone**] [**and**] [**integrated**] system operation documentation.

Overall [**stand-alone**] [**and**] [**integrated**] system operation description document, Sequence of Operations.

Simulation documentation required for LEED credit accreditation.

Manufacturer must be able to submit Building Simulation Modelling to meet the requirements of Architect or engineer’s performance model of the building prior to receiving the awarded contract.

Building simulation for daylighting and building performance.

* + - * 1. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

Include plans, elevations, sections, and [**mounting**] details.

Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

Motor-Operated Shades: Include details of installation and diagrams for power, signal, wiring and [**standard motors**][**,**][**radio motors**] [**and**] [**networked motors**].

Retain "Samples" Paragraph below for single-stage Samples, with a subordinate list if applicable. Retain "Samples for Initial Selection" and "Samples for Verification" paragraphs for two-stage Samples.

* + - * 1. Samples: For each exposed product and for each color and texture specified, 10 inches (250 mm) long.
				2. Samples for Initial Selection: For each type and color of shadeband material.

Include Samples of accessories involving color selection.

* + - * 1. Samples for Verification: For each type of roller shade.

Shadeband Material: Not less than [**10 inches (250 mm)**] [**3 inches (76 mm)**] square. Mark interior face of material if applicable.

Roller Shade: Full-size operating unit, not less than 16 inches (400 mm) wide by 36 inches (900 mm) long for each type of roller shade indicated.

Installation Accessories: Full-size unit, not less than 10 inches (250 mm) long.

* + - * 1. Product Schedule: For roller shades, motor operators, [**network**] controls, and controllers.[**Use same designations indicated on Drawings.**]
			1. INFORMATIONAL SUBMITTALS

Coordinate "Qualification Data" Paragraph below with qualification requirements in Section 014000 "Quality Requirements" and as may be supplemented in "Quality Assurance" Article.

* + - * 1. Qualification Data: For manufacturer and Installer.

Retain "Product Certificates" Paragraph below to require submittal of "UL," "c TUV us," "CCC," or "CE" product certificates from motor operator and control system manufacturer.

All Somfy motors are UL recognized or listed and can be found by searching "Somfy" under "Company Name" in the UL database at http://database.ul.com/cgi-bin/XYV/cgifind/LISEXT/1FRAME/index.html.

* + - * 1. Product Certificates: For each type of shadeband material, motor operator and control system.

Retain Zigbee® option below for wired motors; delete for WireFree.

[**BACnet® MS/TP**] [**BACnet® IP**] [**Modbus™**] [**Z-Wave®**] [**Zigbee®**] BMS or other third-party certification.

Submit functional description for data points required by BMS system.

Submit documentation that line voltage components are UL listed or UL recognized.

* + - * 1. Sample Warranty: For manufacturer's warranty.
			1. CLOSEOUT SUBMITTALS
				1. Operation and Maintenance Data: For roller shades, motor operators, and control systems to include in maintenance manuals.
				2. Warranty: For manufacturer's executed warranty documentation.
			2. MAINTENANCE MATERIAL SUBMITTALS
				1. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

Roller Shades: Full-size units equal to 5 percent of quantity installed for each size, color, and shadeband material indicated, but no fewer than [**two**] <**Insert number**> units.

* + - 1. QUALITY ASSURANCE

dc (direct current) powered motor-operators that are UL recognized or listed. DC powered motors offer very high torque capability compared to their weight and size. AC motors have the advantage of not having brushes to maintain, but are heaver and larger sized and require sophisticated controllers capable of inverting DC to AC at varying frequencies.

Somfy has over 40 years’ experience manufacturing tubular motors and natural light control systems with over 150 million motors sold worldwide.

* + - * 1. Manufacturer Qualifications: Motor operators, controls, and controllers certified by an NRTL to provide UL recognized or listed wired AC and DC powered motors.

ISO9001 certified including in-house engineering and product design activities.

Controls manufacturer capable of supplying commissioning services for control systems.

