SECTION 083326 - OVERHEAD COILING GRILLES

Revise this Section by deleting and inserting text to meet Project-specific requirements.

1. GENERAL
	* + 1. SUMMARY
				1. Section Includes:

Open-curtain overhead coiling grilles.

Closed-curtain overhead coiling grilles.

Refer to sections listed below for cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections. Sections listed below are for spec editor’s and design team coordination and are to remain as Editor’s Notes. Remove referenced specification sections within the body of the specification if not applicable to the project.

Section 055000 "Metal Fabrications" for miscellaneous steel supports, angle-framing of grille opening, corner guards, and bollards.

Section 099114 "Exterior Painting"] [and/or Section 099123 "Interior Painting" for finish painting of factory-primed grilles.

Section 111200 "Parking Control Equipment" for parking control equipment interlocked to overhead coiling grilles.

* + - 1. SUBMITTALS
				1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer’s installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				4. Product Data: For each type and size of overhead coiling grille and accessory.

Include construction details, material descriptions, dimensions of individual components, profiles for curtain components, and finishes.

Retain subparagraph below for power-operated grilles.

Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

Include manufacturer’s installation instructions.

* + - * 1. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

Include plans, elevations, sections, and mounting details.

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

Include points of attachment and their corresponding static and dynamic loads imposed on structure.

For exterior components, include details of provisions for assembly expansion and contraction.

Show locations of controls, locking devices, and other accessories.

Retain subparagraph below if equipment includes wiring.

Include diagrams for power, signal, and control wiring.

Retain "Samples for Initial Selection" and "Samples for Verification" paragraphs below for two-stage Samples.

* + - * 1. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

Include similar Samples of accessories involving color selection.

* + - * 1. Samples for Verification: For each type of exposed finish on the following components, in manufacturer's standard sizes:

Revise subparagraphs below to suit Project; delete items not required.

Open-curtain grille with full-size components consisting of rods, spacers, and links as required to illustrate each assembly[**, including glazed inserts**].

Closed-curtain grille with full-size components consisting of ribs and infill as required to illustrate each assembly.

Retain option in first subparagraph below if required for electric grille operators.

Bottom bar[**with sensor edge**].

Guides.

Retain first subparagraph below for grilles installed before walls are constructed.

Mounting frame.

Brackets.

Hood.

* + - * 1. Quality Control Submittals:

Qualification Data: For Installer.

Sample Warranty: For special warranty.

* + - * 1. Contract Closeout Submittals:

Maintenance Data: For overhead coiling grilles to include in maintenance manuals.

* + - 1. QUALITY ASSURANCE
				1. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.
				2. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and Uniform Code A117.1.

Design Consultant to review code references and verify that the referenced sections/tables are current. Note that code references shall be based on the current version of the Uniform Code.

* + - 1. WARRANTY

When warranties are required, verify with Director’s Representative that warranties stated in this article are not less than remedies available to Facility under prevailing local laws.

* + - * 1. Special Warranty: Manufacturer agrees to repair or replace components of grilles that fail in materials or workmanship within specified warranty period.

Verify available warranties and warranty periods for lifts and components.

Warranty Period: [**Two**] <**Insert number**> years from date of Substantial Completion.

1. PRODUCTS

Manufacturers and products listed in this Section are neither recommended nor endorsed by the AIA or Deltek. Before selecting manufacturers and products, verify availability, suitability for intended applications, and compliance with minimum performance requirements.

Product options commonly available from manufacturers are included in square brackets throughout the Section Text. Not every manufacturer listed can provide every option offered; verify availability with manufacturers.

* + - 1. MANUFACTURERS
				1. Source Limitations: Obtain overhead coiling grilles from single source from single manufacturer.

Retain subparagraph below or revise to suit Project.

Obtain operators and controls from overhead coiling-grille manufacturer.

* + - 1. PERFORMANCE REQUIREMENTS

Retain "Seismic Performance" paragraph below if required for Project. Nonstructural architectural components in Seismic Design Category A are exempt from seismic design requirements; and in Seismic Design Category B, nonstructural architectural components are generally exempt if the Component Importance Factor is 1. Coordinate requirements with Project's structural engineer.

* + - * 1. Seismic Performance: Overhead coiling grilles withstand the effects of earthquake motions determined according to ASCE/SEI 7.

