Preparing Activity: USACE Superseding
UFGS-12 24 13 (August 2017)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
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SECTION 12 24 13

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08/20

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USACE / NAVFAC / AFCEC / NASA **UFGS-12 24 13 (August 2020)**

Preparing Activity: USACE **Superseding**
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UNIFIED FACILITIES GUIDE SPECIFICATIONS

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****

SECTION 12 24 13

ROLLER WINDOW SHADES
08/20

****
NOTE: This guide specification covers the requirements for roller window shades and hardware.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

PART 1 GENERAL

****
NOTE: Use Section 12 21 00 for WINDOW BLINDS. Use Section 12 22 00 for CURTAINS AND DRAPES
****

1.1 REFERENCES

****
NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's

Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI/WCMA A100.1	(2018) American National Standard for Safety of Window Covering Products

ASTM INTERNATIONAL (ASTM)

ASTM G21	(2015; R 2021; E 2021) Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 6	(1993; R 2016) Industrial Control and Systems: Enclosures

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701	(2023; ERTA 1 2023) Standard Methods of Fire Tests for Flame Propagation of Textiles and Films

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS	SCS Global Services (SCS) Indoor Advantage

UNDERWRITERS LABORATORIES (UL)

UL 325	(2017; Reprint Feb 2020) UL Standard for Safety Door, Drapery, Gate, Louver, and Window Operators and Systems
UL 2818	(2022) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

1.2 SUBMITTALS

****

NOTE: Review submittal description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification

technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a “G” to an item, if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

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Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES

SD-02 Shop Drawings

Detailed Drawings; G[, [_____]]

Location Schedule; G[, [_____]]

SD-03 Product Data

Window Shades; G[, [_____]]

[Recycled Content for various fiber components; S

] SD-04 Samples

Window Shades; G[, [_____]]

SD-06 Test Reports

Flammability Requirements; G[, [_____]]

SD-07 Certificates

[Indoor Air Quality for roller window shades; S

] Qualifications

SD-10 Operation and Maintenance Data

Window Shades, Data Package 1; G[, [_____]]

SD-11 Closeout Submittals

Submit Data Package 1 for roller window shades, and Data Package 2 for electrical operators, in accordance with Section 01 78 23 OPERATIONS AND MAINTENANCE DATA.

[1.3 CERTIFICATES

1.3.1 Indoor Air Quality Certifications

1.3.1.1 Roller Window Shades

****
NOTE: The Government's preference is for use of products that have been certified for indoor air quality by a third-party organization such as Greenguard or SCS Global Services. However, verify there is a certified product available that is both cost effective and appropriate for the project.
****

Provide products certified to meet indoor air quality requirements by UL 2818 (Greenguard) [Gold], SCS Global Services Indoor Advantage Gold or provide validation by other third-party program that products meet the requirements of this paragraph. Provide current product certification documentation from certification body.

]1.4 QUALITY ASSURANCE

1.4.1 Qualifications

1.4.1.1 Installer's Qualifications

Installer trained and certified by the manufacturer with a minimum of ten years of experience in installing products comparable to those specified in this section.

1.4.2 Flammability Requirements

Passes in accordance with NFPA 701 small and large-scale vertical burn. Materials tested are identical to products proposed for use.

1.4.3 Electrical Requirements

NFPA Article 100 listed and labeled in accordance with UL 325 or other testing agency acceptable to authorities having jurisdiction, marked for intended use, and tested as a system. Individual testing of components is not acceptable in lieu of system testing.

1.4.4 Anti-Microbial Requirements

'No Growth' per ASTM G21 results for fungi ATCC9642, ATCC 9644, ATCC9645.

1.5 DELIVERY, STORAGE, AND HANDLING

Deliver components to the jobsite in the manufacturer's original packaging with the brand or company name, item identification, and project reference clearly marked. Store components in a dry location that is adequately ventilated and free from dust, water, or other contaminants and has easy access for inspection and handling. Store materials flat in a clean dry area with temperature maintained above 10 degrees C 50 degrees F. Do not open containers until needed for installation unless verification inspection is required. Handle and store shades in accordance with manufacturer's recommendations.