Motor manufacturer capable of supplying a full range of wirefree (12Vdc - battery and solar powered) direct voltage DC (24Vdc), main or line-voltage (120Vac) motor and control products.

* + - * 1. Installer Qualifications: Trained[ **and certified**] by manufacturer of motor-operator and control system products.
				2. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, to verify operation[**with** **standalone** **control**][**with** **networked** **control**], and to set quality standards for fabrication and installation.

Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

Retain subparagraph below if the intention is to make an exception to the default requirement in Section 014000 "Quality Requirements" for demolishing and removing mockups.

Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

* + - 1. DELIVERY, STORAGE, AND HANDLING
				1. Deliver roller shades, motor operators, control systems and accessories in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.
				2. Store equipment indoors in clean, dry space with uniform temperature to prevent condensation. Protect from exposure to dirt, fumes, water, corrosive substances, and physical damage.
			2. FIELD CONDITIONS
				1. Environmental Limitations: Do not install roller shades, motor operators, and control systems until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
				2. Field Measurements: Where roller shades, motor operators and control systems are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings.

Allow clearances for operating hardware of operable glazed units through entire operating range.

Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

* + - 1. WARRANTY

When warranties are required, verify with Owner's counsel that warranties stated in this article are not less than remedies available to Owner under prevailing local laws.

Somfy motors have a life expectancy of 10 years or more. Refer to Somfy Systems Warranty information at the following link www.somfysystems.com/about-us/warranty/.

* + - * 1. Special Warranty for Motor and Control Systems: Manufacturer agrees to repair or replace motor and control units that are not free from defects in material and workmanship under normal and proper use within specified full warranty period, not prorated.

Warranty Period: Five years from date of manufacture.

1. PRODUCTS

Manufacturers and products listed in SpecAgent and Masterworks Paragraph Builder are neither recommended nor endorsed by the AIA or ARCOM. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

* + - 1. MANUFACTURERS

For Somfy motors, see https://www.somfysystems.com/commercial/motors.

For Somfy control systems, see https://www.somfysystems.com/commercial/control-systems.

* + - * 1. Source Limitations: Obtain roller shades from single source from single manufacturer.
			1. MOTOR-OPERATED, SINGLE-ROLLER SHADES
1. ACCEPTABLE MANUFACTURER
2. Hunter Douglas Architectural Window Coverings – 13915 Danielson Street, Suite 100, Poway, CA 92064; Phone 800.727.8953 x1; Fax 800.205.9819; Website [www.hunterdouglasarchitectural.com/windowcoverings](http://www.hunterdouglasarchitectural.com/windowcoverings); or architect approved equivalent.
3. Request for substitutions must be approved by architect minimum of 30 days prior to close of bid.
4. Find a representative: [http://www.hunterdouglasarchitectural.com/contacts/index.jsp#](http://www.hunterdouglasarchitectural.com/contacts/index.jsp)

Retain "Standard Motors with Wired Controls," "Radio Controlled Motors," or "Networked Automation Controlled Motors" Paragraph below

 Motor sound ratings determined according to ISO3741 (http://www.iso.org/iso/home/store/catalogue\_tc/catalogue\_detail.htm?csnumber=52053).

* + - * 1. Standard Motors with Wired Controls: Provide factory-assembled, shade-operator system, complete with electric motor and factory-prewired motor controls with a connector that disconnects motor from power, enclosures protecting controls and operating parts, and accessories necessary for a complete installation. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.

Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

If required, insert manufacturers' description of alternative motor that is available (for example, "quiet operation" motor, and so forth) in "Basis-of-Design Electric Motor" Subparagraph below. Sonesse 50 RA is UL rated SJTW 18 AWG as both Interior and Exterior rated.

Basis-of-Design Electric Motor: Hunter Douglas Architectural Motor operated RB500 Roller Shade; [**Sonesse® 40 WT**] [**LS-40 WT**] [**LT-50 RA**] [**Sonesse® 50 RA**] [**Sonesse® 50 PA**] [**Sonesse® ULTRA 50 RA**] [**Roll Up Wired**™ **R28**]; tubular, enclosed in roller.