The value in "Component Importance Factor" subparagraph below is determined according to ASCE/SEI 7 based on anticipated risk and need. Revise subparagraph if more than one coiling grille is required and they have different component importance factors. Coordinate requirement with Project's structural engineer.

Component Importance Factor: [**1.5**] [**1.0**].

* + - 1. OPEN-CURTAIN GRILLE ASSEMBLY <**Insert drawing designation**>

Copy this article and re-edit for each open-curtain coiling-grille unit. This article is intended as a guide if Project requires several units of varying sizes, characteristics, and capacities. For each grille assembly, retain required options in this article and their related requirements in other Part 2 articles. Consult manufacturers for recommendations and availability. Local New York State and area manufacturers and distributers are preferred.

Insert drawing designation. Use these designations on Drawings to identify each product.

* + - * 1. Open-Curtain Grille: Overhead coiling[**, countertop**] grille with a curtain having a network of horizontal rods that interconnect with vertical links.

Retain one option in "Operation Cycles" paragraph below. First option is standard with some manufacturers; second option is more commonly used. Last three options are for high-cycle operation, corrosive environments, and severe or abusive use. Consult manufacturer for recommendations.

* + - * 1. Operation Cycles: Grille components and operators capable of operating for not less than [**10,000**] [**20,000**] [**50,000**] [**100,000**] [**200,000**] <**Insert number**>. One operation cycle is complete when a grille is opened from the closed position to the fully open position and returned to the closed position.

Retain subparagraph below if high-cycle grilles are specified.

Include tamperproof cycle counter.

* + - * 1. Grille Curtain Material: [**Aluminum**] [**Stainless steel**] [**Galvanized steel**].

Retain one spacing option in "Rod Spacing" and "Link Spacing" subparagraphs below or revise to suit Project. Spacings vary among manufacturers.

Rod Spacing: Approximately [**1-1/2 inches**] [**2 inches**] [**3 inches**] <**Insert dimension**> o.c.

Three link spacings and two patterns in "Link Spacing" subparagraph below are most commonly available; revise to suit Project. Verify availability with manufacturers if another pattern or type of spacer, such as one made of perforated sheet material, is required.

Link Spacing: Approximately [**3 inches**] [**6 inches**] [**9 inches**] <**Insert dimension**> apart in a [**straight in-line**] [**brick (staggered)**] <**Insert pattern**> pattern.

Features in "Glazing Inserts" and "Spacers" subparagraphs below vary among manufacturers; verify availability with manufacturer.

Glazing Inserts: [**Manufacturer's standard**] <**Insert description**>.

Spacers between links are most often made of metal tubes; some manufacturers offer PVC spacers.

Spacers: [**Metal tubes matching curtain material**] [**PVC**] <**Insert description**>.

Retain "Bottom Bar" paragraph below if other than manufacturer's standard bottom bar, finished to match grille, is required; revise to suit Project.

* + - * 1. Bottom Bar: Continuous [**tubular shape**] [**channel**] [**or**] [**doubled angles**], fabricated from [**aluminum extrusion**] [**hot-dip galvanized steel**] [**or**] [**stainless steel**] and finished [**to match grille**] <**Insert requirement**>.

Aluminum guides in "Curtain Jamb Guides" paragraph below are most common. Retain last option for removable post and guides separating multiple grille installations that require a clear opening.

* + - * 1. Curtain Jamb Guides: [**Aluminum**] [**Stainless steel**] [**Galvanized steel**] with exposed finish [**matching curtain slats**] <**Insert requirement**>. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.[**Provide removable post(s) and jamb guides where indicated on Drawings.**]
				2. Hood: [**Match curtain material and finish**] [**Aluminum**] [**Stainless steel**] [**Galvanized steel**].

First option in "Shape" subparagraph below is standard. Verify availability of second option with manufacturer.

Shape: [**Round**] [**Square**] [**As indicated on Drawings**] <**Insert shape**>.

Mounting: [**Face of wall**] [**Between jambs**] [**On mounting frame**] [**As indicated on Drawings**].

Retain one of first two options in "Locking Devices" paragraph below. Retain last option for chain-hoist-operated grilles or emergency chain-hoist operation. The industry generally discourages using locks on motor-operated coiling grilles; see the Evaluations.