1.6 WARRANTY

Provide manufacturer's warranty to repair or replace defective materials and workmanship for a period of [10] [_____] years from date of final acceptance of the work.

PART 2 PRODUCTS

****
NOTE: Coordinate with the drapery hardware specified for the project.
****

2.1 WINDOW SHADES

****
NOTE: Window shade options will include manual single or dual shade and motor-operated single or dual shade. Light filtering shade cloth is translucent in varying shades of opacity. Room darkening shades are opaque and block out light completely.

The designer should specify a complete room darkening system only if total light block is necessary, as in an audio visual application. A room darkening shade is typically made of a vinyl coated fiberglass cloth. Do not specify cotton cambric fabric for room darkening shades since it cannot provide total light block. Coordinate maximum unit sizes available with the window sizes.

Attachment of fabric to roller tube with double sided adhesive is not recommended.

Recycled content is affected by openness factor. Projects need to balance the desired openness factor with all other requirements including recycled content, aesthetics, color and energy efficiency.
****

Submit drawings showing plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and

relationship to work. Submit a location schedule showing location, size and quantity of shades. Include the use of same room designations as indicated on the drawings.

Provide product data composed of catalog cuts, brochures, and operating and maintenance instructions on each product to be used. Include styles, profiles and features.

Furnish samples of each type and color of roller shade fabric and roller shade channel. Provide shade material minimum 150 by 150 mm 6 by 6 inches in size. Mark face of material to indicate interior faces.

Mock up: Install shade in area designated by Contracting Officer. Do not proceed with remaining work until the Contracting Officer approves workmanship and operation. Rework mock up as required to produce acceptable work. The approved shade can be used in the installation.

Submit fire resistance data, flame spread and smoke contribution data.

Provide roller tube that operates smoothly and of sufficient diameter and thickness to prevent excessive deflection. Provide brackets that are appropriate for [inside][outside][ceiling] mount. Provide shade cloth meeting the performance described in NFPA 701, small scale test. Treat steel features for corrosion resistance.

Provide Various Fiber Components with a minimum of 60 percent recycled content. Provide data identifying percentage of recycled content for various fiber components.

****

NOTE: Included bracketed sentence below requiring products with indoor air quality certifications when product will be located in offices or classrooms.

****

[Provide certification of indoor air quality for roller window shades.]

2.1.1 Manufacturer's Qualifications

Obtain motor-controlled roller shades through one source from a single manufacturer with a minimum of twenty years of experience and minimum of three projects of similar scope and size in manufacturing products comparable to those specified in this section. Furnish manual and motorized shades produced by the same manufacturer to provide matching appearance.

2.1.2 Manually Operated Shades with Single Rollers

2.1.2.1 Chain-and-Clutch Operating Mechanisms

Provide continuous-loop bead chain and clutch that stops shade movement when bead chain is released; shade to be permanently adjusted and lubricated.

2.1.2.2 Bead Chains

Provide bead chain from #10 stainless steel rated to 400N 90 lb. minimum breaking strength with pull chain tensioning device complying with ANSI/WCMA A100.1

a. Loop Length: [Full length of roller shade][As indicated].

b. Limit Stops: Allows shade to stop when chain is released. Provide limit stops to prevent shade from being raised or lowered too far.

c. Chain-Retainer Type: [Clip, jamb mount][Chain tensioner, jamb mounted][Chain tensioner, sill mounted].

[2.1.2.3 Crank-and-Gear Operating Mechanisms

Sealed gearbox drive system controlled by crank handle, [detachable][permanently mounted].

a. Crank-Handle Length: [Manufacturer's standard for height of shade][As indicated on drawings].

[b. Coupling system: Provide system to operate shades from single crank by coupling shade rollers together. System to consist of endcaps, plus couplings to connect rollers.

]]2.1.2.4 Rollers

Provide corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shade bands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shade cloth for service.

a. Roller Drive-End Location: [Right side of interior face of shade][Left side of interior face of shade][As indicated].

b. Direction of Shade cloth Roll: [Regular, from back (exterior face) of roller][Reverse, from front (interior face) of roller].

c. Shade cloth-to-Roller Attachment: [Manufacturer's standard method][Removable spline fitting into integral channel in tube]. Adhesive attachment is not acceptable.