Motor Electrical Characteristics: [**110-V ac, 60 Hz**] [**120-V ac, 60 Hz**] [**24-V dc**] <**Insert requirements**>.

Power Cable: [**4-wire cable (hard wired)**] [**4-wire cable with molded Anderson plug**] [**2-wire cable (JST connectors)**].

Shade Characteristics of Motor:

Total shade widths are contingent upon shade hardware.

Maximum Total Shade Width: [**As required to operate roller shades indicated**] <**Insert requirements**>.

Max shade drops are contingent upon shade hardware and maximum turns on the limit switch.

Maximum Shade Drop: [**As required to operate roller shades indicated**] <**Insert requirements**>.

Motor manufacturer to offer a motor capable of handling shade manufacturer hardware.

Maximum Weight Capacity: Motor range to provide 53.1 to 443 in-lbf (6 to 50 Nm) lifting capacity options. [**As required to operate roller shades indicated**] <**Insert requirements**>.

Retain "Minimum Audible Noise" Subparagraph below to meet more stringent project noise requirements. Use Somfy ULTRA motors to meet requirements. Sound Level correlates with Torque.

Minimum Audible Noise: Minimum audible noise equal to or less than 38 dBA according to the standards of ISO3741NF31022 in dBA ref.1pW at nominal torque without end product.

Retain one of two "Motor Control" subparagraphs below and revise to suit Project.

Motor Control:

Single Motor Control:

Wired Individual Button Control Station: Momentary-contact, wall-switch-operated control station with open, close, and center off functions.

Keyed Control Station: Keyed, [**maintained**] [**momentary**]-contact, three-position, switch-operated control station with open, close, and off functions. Provide two keys per station.

Switch Control Station: [**Maintained**] [**Momentary**]-contact, wall-switch-operated control station with open, close, and center off functions.

Switch Positions: [**Three**] [**Five**].

Switch Style: [**Toggle**] [**Rocker**].

Group Motor Control:

Wired Group Control Station: Managed control of individual or groups of standard motors though a microcontroller-based device.

Individual Control: One motor at a time.

Group Control: Definable group.

User Interface: 6-button keypad.

Setup: Auto detect run timing and hard mechanical limit switch with current sensing.

Microprocessor Control: Electronic programmable means for setting, changing, and adjusting control features; isolated from voltage spikes and surges.

Microprocessor Control available in gray finish only.

Basis-of-Design Product: Hunter Douglas Architectural Window Coverings; IGC4N1.

Basis-of-Design Product: Hunter Douglas Architectural Window Coverings; animeo® IB+ Motor Controller.

Color: [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

Limit Switches: Adjustable switches, interlocked with motor controls and set to stop shade movement automatically at fully raised and fully lowered positions.

Operating Features:

Time calculated positioning:

Alignment of multiple shades in a group.

Three automatically set and adjustable recallable intermediate positions in between the upper and lower travel of the shade.

Group switching with integrated switch control; single faceplate for multiple switch cutouts.

Capable of interface with [**audiovisual**] [**multiroom**] [**building management system**] <**Insert description**> control system.

Capable of accepting input from building automation control system.

Retain first subparagraph below for sensor- or timer-controlled systems.

Override switch.

Accessories:

Radio Control Adapter Kit: Adapts standard motors for radio control using a RTS receiver for dry contact.

Basis-of-Design Product: Hunter Douglas Architectural Window Coverings; IGC4N1 RTS Radio receiver.

Network Control Components: Adapts standard motors for timer/sensor or local radio control or via dry contact.

Timer and sensor control logic are available with animeo® systems able to operate Wired Technology® motors.

Basis-of-Design Products: Hunter Douglas Architectural Window Coverings; animeo® IB+ and/or animeo® Solo controllers.

Timer Control: Clock timer based on astronomic timeclock with 60-minute offset, [**24-hour**] [**seven-day**] <**Insert period**> programmable for regular events.