* + - * 1. Locking Devices: Equip grille with [**slide bolt for padlock**] [**locking device assembly**] [**and**] [**chain lock keeper**].

Retain "Locking Device Assembly" subparagraph below if retaining second option in "Locking Devices" paragraph above.

Locking Device Assembly: [**Single-jamb side**] [**Cremone-type, both jamb sides**] locking bars, operable from [**inside with thumbturn**] [**outside with cylinder**] [**outside only, with cylinder**] [**inside and outside with cylinders**] <**Insert requirement**>.

Retain "Manual Grille Operator" or "Electric Grille Operator" paragraph below.

* + - * 1. Manual Grille Operator: [**Push-up operation**] [**Chain-hoist operator**] [**Manufacturer's standard crank operator**] [**Awning-crank operator**] [**Wall-crank operator**].

Retain first subparagraph below for chain or crank operator if located on other side of wall from grille curtain.

Provide operator with through-wall shaft operation.

Retain subparagraph below for crank operator if required.

Provide operator with manufacturer's standard removable operating arm.

* + - * 1. Electric Grille Operator:

Retain one option in "Usage Classification" subparagraph below or revise to suit Project. Usage classification varies among manufacturers and for each operator design; it is a durability requirement separate from whole-grille operation cycles. Consult manufacturer for specific recommendations.

Usage Classification: [**Heavy duty, 25 or more cycles per hour and more than 90 cycles per day**] [**Standard duty, up to 25 cycles per hour and up to 90 cycles per day**] [**Medium duty, up to 12 cycles per hour and up to 50 cycles per day**] [**Light duty, up to 10 cycles per hour**] <**Insert classification**>.

Operator Location: [**Top of hood**] [**Front of hood**] [**Wall**] [**Bench**] [**Through wall**] [**As indicated on Drawings**].

Retain "Safety" subparagraph below if grille is used as an automatic garage "door"; consider retaining it for all power-operated grilles. Option below is requirement of UL 325; revise to suit Project. The BCNYS requires listing for "automatic garage door openers."

Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use[**; moving parts of operator enclosed or guarded if exposed and mounted at 8 feet or lower**].

Retain one of two options in "Motor Exposure" subparagraph below or revise to suit Project. The operating environment, including hazardous conditions, may require other motor types and enclosure modifications.

Motor Exposure: [**Interior**] [**Exterior, wet, and humid**].

Retain "Motor Electrical Characteristics" subparagraph below if characteristics are not indicated on Drawings.

Motor Electrical Characteristics:

Horsepower: [**1/2**] [**1**] [**2**] [**3**] <**Insert value**> hp.

Retain "Voltage, Single Phase, 60 Hz" or "Voltage, Three Phase, 60 Hz" subparagraph below for ac systems.

Voltage, Single Phase, 60 Hz: [**115-V ac**] [**208-V ac**] [**230-V ac**].

Voltage, Three Phase, 60 Hz: [**208-V ac**] [**230-V ac**] [**460-V ac**].

Emergency Manual Operation: [**Push-up**] [**Chain**] [**Crank**] type.

Retain "Obstruction-Detection Device" subparagraph below if grille is used as an automatic garage "door"; consider retaining for all power-operated grilles.

Obstruction-Detection Device: Automatic [**photoelectric sensor**] [**electric sensor edge on bottom bar**] [**pneumatic sensor edge on bottom bar**] [**; self-monitoring type**] <**Insert type**>.

Retain "Sensor Edge Bulb Color" subparagraph below if retaining second or third option in "Obstruction-Detection Device" subparagraph above.

Sensor Edge Bulb Color: [**Black**] [**As selected by Director’s Representative from manufacturer's full range**] <**Insert color**>.

Control Station: [**Interior mounted**] [**Exterior mounted**] [**Where indicated on Drawings**] <**Insert location**>.

Other Equipment: [**Audible and visual signals**] [**Emergency-egress release**] [**Self-opening mechanism**] <**Insert device**>.

* + - * 1. Curtain Accessories: Equip grille with [**astragal**] [**push/pull handles**] [**and**] [**pole hook**] <**Insert item**>.
				2. Grille Finish:

Retain one of first four subparagraphs below. These include advertised materials and finishes; available materials and finishes vary with each manufacturer. If retaining more than one, indicate location of each on Drawings or by inserts.