2.1.2.5 Mounting Hardware

Provide corrosion resistant brackets or endcaps compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated. Provide hardware that allows for field adjustment or removal of shade roller tube and other operable hardware component without removal of brackets and end or center supports.

2.1.2.6 Shade Cloth

a. Shade Material: [Light-filtering fabric: Openness [1 percent][3 percent][5 percent][_____]][Light-blocking fabric].

b. Shade Cloth Bottom (Hem) Bar: Steel or extruded aluminum. Provide shade bar [enclosed in sealed pocket of shade band material][exposed with endcaps][exposed with endcaps and integral light seal at bottom where it meets the sill].

2.1.2.7 Installation Accessories

a. Front Fascia: L-shaped aluminum extrusion to conceal shade roller

and hardware that snaps onto end caps without requiring exposed fasteners of any kind. Fascia can be mounted continuously across two or more shade bands. Provide manufacturers standard height fascia as required to conceal roller and shade band assembly when shade is fully open.

[b. Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure. Provide manufacturers standard height fascia as required to conceal roller and shade band assembly when shade is fully open.

] c. Endcaps: Extruded aluminum with universal design suitable for mounting to window mullions. Provide size compatible with roller size. Provide end cap covers matching fascia/headbox finish.

[d. 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. Provide manufacturers standard height fascia as required to conceal roller and shade band assembly when shade is fully open. Provide pocket with lip at lower edge to support acoustical ceiling panel.

][e. 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.

][2.1.2.8 Room Darkening Shades

Provide room darkening (black-out) window shades designed to eliminate all visible light gaps when shades are fully closed and conform with the following:

a. Provide roller tube made of aluminum. Provide shop fabricated light traps consisting of a head box to house the roller shade, and U-shaped channels to serve as guides for the shade along the sides and to receive the bottom edge of the shade along the sill.

b. Provide light trap made of sheet steel having a minimum thickness of 0.64 mm 22 gauge or anodized, extruded, aluminum. Provide legs of the channels not less than 44 mm 1-3/4 inches long and separated by the minimum distance that permits free operation of the shade. Edges of light trap coming into contact with the shade cloth are smooth pile light seal. The exposed face of the head box is hinged or removable for access to the shade roller. The interior or unexposed surfaces of the light trap have a finish coat of flat black enamel. The exposed portions of the light trap have a factory-applied priming coat of gray paint.

c. Provide type of cloth for blackout purposes. Provide shade from a single piece of [PVC polyester][PVC fiberglass][PVC free material][_____].

d. Fit the bottom edge of the shade with a steel operating bar. Shades to engage positively with bottom rail through operating bar or chain pull. Paint bars with flat black enamel. Make pull cords of No. 4 braided nylon or beaded chain having not less than 778 N 175 pounds breaking strength.

]2.1.3 Manually Operated Shades with Dual Rollers

2.1.3.1 Chain-and-Clutch Operating Mechanisms

Provide continuous-loop bead chain and clutch that stops shade movement when bead chain is released; shade to be permanently adjusted and lubricated.

2.1.3.2 Bead Chains

Provide bead chain from #10 stainless steel rated to 400 N 90 lb. minimum breaking strength with pull chain tensioning device complying with ANSI/WCMA A100.1. Provide positive mechanical engagement of drive mechanism to shade roller tube. Center bead chain placement for right or left- hand operation.

a. Loop Length: [Full length of roller shade][As indicated].

b. Limit Stops: Allows shade to stop when chain is released. Provide limit stops to prevent shade from being raised or lowered too far.

c. Chain-Retainer Type: [Clip, jamb mount][Chain tensioner, jamb mounted][Chain tensioner, sill mounted].

[2.1.3.3 Crank-and-Gear Operating Mechanisms

Sealed gearbox drive system controlled by crank handle, [detachable][permanently mounted].

a. Crank-Handle Length: [Manufacturer's standard for height of shade][As indicated].

[b. Coupling system: Provide system to operate shades from single crank by coupling shade rollers together. System to consist of endcaps, plus couplings to connect rollers.