Sun Sensor Control: Adjustable system consisting of digital displays detecting sun intensity and responding by automatically adjusting shades.

Local control carried out via dry contact allowing for the use of any manufacturer’s dry contact switch.

URTSI is used to integrate Somfy motors with other control technologies made by Somfy or other key players in the industry. For more information, refer to Section122509.

* + - * 1. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

Roller Drive-End Location: [**Right side of interior face of shade**] [**Left side of interior face of shade**] [**As indicated on Drawings**] <**Insert requirements**>.

Coordinate direction of roll with fascia, headbox, or shade-pocket design.

Direction of Shadeband Roll: [**Regular, from back (exterior face) of roller**] [**Reverse, from front (interior face) of roller**].

Shadeband-to-Roller Attachment: [**Manufacturer's standard method**] [**Adhesive strip**] [**Removable spline fitting into integral channel in tube**] <**Insert description**>.

Types and sizes of mounting hardware vary among manufacturers. Revise "Mounting Hardware" Paragraph below if specific types of hardware (for example, extended brackets or slim-profile brackets) are required. Where hardware dimensions are critical, indicate installation conditions and size constraints on Drawings.

* + - * 1. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

If retaining "Roller-Coupling Assemblies" Paragraph below, indicate locations and quantities of rollers joined with coupling assemblies on Drawings or in a window-treatment schedule.

* + - * 1. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers that are operated by one roller drive-end assembly.
				2. Shadebands:

Coordinate option retained in "Shadeband Material" Subparagraph below with requirements specified in "Shadeband Materials" Article.

Shadeband Material: [**Light-filtering fabric**] [**Light-blocking fabric**] <**Insert requirements**>.

Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.

Bottom bars vary among manufacturers; insert requirements for specific type and shape in "Type" Subparagraph below.

Methods of sealing light gaps at bottoms of shades vary among manufacturers. Exposed bottom bars with integral light seals are available from many of the manufacturers.

Type: [**Enclosed in sealed pocket of shadeband material**] [**Exposed with endcaps**] [**Exposed with endcaps and integral light seal at bottom where it meets the sill**] <**Insert description**>.

Retain "Color and Finish" Subparagraph below for exposed bottom bars.

Color and Finish: [**As selected by Architect from manufacturer's full range**] <**Insert color and finish**>.

* + - * 1. Installation Accessories:

Retain "Front Fascia" or "Exposed Headbox" Subparagraph below for exposed roller enclosures. Retain "Exposed Headbox" Subparagraph for light-blocking shades.

Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.

Shapes and heights of fasciae vary among manufacturers.

Shape: [**L-shaped**] [**Curved**] <**Insert requirements**>.

Height: Manufacturer's standard height required to conceal roller and shadeband assembly when shade is fully open, but not less than [**4 inches (102 mm)**] [**3 inches (76 mm)**] <**Insert dimension**>.

Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure.

Height: Manufacturer's standard in height required to enclose roller and shadeband assembly when shade is fully open, but not less than [**4 inches (102 mm)**] [**3 inches (76 mm)**] [**as indicated on Drawings**] <**Insert dimension**>.

If retaining "Endcap Covers" Subparagraph below, verify availability with manufacturers.

Endcap Covers: To cover exposed endcaps.

Retain "Recessed Shade Pocket" Subparagraph below for roller enclosure installed above the ceiling.

Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.

Height: Manufacturer's standard height required to enclose roller and shadeband assembly when shade is fully open, but not less than [**6 inches (152 mm)**] [**5 inches (127 mm)**] [**4 inches (102 mm)**] [**height indicated on Drawings**] <**Insert dimension**>.

Provide pocket with lip at lower edge to support acoustical ceiling panel.

Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recess or pocket and for snap-in attachment to wall clip without fasteners.

Widths of closure panels vary among manufacturers.

Closure-Panel Width: [**As indicated on Drawings**] [**2 inches (51 mm)**] <**Insert dimension**>.