Second option in "Aluminum Finish" subparagraph below is standard; verify availability of other aluminum finishes with manufacturer.

Aluminum Finish: [**Mill**] [**Clear anodized**] [**Light bronze anodized**] [**Medium bronze anodized**] [**Dark bronze anodized**] [**Black anodized**] [**Anodized color matching Director’s Representative's sample**] [**Anodized color as selected by Director’s Representative from full range of industry colors and color densities**] <**Insert color**>.

Baked-Enamel or Powder-Coat Finish: [**Color as indicated by manufacturer's designations**] [**Color matching Director’s Representative's sample**] [**Color as selected by Director’s Representative from manufacturer's full range**] <**Insert color and gloss**>.

Factory Prime Finish: Manufacturer's standard color.

Second option in "Stainless Steel Finish" subparagraph below is standard; verify availability of other stainless steel finishes with manufacturer.

Stainless Steel Finish: [**No. 2B (bright, cold rolled)**] [**No. 4 (polished directional satin)**] <**Insert finish**>.

Retain "PVC Spacers" subparagraph below if required.

PVC Spacers: [**Color as indicated by manufacturer's designations**] [**Color as selected by Director’s Representative from manufacturer's full range**] <**Insert color**>.

* + - 1. CLOSED-CURTAIN GRILLE ASSEMBLY <**Insert drawing designation**>

Copy this article and re-edit for each closed-curtain coiling-grille unit. This article is intended as a guide if Project requires several units of varying sizes, characteristics, and capacities. For each grille assembly, retain required options in this article and their related requirements in other Part 2 articles. Consult manufacturers for recommendations and availability. Local New York State and area manufacturers and distributers are preferred.

Insert drawing designation. Use these designations on Drawings to identify each product.

* + - * 1. Closed-Curtain Grille: Overhead coiling[**, countertop**] grille with a curtain having a series of horizontal ribs alternating with continuous horizontal infill panels secured by the ribs.

Retain one option in "Operation Cycles" paragraph below. First option is standard with some manufacturers; second option is more commonly used. Last three options are for high-cycle operation, corrosive environments, and severe or abusive use. Consult manufacturer for recommendations.

* + - * 1. Operation Cycles: Grille components and operators capable of operating for not less than [**10,000**] [**20,000**] [**50,000**] [**100,000**] [**200,000**] <**Insert number**>. One operation cycle is complete when a grille is opened from the closed position to the fully open position and returned to the closed position.

Retain subparagraph below if high-cycle grilles are specified.

Include tamperproof cycle counter.

* + - * 1. Grille Curtain Material: Aluminum ribs with continuous inserts indicated.

Spacings may vary; verify availability with manufacturer.

Rib Spacing: Approximately [**3 inches**] <**Insert dimension**> o.c.

Inserts: [**Glass panels**] [**Clear, transparent plastic panels**] [**Translucent plastic panels**] [**Solid aluminum panels**] [**Perforated aluminum panels**].

Retain "Bottom Bar" paragraph below if other than manufacturer's standard bottom bar, finished to match grille, is required; revise to suit Project.

* + - * 1. Bottom Bar: Continuous [**tubular shape**] [**channel**] [**or**] [**doubled angles**], fabricated from [**aluminum extrusion**] [**hot-dip galvanized steel**] [**or**] [**stainless steel**] and finished [**to match grille**] <**Insert requirement**>.

Aluminum guides in "Curtain Jamb Guides" paragraph below are standard; revise if required. Retain last option for removable post and guides separating multiple grille installations that require a clear opening.

* + - * 1. Curtain Jamb Guides: Aluminum with exposed finish [**matching curtain slats**] <**Insert requirement**>. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.[**Provide removable post(s) and jamb guides where indicated on Drawings.**]
				2. Hood: [**Match curtain material and finish**] [**Aluminum**] [**Stainless steel**] [**Galvanized steel**].

First option in "Shape" subparagraph below is standard. Verify availability of second option with manufacturer.

Shape: [**Round**] [**Square**] [**As indicated on Drawings**] <**Insert shape**>.

Mounting: [**Face of wall**] [**Between jambs**] [**On mounting frame**] [**As indicated on Drawings**].