]]2.1.3.4 Rollers

Provide corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shade bands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shade bands for service.

a. Dual Shade-Roller Mounting Configuration: [Side by Side][Offset][_____].

b. Inside Roller: Drive-End Location: [Right side of interior face of shade][Left side of interior face of shade][As indicated on drawings]. Direction of Shade cloth Roll: [Regular, from back (exterior face) of roller][Reverse, from front (interior face) of roller].

c. Outside Roller: Drive-End Location: [Right side of interior face of shade][Left side of interior face of shade][As indicated]. Direction of Shade cloth Roll: [Regular, from back (exterior face) of roller] [Reverse, from front (interior face) of roller].

d. Shade cloth-to-Roller Attachment: [Manufacturer's standard method][Removable spline fitting into integral channel in tube]. Adhesive attachment is not acceptable.

2.1.3.5 Mounting Hardware

Provide corrosion resistant brackets or endcaps compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated. Provide hardware that allows for field adjustment or removal of shade roller tube and other operable hardware component without removal of brackets and end or center supports.

2.1.3.6 Inside Shade Cloth

a. Shade Material: [Light-filtering fabric: Openness [1 percent][3 percent][5 percent][_____]][Light-blocking fabric].

b. Shade Cloth Bottom (Hem) Bar: Steel or extruded aluminum. Provide shade bar [enclosed in sealed pocket of shade cloth material][exposed with endcaps][exposed with endcaps and integral light seal at bottom where it meets the sill].

2.1.3.7 Outside Shade Cloth

a. Shade Material: [Light-filtering fabric: Openness [1 percent][3 percent][5 percent][_____]][Light-blocking fabric].

b. Shade Cloth Bottom (Hem) Bar: Steel or extruded aluminum. Provide shade bar [enclosed in sealed pocket of shade cloth material][exposed with endcaps][exposed with endcaps and integral light seal at bottom where it meets the sill].

2.1.3.8 Installation Accessories

a. Front Fascia: L-shaped aluminum extrusion to conceal shade roller and hardware that snaps onto end caps without requiring exposed fasteners of any kind. Fascia can be mounted continuously across two or more shade bands. Provide manufacturers standard height fascia as required to conceal roller and shade band assembly when shade is fully open.

[b. Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure. Provide manufacturers standard height fascia as required to conceal roller and shade band assembly when shade is fully open.

] c. Endcaps: Extruded aluminum with universal design suitable for mounting to window mullions. Provide size compatible with roller size. Provide end cap covers matching fascia/headbox finish.

[d. 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. Provide manufacturers standard height fascia as required to conceal roller and shade band assembly when shade is fully open. Provide pocket with lip at lower edge to support acoustical ceiling panel.

][e. 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.

][2.1.3.9 Room Darkening Shades

Provide room darkening (black-out) window shades designed to eliminate all visible light gaps when shades are fully closed, and conform with the following:

a. Provide roller tube made of aluminum. Provide shop fabricated light traps, consisting of a head box to house the shade roller, and U-shaped channels to serve as guides for the shade along the sides and to receive the bottom edge of the shade along the sill.

b. Provide light trap made of sheet steel having a minimum thickness of 0.64 mm 22 gauge or anodized, extruded, aluminum. Provide legs of the channels not less than 44 mm 1-3/4 inches long and separated by the minimum distance that permits free operation of the shade. Edges of light trap coming into contact with the shade cloth are smooth pile light seal. The exposed face of the head box is hinged or removable for access to the shade roller. The interior or unexposed surfaces of the light trap have a finish coat of flat black enamel. The exposed portions of the light trap have a factory-applied priming coat of gray paint.

c. Provide type of cloth for blackout purposes. Provide shade from a single piece of [PVC polyester][PVC fiberglass][PVC free material][_____].

d. Fit the bottom edge of the shade with a steel operating bar. Shades to engage positively with bottom rail through operating bar or chain pull. Paint bars with flat black enamel. Make pull cords of No. 4 braided nylon or beaded chain having not less than 778 N 175 pounds breaking strength.

][2.1.4 Motor-Operated Shades with Single Rollers

Provide factory-assembled, shade-operator system of size and capacity and with features, characteristics, and accessories suitable for conditions indicated, complete with electric motor and factory-prewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.