Retain "Side Channels" and "Bottom (Sill) Channel or Angle" subparagraphs below for light-blocking shades.

Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.

Methods of sealing light gaps at bottoms of shades vary among manufacturers. Shadeband bottom bars fit into bottom channels or butt against bottom angles to seal light leaks.

Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.

Installation Accessories Color and Finish: [**As selected from manufacturer's full range**] <**Insert color and finish**>.

Accessories:

Radio Control Adapter Kit: Adapts standard motors for radio control using an RTS receiver for dry contact.

Basis-of-Design Product: Hunter Douglas Architectural Window Coverings; IGC4N1 RTS Radio receiver.

Network Control Components: Adapts standard motors for timer/sensor or local radio control or via dry contact.

Timer and sensor control logic are available with animeo® systems able to operate Wired Technology® motors.

Basis-of-Design Products: Hunter Douglas Architectural Window Coverings; animeo® IB+ and/or animeo® Solo controllers

Timer Control: Clock timer based on astronomic timeclock with 60-minute offset, [**24-hour**] [**seven-day**] <**Insert period**> programmable for regular events.

Sun Sensor Control: Adjustable system consisting of digital displays detecting sun intensity and responding by automatically adjusting shades.

Local control carried out via dry contact allowing for the use of any manufacturers dry contact switch.

* + - * 1. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shades for service.

Coordinate option retained in "Double-Roller Mounting Configuration" Subparagraph below with available space. Side-by-side mounting is wider than offset mounting; offset mounting is taller than side-by-side mounting.

Double-Roller Mounting Configuration: [**Side by side**] [**Offset, outside shade over and inside shade under**] <**Insert requirements**>.

Inside Roller:

Drive-End Location: [**Right side of interior face of shade**] [**Left side of interior face of shade**] [**As indicated on Drawings**] <**Insert requirements**>.

Coordinate direction of roll with mounting configuration, fascia, headbox, or shade-pocket design.

Direction of Shadeband Roll: [**Regular, from back (exterior face) of roller**] [**Reverse, from front (interior face) of roller**].

Outside Roller:

Drive-End Location: [**Right side of interior face of shade**] [**Left side of interior face of shade**] [**As indicated on Drawings**] <**Insert requirements**>.

Coordinate direction of roll with mounting configuration, fascia, headbox, or shade-pocket design.

Direction of Shadeband Roll: [**Regular, from back (exterior face) of roller**] [**Reverse, from front (interior face) of roller**].

Shadeband-to-Roller Attachment: [**Manufacturer's standard method**] [**Adhesive strip**] [**Removable spline fitting into integral channel in tube**] <**Insert description**>.

Types and sizes of mounting hardware vary among manufacturers. Revise "Mounting Hardware" Paragraph below if specific types of hardware (for example, one-piece, double-roller brackets) are required. Where hardware dimensions are critical, indicate installation conditions and size constraints on Drawings.

* + - * 1. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller mounting configuration, roller assemblies, operating mechanisms, installation accessories, and installation locations and conditions indicated.

If retaining "Roller-Coupling Assemblies" Paragraph below, indicate locations and quantities of rollers joined with coupling assemblies on Drawings or in a window-treatment schedule.

* + - * 1. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.
				2. Inside Shadebands:

Typically, light-filtering shadebands are installed on the inside rollers and light-blocking shadebands are installed on the outside rollers in double-roller configurations. Coordinate option retained in "Shadeband Material" Subparagraph below with requirements specified in "Shadeband Materials" Article.

Shadeband Material: [**Light-filtering fabric**] <**Insert requirements**>.

Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.

Bottom bars vary among manufacturers; insert requirements for specific type and shape in "Type" Subparagraph below.

Type: [**Enclosed in sealed pocket of shadeband material**] [**Exposed with endcaps**] <**Insert description**>.

Retain "Color and Finish" Subparagraph below for exposed bottom bars.

Color and Finish: [**As selected by Architect from manufacturer's full range**] <**Insert color and finish**>.