Retain one of first two options in "Locking Devices" paragraph below. Retain last option for chain-hoist-operated grilles or emergency chain-hoist operation. The industry generally discourages using locks on motor-operated coiling grilles; see the Evaluations.

* + - * 1. Locking Devices: Equip grille with [**slide bolt for padlock**] [**locking device assembly**] [**and**] [**chain lock keeper**].

Retain "Locking Device Assembly" subparagraph below if retaining second option in "Locking Devices" paragraph above.

Locking Device Assembly: [**Single-jamb side**] [**Cremone-type, both jamb sides**] locking bars, operable from [**inside with thumbturn**] [**outside with cylinder**] [**outside only, with cylinder**] [**inside and outside with cylinders**] <**Insert requirement**>.

Retain "Manual Grille Operator" or "Electric Grille Operator" paragraph below.

* + - * 1. Manual Grille Operator: [**Push-up operation**] [**Chain-hoist operator**] [**Manufacturer's standard crank operator**] [**Awning-crank operator**] [**Wall-crank operator**].

Retain first subparagraph below for chain or crank operator if located on other side of wall from grille curtain.

Provide operator with through-wall shaft operation.

Retain subparagraph below for crank operators if required.

Provide operator with manufacturer's standard removable operating arm.

* + - * 1. Electric Grille Operator:

Retain one option in "Usage Classification" subparagraph below or revise to suit Project. Usage classification varies among manufacturers and for each operator design; it is a durability requirement separate from whole-grille operation cycles. Consult manufacturer for specific recommendations.

Usage Classification: [**Heavy duty, 25 or more cycles per hour and more than 90 cycles per day**] [**Standard duty, up to 25 cycles per hour and up to 90 cycles per day**] [**Medium duty, up to 12 cycles per hour and up to 50 cycles per day**] [**Light duty, up to 10 cycles per hour**] <**Insert classification**>.

Operator Location: [**Top of hood**] [**Front of hood**] [**Wall**] [**Bench**] [**Through wall**] [**As indicated on Drawings**].

Retain "Safety" subparagraph below if grille is used as an automatic garage "door"; consider retaining it for all power-operated grilles. Option below is requirement of UL 325; revise to suit Project. The BCNYS requires listing for "automatic garage door openers."

Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use[**; moving parts of operator enclosed or guarded if exposed and mounted at 8 feet or lower**].

Retain one option in "Motor Exposure" subparagraph below or revise to suit Project. The operating environment, including hazardous conditions, may require other motor types and enclosure modifications.

Motor Exposure: [**Interior**] [**Exterior, wet, and humid**].

Retain "Motor Electrical Characteristics" subparagraph below if characteristics are not indicated on Drawings.

Motor Electrical Characteristics:

Horsepower: [**1/2**] [**1**] [**2**] [**3**] <**Insert value**> hp.

Retain "Voltage, Single Phase, 60 Hz" or "Voltage, Three Phase, 60 Hz" subparagraph below for ac systems.

Voltage, Single Phase, 60 Hz: [**115-V ac**] [**208-V ac**] [**230-V ac**].

Voltage, Three Phase, 60 Hz: [**208-V ac**] [**230-V ac**] [**460-V ac**].

Emergency Manual Operation: [**Push-up**] [**Chain**] [**Crank**] type.

Retain "Obstruction-Detection Device" subparagraph below if grille is used as an automatic garage "door"; consider retaining for all power-operated grilles.

Obstruction-Detection Device: Automatic [**photoelectric sensor**] [**electric sensor edge on bottom bar**] [**pneumatic sensor edge on bottom bar**] [**; self-monitoring type**] <**Insert type**>.

Retain "Sensor Edge Bulb Color" subparagraph below if retaining second or third option in "Obstruction-Detection Device" subparagraph above.

Sensor Edge Bulb Color: [**Black**] [**As selected by Director’s Representative from manufacturer's full range**] <**Insert color**>.

Control Station: [**Interior mounted**] [**Exterior mounted**] [**Where indicated on Drawings**] <**Insert location**>.

Other Equipment: [**Audible and visual signals**] [**Emergency-egress release**] [**Self-opening mechanism**] <**Insert device**>.