2.1.4.1 Motors

Provide motors that are [hardwired, wired into the building electrical system and][plug-in to standard AC electrical outlets and] concealed from interior view. The position of the motor and electrical connection is [left][right] side of roller, based on the hand of the user facing the shade from inside, unless otherwise indicated [on drawing][in the ROLLER WINDOW SHADE PLACEMENT SCHEDULE]. Provide motors capable of operating at or below 44 dBA measured 914 mm 3 feet from the center of the shade depending on the electronic drive unit selected; no audible clicks when motor starts and stop. Motors are [120V, 60 Hz][low voltage with Class 2 power supply].

2.1.4.2 Controls

Provide electric controls with NEMA ICS 6 Type 1 enclosure for [surface][recessed or flush] mounting. Controls are able to electronically set and reconfigure shade open and close limits, shade preset positions, system groups and system subgroups at the control without rewiring and without access to the Electronic Drive Unit. Provide wall control engraved with button, group, or scene description as indicated on the drawings.

[a. Key Pad: Three-position, switch-operated control station with open, close, and off functions. Provide two keys per station. Battery operated key pads are not allowed.

][b. Switches: Wall-switch-operated control station with open, close, and center off functions. Switch Positions: [Three][Five]. Switch Style: [Toggle][Rocker].

][c. Group Control Station: Three-position, rocker-style, wall-switch-operated control station with open, close, and center off functions for single-switch group control.

][d. Individual/Group Control Station: Three-position, rocker-style, wall-switch-operated control station with open, close, and center off functions for individual and group control.

][e. Sun Sensor Control: Provide solar adaptive shading software that automatically adjusts motorized shades throughout the day in response to the changing position and intensity of the sun. Customized shade schedules are developed combining information about building location and facade orientation. Wireless mullion sensors to be provided for cloudy-day override.

][f. Low Voltage Controls: Provide a digital system that includes a low-voltage interface to communicate with both wired and wireless inputs. Wireless controls to utilize radio frequency in FCC governed frequency spectrum for periodic operation; continuous transmission spectrum is not permitted.

][g. Provide a whole building shade control system that can be preprogrammed and reprogrammed to accomplish different operations for management flexibility.

][2.1.4.3 Timer Controls

Clock timer, [24-hour][seven-day][_____] programmable for regular events.

[a. Provide switches that are adjustable and interlocked with motor controls and set to automatically stop the shade at fully raised and fully lowered positions.[Low voltage switching is required.]

][b. Operating Function: [Stop and hold shade at any position][Stop and hold shade at open, midpoint, and closed positions][Stop and hold shade at 3 pre-determined positions including open, closed and user-programmed position][Stop and hold shade at 5 pre-determined position including open, closed, and 3 user-programmed positions][_____].

][c. Provide the following options: [Low voltage system][Group switching

with integrating switch control].[Capable of interface with [audiovisual][multi-room][_____] control system][Capable of accepting input from building automation control system][Override switch][Power failure memory for the life of the systems which protects presets][_____].

]]2.1.4.4 Rollers

Provide corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shade bands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shade cloth for service.

a. Roller Drive-End Location: [Right side of interior face of shade][Left side of interior face of shade][As indicated on drawings].

b. Direction of Shade Cloth Roll: [Regular, from back (exterior face) of roller][Reverse, from front (interior face) of roller].

c. Shade Cloth-to-Roller Attachment: [Manufacturer's standard method][Removable spline fitting into integral channel in tube]. Adhesive attachment is not acceptable.

2.1.4.5 Mounting Hardware

Provide corrosion resistant brackets or endcaps compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated. Provide hardware that allows for field adjustment or removal of shade roller tube and other operable hardware component without removal of brackets and end or center supports.

2.1.4.6 Shade Cloth

a. Shade Material: Light-filtering fabric: Openness [1 percent][3 percent][5 percent][_____][Light-blocking fabric].

b. Shade Cloth Bottom (Hem) Bar: Steel or extruded aluminum. Provide shade bar [enclosed in sealed pocket of shade cloth material][exposed with endcaps][exposed with endcaps and integral light seal at bottom where it meets the sill].