* + - * 1. Outside Shadebands:

Coordinate option retained in "Shadeband Material" Subparagraph below with requirements specified in "Shadeband Materials" Article.

Shadeband Material: [**Light-blocking fabric**] <**Insert requirements**>.

Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.

Bottom bars vary among manufacturers; insert requirements for specific type and shape in "Type" Subparagraph below.

Methods of sealing light gaps at bottoms of shades vary among manufacturers. Exposed bottom bars with integral light seals are available from many of the manufacturers.

Type: [**Enclosed in sealed pocket of shadeband material**] [**Exposed with endcaps**] [**Exposed with endcaps and integral light seal where bottom (sill) channels are indicated**] <**Insert description**>.

Retain "Color and Finish" Subparagraph below for exposed bottom bars.

Color and Finish: [**As selected by Architect from manufacturer's full range**] <**Insert color and finish**>.

* + - * 1. Installation Accessories:

Retain "Front Fascia" or "Exposed Headbox" Subparagraph below for exposed roller enclosures. Retain "Exposed Headbox" Subparagraph for light-blocking shades.

Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.

Shapes and heights of fasciae vary among manufacturers.

Shape: [**L-shaped**] [**Curved**] <**Insert requirements**>.

Height: Manufacturer's standard height required to conceal roller and shadeband assembly when shade is fully open, but not less than [**4 inches (102 mm)**] [**3 inches (76 mm)**] <**Insert dimension**>.

Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure.

Height: Manufacturer's standard height required to enclose roller and shadeband assembly when shade is fully open, but not less than [**4 inches (102 mm)**] [**3 inches (76 mm)**] [**as indicated on Drawings**] <**Insert dimension**>.

If retaining "Endcap Covers" Subparagraph below, verify availability with manufacturers.

Endcap Covers: To cover exposed endcaps.

Retain "Recessed Shade Pocket" Subparagraph below for roller enclosure installed above the ceiling.

Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.

Height: Manufacturer's standard height required to enclose roller and shadeband assembly when shade is fully open, but not less than [**6 inches (152 mm)**] [**5 inches (127 mm)**] [**4 inches (102 mm)**] [**height indicated on Drawings**] <**Insert dimension**>.

Provide pocket with lip at lower edge to support acoustical ceiling panel.

Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recesses or pockets and for snap-in attachment to wall clip without fasteners.

Widths of closure panels vary among manufacturers.

Closure-Panel Width: [**As indicated on Drawings**] [**2 inches (51 mm)**] <**Insert dimension**>.

Retain "Side Channels" and "Bottom (Sill) Channel or Angle" subparagraphs below for light-blocking shades.

Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.

Methods of sealing light gaps at bottoms of shades vary among manufacturers. Shadeband bottom bars fit into bottom channels or butt against bottom angles to seal light leaks.

Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.

Installation Accessories Color and Finish: [**As selected from manufacturer's full range**] <**Insert color and finish**>.

* + - 1. ADJUSTING
				1. Adjust and balance roller shades and motorized equipment to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

Program each motor-operator control system to [**manufacturer’s standard settings**] [**Owner-provided program settings**].

* + - * 1. Commissioning Control Systems: Perform commissioning of integrated automation control systems[**and connection to building management system**].

Managed by [**shade manufacturer/supplier**] [**motor and control manufacturer**] [**digital network integrator**] <**Insert name of commissioning agency**>.

Contact manufacturer for fee-based window treatment control system commissioning support.

System should be commissioned and operation based on pre-project planning and optimal system performance led by occupant comfort or energy savings.

Control systems to be commissioned on a per-floor basis followed by complete system programming of the window treatment network.

* + - 1. CLEANING AND PROTECTION
				1. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.
				2. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
				3. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.
			2. CLOSEOUT ACTIVITIES

Retain this article for motorized roller shades.

* + - * 1. Demonstration and Training: Engage a factory-authorized service representative to demonstrate and train Owner's maintenance personnel to adjust, operate, and maintain motor-operated roller shades and[**networked automation**] motor control systems.

**END OF SECTION 12492**