* + - * 1. Grille Finish:

Retain one of four subparagraphs below. These include advertised materials and finishes; available materials and finishes vary with each manufacturer. If retaining more than one, indicate location of each on Drawings or by inserts.

Second option in "Aluminum Finish" subparagraph below is standard; verify availability of other aluminum finishes with manufacturer.

Aluminum Finish: [**Mill**] [**Clear anodized**] [**Light bronze anodized**] [**Medium bronze anodized**] [**Dark bronze anodized**] [**Black anodized**] [**Anodized color matching Director’s Representative's sample**] [**Anodized color as selected by Director’s Representative from full range of industry colors and color densities**] <**Insert color**>.

Baked-Enamel or Powder-Coat Finish: [**Color as indicated by manufacturer's designations**] [**Color matching Director’s Representative's sample**] [**Color as selected by Director’s Representative from manufacturer's full range**] <**Insert color and gloss**>.

Factory Prime Finish: Manufacturer's standard color.

Second option in "Stainless Steel Finish" subparagraph below is standard; verify availability of other stainless steel finishes with manufacturer.

Stainless Steel Finish: [**No. 2B (bright, cold rolled)**] [**No. 4 (polished directional satin)**] <**Insert finish**>.

* + - 1. MATERIALS, GENERAL

Retain this article for motorized operator.

* + - * 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
			1. GRILLE CURTAIN MATERIALS AND CONSTRUCTION

Retain requirements in this article to suit Project. If retaining multiple requirements for different grilles and to identify optional requirements for a single grille, revise requirements below and insert text as needed in grille assembly articles retained in Part 2.

Retain one of or both "Open-Curtain Grilles" and "Closed-Curtain Grilles" paragraphs below to suit Project.

* + - * 1. Open-Curtain Grilles: Fabricate metal grille curtain as an open network of horizontal rods, spaced at regular intervals, that are interconnected with vertical links, which are formed and spaced as indicated and are free to rotate on the rods.

Retain required grille material(s) from four subparagraphs below or revise to suit Project. Verify availability with manufacturer.

Aluminum Grille Curtain: ASTM B221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

Stainless Steel Grille Curtain: ASTM A666 or ASTM A240, Type 300 series.

Steel Grille Curtain: Hot-dip zinc coated (galvanized) complying with ASTM A123, or electrogalvanized complying with ASTM 653, and phosphatized before fabrication.

Retain "Glazing Insert" subparagraph below if required. Glazing insert reduces the amount of open area and is available from several manufacturers. Verify availability with other manufacturers.

Glazing Insert: Manufacturer's standard glazing of clear polycarbonate sheet secured by the curtain links.

* + - * 1. Closed-Curtain Grilles: Fabricate curtain as a series of horizontal double-C ribs, spaced at regular intervals, that alternate with continuous horizontal infill panels secured by the ribs.

Aluminum Horizontal Ribs: ASTM B221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

Retain one or more of "Glass Panels," "Plastic Panels," and "Aluminum Panels" subparagraphs below to suit Project. Verify availability with manufacturers; revise for products selected and as required for colored panels.

Glass Panels: Uncoated, clear, heat-treated, fully tempered float glass; complying with ASTM C1048, Condition A, Type I, Class I, Quality q3, Kind FT; manufacturer's standard panel dimensions and thickness.

Plastic Panels: Fire-retardant polycarbonate sheet manufactured by the extrusion process; UV resistant; manufacturer's standard panel dimensions and thickness.

Revise finish in "Aluminum Panels" subparagraph below or by inserts in grille assembly articles retained in Part 2 if aluminum panels are required to contrast with ribs.

Aluminum Panels: ASTM B209, alloy and temper standard with manufacturer for type of use and finish indicated; manufacturer's standard panel dimensions and thickness; finished to match ribs.

Retain "Perforations" subparagraph below if perforated aluminum panels are required.

Perforations: [**Manufacturer's standard pinholes**] <**Insert description**>.

* + - * 1. Bottom Bar: Manufacturer's standard continuous shape unless otherwise indicated, finished to match grille.

Astragal: Equip grille bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.

Retain subparagraph below if required.

Provide motor-operated grilles with combination bottom astragal and sensor edge.