2.1.4.7 Installation Accessories

a. Front Fascia: L-shaped aluminum extrusion to conceal shade roller and hardware that snaps onto end caps without requiring exposed fasteners of any kind. Fascia can be mounted continuously across two or more shade bands. Provide manufacturers standard height fascia as required to conceal roller and shade band assembly when shade is fully open.

[b. Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure. Provide manufacturers standard height fascia as required to conceal roller and shade band assembly when shade is fully open.

] c. Endcaps: Extruded aluminum with universal design suitable for mounting to window mullions. Provide size compatible with roller size. Provide end cap covers matching fascia/headbox finish.

[d. 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. Provide manufacturers standard height fascia as required to conceal roller and shade band assembly when shade is fully open. Provide pocket with lip at lower edge to support acoustical ceiling panel.

][e. 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.

][2.1.4.8 Room Darkening Shades

Provide room darkening (black-out) window shades designed to eliminate all visible light gaps when shades are fully closed, and conform with the following:

a. Provide roller tube made of aluminum. Provide shop fabricated light traps consisting of a head box to house the roller shade, and U-shaped channels to serve as guides for the shade along the sides and to receive the bottom edge of the shade along the sill.

b. Provide light trap made of sheet steel having a minimum thickness of 0.64 mm 22 gauge or anodized, extruded, aluminum. Provide legs of the channels not less than 44 mm 1-3/4 inches long and separated by the minimum distance that permits free operation of the shade. Edges of light trap coming into contact with the shade cloth are smooth pile light seal. The exposed face of the head box is hinged or removable for access to the shade roller. The interior or unexposed surfaces of the light trap have a finish coat of flat black enamel. The exposed portions of the light trap have a factory-applied priming coat of gray paint.

c. Provide type of cloth for blackout purposes. Provide shade from a single piece of [PVC polyester][PVC fiberglass][PVC free material][_____].

d. Fit the bottom edge of the shade with a steel operating bar. Shades to engage positively with bottom rail through operating bar or chain pull. Paint bars with flat black enamel. Make pull cords of No. 4 braided nylon or beaded chain having not less than 778 N 175 pounds breaking strength.

]][2.1.5 Motor-Operated, with Dual Rollers

Provide factory-assembled, shade-operator system of size and capacity and with features, characteristics, and accessories suitable for conditions indicated, complete with electric motor and factory-prewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.

2.1.5.1 Motors

Provide motors that are [hardwired, wired into the building electrical system and][plug-in to standard AC electrical outlets and] concealed from interior view. The position of the motor and electrical connection is

[left][right] side of roller, based on the hand of the user facing the shade from inside, unless otherwise indicated [on drawing][in the ROLLER WINDOW SHADE PLACEMENT SCHEDULE]. Provide motors capable of operating at or below 44 dBA measured 914 mm 3 feet from the center of the shade depending on the electronic drive unit selected; no audible clicks when motor starts and stops. Motors are [120V, 60 Hz] [low voltage with Class 2 power supply].

2.1.5.2 Controls

Provide electric controls with NEMA ICS 6, Type 1 enclosure for [surface][recessed or flush] mounting. Controls are able to electronically set and reconfigure shade open and close limits, shade preset positions, system groups and system subgroups at the control without rewiring and without access to the Electronic Drive Unit. Provide wall control engraved with button, group, or scene description as indicated on the drawings.

[a. Key Pad: Three-position, switch-operated control station with open, close, and off functions. Provide two keys per station. Battery operated key pads are not allowed.

][b. Switches: Wall-switch-operated control station with open, close, and center off functions. Switch Positions: [Three][Five]. Switch Style: [Toggle][Rocker].

][c. Group Control Station: Three-position, rocker-style, wall-switch-operated control station with open, close, and center off functions for single-switch group control.

][d. Individual/Group Control Station: Three-position, rocker-style, wall-switch-operated control station with open, close, and center off functions for individual and group control.

][e. Sun Sensor Control: Provide solar adaptive shading software that automatically adjusts motorized shades throughout the day in response to the changing position and intensity of the sun. Customized shade schedules are developed combining information about building location and facade orientation. Wireless mullion sensors to be provided for cloudy-day override.

][f. Low Voltage Controls: Provide a digital system that includes a low-voltage interface to communicate with both wired and wireless inputs. Wireless controls to utilize radio frequency in FCC governed frequency spectrum for periodic operation; continuous transmission spectrum is not permitted.