* + - * 1. Grille Curtain Jamb Guides: Manufacturer's standard shape having curtain groove with return lips or bars to retain curtain. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise; with removable stops on guides to prevent overtravel of curtain.

Retain subparagraph below for removable post and guides separating multiple grille installations that require a clear opening.

Removable Posts and Jamb Guides: Manufacturer's standard.

* + - 1. HOODS AND ACCESSORIES

Retain requirements in this article to suit Project. If retaining multiple requirements for different grilles and to identify optional requirements for a single grille, revise requirements below and insert text as needed in grille assembly articles retained in Part 2.

Retain "General" paragraph below if coiled curtain and operating mechanism are exposed (not concealed in ceiling or soffit); consider retaining a hood even if coiled grille is above ceiling.

* + - * 1. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

Retain required material(s) in "Galvanized Steel," "Stainless Steel," and "Aluminum" subparagraphs below. Thicker steel sheet is available from some manufacturers; verify availability.

Galvanized Steel: Nominal 0.028-inch- thick, hot-dip galvanized-steel sheet with G90 zinc coating, complying with ASTM A653.

Stainless Steel: 0.025-inch- thick, stainless steel sheet, Type 304, complying with ASTM A666 or ASTM A240.

Clear- and color-anodized finishes are available.

Aluminum: 0.040-inch- thick aluminum sheet, complying with ASTM B209, of alloy and temper recommended by manufacturer and finisher for type of use and finish indicated.

Retain "Removable Metal Soffit" paragraph below for concealed installations only. Metal soffit is not often used. Indicate location, details, and size on Drawings.

* + - * 1. Removable Metal Soffit: Formed or extruded from same metal and with same finish as curtain if hood is mounted above ceiling unless otherwise indicated.

Mounting method in "Mounting Frame" paragraph below is available from some manufacturers to allow fast-track installation of grille before walls are built. Revise paragraph if a custom-designed frame is indicated on Drawings. Verify availability with manufacturer.

* + - * 1. Mounting Frame: Manufacturer's standard mounting frame designed to support grille; factory fabricated from ASTM A36 structural-steel [**tubes**] [**or**] [**shapes**], hot-dip galvanized per ASTM A123; fastened to floor and structure above grille; to be built into wall construction; and complete with anchors, connections, and fasteners.

Retain "Push/Pull Handles" paragraph below for push-up-operated grilles or emergency push-up operation.

* + - * 1. Push/Pull Handles: Equip push-up-operated or emergency-operated grille with lifting handles on each side of grille, finished to match grille.

Retain "Pull-Down Strap" or "Pole Hooks" paragraph below if required. Consult manufacturer for recommendations.

* + - * 1. Pull-Down Strap: Provide pull-down straps for grilles more than 84 inches high.
				2. Pole Hooks: Provide pole hooks and poles for grilles more than 84 inches high.

Insert other accessories to suit Project.

* + - 1. LOCKING DEVICES

Retain requirements in this article to suit Project. If retaining multiple requirements for different grilles and to identify optional requirements for a single grille, revise requirements below and insert text as needed in grille assembly articles retained in Part 2.

Retain one of or both "Slide Bolt" and "Locking Device Assembly" paragraphs below for required locking device(s); revise to suit Project. First paragraph is standard for push-up grilles; revise if no padlock is required or if manufacturer's standard is a bolt on one side. Second paragraph describes a locking device with choice of locations and operation as retained in grille assembly articles in Part 2.

* + - * 1. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.
				2. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

Retain one of first three options in "Lock Cylinders" subparagraph below.

Lock Cylinders: As [**specified in Section 087100 "Door Hardware"**] [**standard with manufacturer**] [**and keyed to building keying system**].

Retain "Keys" subparagraph below if cylinders are provided by grille manufacturer.

Keys: [**Two**] [**Three**] <**Insert number**> for each cylinder.

Retain "Chain Lock Keeper" paragraph below for chain-hoist-operated grilles or emergency chain-hoist operation.

* + - * 1. Chain Lock Keeper: Suitable for padlock.

Retain "Safety Interlock Switch" paragraph below for power-operated grilles.

* + - * 1. Safety Interlock Switch: Equip power-operated grilles with safety interlock switch to disengage power supply when grille is locked.
			1. COUNTERBALANCE MECHANISM

Retain this article for all grilles.