][g. Provide a whole building shade control system that can be preprogrammed and reprogrammed to accomplish different operations for management flexibility.

]2.1.5.3 Timer Controls

Clock timer, [24-hour][seven-day][_____] programmable for regular events.

[a. Provide switches that are adjustable and interlocked with motor controls and set to automatically stop the shade at fully raised and fully lowered positions.[Low voltage switching is required.]

][b. Operating Function: [Stop and hold shade at any position][Stop and hold shade at open, midpoint, and closed positions][Stop and hold shade at 3 pre-determined positions including open, closed and user-programmed position][Stop and hold shade at 5 pre-determined position including open, closed, and 3 user-programmed positions][_____].

][c. Provide the following options: [Low voltage system][Group switching with integrating switch control].[Capable of interface with [audiovisual][multi-room][_____] control system][Capable of accepting input from building automation control system][Override switch][Power failure memory for the life of the systems which protects presets][_____].

]2.1.5.4 Rollers

Provide corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shade bands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shade cloth for service.

a. Dual Shade Mounting Configuration: [Side by Side][Offset][_____].

b. Inside Roller: Drive-End Location: [Right side of interior face of shade][Left side of interior face of shade][As indicated on drawings]. Direction of Shade Cloth Roll: [Regular, from back (exterior face) of roller][Reverse, from front (interior face) of roller].

c. Outside Roller: Drive-End Location: [Right side of interior face of shade][Left side of interior face of shade][As indicated on drawings]. Direction of Shade Band Roll: [Regular, from back (exterior face) of roller][Reverse, from front (interior face) of roller].

d. Shade Cloth-to-Roller Attachment: [Manufacturer's standard method][Removable spline fitting into integral channel in tube]. Adhesive attachment is not acceptable.

2.1.5.5 Sub Title

Provide corrosion resistant brackets or endcaps compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated. Provide hardware that allows for field adjustment or removal of shade roller tube and other operable hardware component without removal of brackets and end or center supports.

2.1.5.6 Inside Shade Cloth

a. Shade Material: [Light-filtering fabric: Openness [1 percent][3 percent][5 percent][_____]][Light-blocking fabric].

b. Shade Cloth Bottom (Hem) Bar: Steel or extruded aluminum. Provide shade bar [enclosed in sealed pocket of shade cloth material][exposed with endcaps][exposed with endcaps and integral light seal at bottom where it meets the sill].

2.1.5.7 Outside Shade Cloth

a. Shade Material: [Light-filtering fabric: Openness [1 percent][3 percent][5 percent][_____]][Light-blocking fabric].

b. Shade Cloth Bottom (Hem) Bar: Steel or extruded aluminum. Provide shade bar [enclosed in sealed pocket of shade cloth material][exposed with endcaps][exposed with endcaps and integral light seal at bottom where it meets the sill].

2.1.5.8 Installation Accessories

a. Front Fascia: L-shaped aluminum extrusion to conceal shade roller and hardware that snaps onto end caps without requiring exposed fasteners of any kind. Fascia can be mounted continuously across two or more shade bands. Provide manufacturers standard height fascia as required to conceal roller and shade band assembly when shade is fully open.

[b. Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure. Provide manufacturers standard height fascia as required to conceal roller and shade band assembly when shade is fully open.

] c. Endcaps: Extruded aluminum with universal design suitable for mounting to window mullions. Provide size compatible with roller size. Provide end cap covers matching fascia/headbox finish.

[d. 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. Provide manufacturers standard height fascia as required to conceal roller and shade band assembly when shade is fully open. Provide pocket with lip at lower edge to support acoustical ceiling panel.

][e. 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.

][2.1.5.9 Room Darkening Shades

Provide room darkening (black-out) window shades designed to eliminate all visible light gaps when shades are fully closed, and conform with the following:

a. Provide roller tube made of aluminum. Provide shop fabricated light traps consisting of a head box to house the roller shade, and U-shaped channels to serve as guides for the shade along the sides and to receive the bottom edge of the shade along the sill.

b. Provide light trap made of sheet steel having a minimum thickness of 0.64 mm 22 gauge or anodized, extruded, aluminum. Provide legs of the channels not less than 44 mm 1-3/4 inches long and separated by the minimum distance that permits free operation of the shade. Edges of light trap coming into contact with the shade cloth are smooth pile light seal. The exposed face of the head box is hinged or removable for access to the shade roller. The interior or unexposed surfaces of the light trap have a finish coat of flat black enamel. The exposed portions of the light trap have a factory-applied priming coat of gray paint.

c. Provide type of cloth for blackout purposes. Provide shade from a single piece of [PVC polyester][PVC fiberglass][PVC free material][_____].

d. Fit the bottom edge of the shade with a steel operating bar. Shades to engage positively with bottom rail through operating bar or chain pull. Paint bars with flat black enamel. Make pull cords of No. 4 braided nylon or beaded chain having not less than 778 N 175 pounds breaking strength.

]]2.2 COLOR

****

NOTE: Editing of color reference sentence(s) must be coordinated with the Government. Generally, Section 09 06 00 SCHEDULES FOR FINISHES or drawings are used to indicate color references. Color must be selected from manufacturer's standard colors or identified as a manufacturer's color in this specification only when the project has minimal finishes.

When the government directs that color be located in the drawings, a note must be added to the drawings that states: "Where color is shown as being specific to one manufacturer, an equivalent color by another manufacturer may be submitted for approval. Manufacturers and materials specified are not intended to limit the selection of equal colors from other manufacturers. The word "color" as used herein includes surface color and pattern."

Considerations of fabric selection include: glare control, view maintenance, privacy and heat build-up. Identify if solar reflective property is required on the backside of the fabric and specify a dual-sided fabric if applicable.

When more than one type, pattern or color is specified identify location.

When a manufacturer's name, stock number, pattern, and color is specified for color, verify that the product conforms to the specification, as edited and is not a proprietary product.

****

Provide color, pattern and texture for metal trim and shade fabric [as specified in Section 09 06 00 SCHEDULES FOR FINISHES.] [as indicated; colors listed are not intended to limit the selection of equal colors from other manufacturers.]

PART 3 EXECUTION

3.1 FIELD MEASUREMENTS

After becoming familiar with details of the work, verify all dimensions in the field, and advise the Contracting Officer of any discrepancy before

performing the work.

3.2 ROLLER WINDOW SHADE PLACEMENT SCHEDULE

****
NOTE: The Roller Window Shade Placement Schedule will be provided at the designer's option when it will clarify placement of the window treatments. When all exterior windows are to receive a window treatment, a note can be added to this effect instead of filling out the schedule completely. The location of window treatment placement should be clearly defined within this specification. The Placement Schedule will be completely filled out with the room number/name, window covering type, window type and quantity.
****

[All exterior windows include [_____].] [Provide window covering as follows:

Room Number/Name	Roller Window Shade Covering Type	Window Type/Size	Window Quantity
[_____]	[_____]	[_____]	[_____]

]

3.3 INSTALLATION

Do not install building construction materials that show visual evidence of biological growth.

Provide roller window shades, complete with necessary brackets, fittings, and hardware [in accordance with paragraph ROLLER WINDOW SHADE PLACEMENT SCHEDULE][as indicated].

Perform installation in accordance with the approved detailed drawings and manufacturer's installation instructions. Install units level, plumb, secure, and at proper height and location relative to window units. Provide and install supplementary or miscellaneous items in total, including clips, brackets, or anchorages incidental to or necessary for a sound, secure, and complete installation. Do not start installation until completion of room painting and finishing operations.

3.4 CLEAN-UP

Upon completion of the installation, clean window treatments and exposed components as recommended by manufacturer. Adjust window treatment for form and appearance and proper operating condition. Repair or replace damaged units as directed by the Contracting Officer. Isolate metal parts from direct contact with concrete, mortar, or dissimilar metals. Ensure shades installed in recessed pockets can be removed without disturbing the pocket. The entire shade, when retracted, is contained inside the pocket. For shades installed outside the jambs and mullions, overlap each jamb and mullion 19 mm 0.75 inch or more when the jamb and mullion sizes permit. Include all hardware, brackets, anchors, fasteners, and accessories necessary for a complete, finished installation.

-- End of Section --