* + - * 1. General: Counterbalance grilles by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

In "Counterbalance Barrel" paragraph below, retain "seamless" option for greatest durability and "welded" option for lower cost and smaller grilles. Consult manufacturer for recommendations.

* + - * 1. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, [**seamless**] [**or**] [**welded**] carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of parts and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
				2. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.
				3. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
				4. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.
			1. MANUAL GRILLE OPERATORS

Retain this article for manually operated grilles, not including emergency manual operation for electric grille operators.

Retain requirements in this article to suit Project. If retaining multiple requirements for different grilles and to identify optional requirements for a single grille, revise requirements below and insert text as needed in grille assembly articles retained in Part 2.

* + - * 1. General: Equip grille with manual grille operator by grille manufacturer.

Requirement in "Push-up Grille Operation" paragraph below is common for steel grilles with area of not more than 100 sq. ft. and aluminum grilles with area of not more than 120 sq. ft.

* + - * 1. Push-up Grille Operation: Lift handles and pull rope for raising and lowering grille, with counterbalance mechanism designed so that required lift or pull for grille operation does not exceed [**25 lbf**] <**Insert value**>.

Items in "Chain-Hoist Operator" and "Crank Operator" paragraphs below are common for manually operated grilles with area of more than 100 sq. ft.

* + - * 1. Chain-Hoist Operator: Consisting of endless steel hand chain, chain-pocket wheel and guard, and gear-reduction unit with a maximum [**25-lbf**] [**30-lbf**] <**Insert value**> force for grille operation. Provide alloy-steel hand chain with chain holder secured to operator guide.

"Awning" and "box" are the two types of crank operators. Indicate required type in grille assembly articles retained in Part 2.

* + - * 1. Crank Operator: Consisting of crank and crank gearbox, steel crank drive shaft, and gear-reduction unit, of type indicated. Size gears to require not more than [**25-lbf**] [**30-lbf**] <**Insert value**> force to turn crank. Fabricate gearbox to be oiltight and to completely enclose operating mechanism. Provide manufacturer's standard crank-locking device.
			1. ELECTRIC GRILLE OPERATORS

Retain this article for electric grille operators, including emergency manual operation, and for larger units or frequently operated grilles. Coordinate with Project's electrical engineer for interface of electric grille operators and equipment with fire-protection system.

Retain requirements in this article to suit Project. If retaining multiple requirements for different grilles and to identify optional requirements for a single grille, revise requirements below and insert text as needed in grille assembly articles retained in Part 2.

* + - * 1. General: Electric grille operator assembly of size and capacity recommended and provided by grille manufacturer for grille and operation cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking grille, and accessories required for proper operation.

Consider naming a grille-operator model or manufacturer or basis-of-design grille-operator model or manufacturer only if known and available from coiling-grille manufacturer and other operators are unacceptable. Specific operators may not be available from all grille manufacturers; operator features may not be common to all operator manufacturers. Consult grille manufacturers for recommendations.

Comply with NFPA 70.

Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V ac or dc.

Durability requirement in "Usage Classification" paragraph below is separate from "operation cycles," which apply to the whole grille system and are specified in grille assembly articles.

* + - * 1. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each grille.
				2. Grille Operator Location(s): Operator location indicated for each grille.

Retain one or more of five subparagraphs below to suit Project. Delete all subparagraphs if operator location(s) is indicated on Drawings.

Top-of-Hood Mounted: Operator is mounted to the right or left grille head plate, with the operator on top of the grille-hood assembly and connected to the grille drive shaft with drive chain and sprockets. Headroom is required for this type of mounting.

Front-of-Hood Mounted: Operator is mounted to the right or left grille head plate, with the operator on coil side of the grille-hood assembly and connected to the grille drive shaft with drive chain and sprockets. Front clearance is required for this type of mounting.

Wall Mounted: Operator is mounted to the inside front wall on the left or right side of grille and connected to grille drive shaft with drive chain and sprockets. Side room is required for this type of mounting. Wall-mounted operator can also be mounted above or below shaft; if above shaft, headroom is required.

Bench Mounted: Operator is mounted to the right or left grille head plate and connected to the grille drive shaft with drive chain and sprockets. Side room is required for this type of mounting.

Through-Wall Mounted: Operator is mounted on other side of wall from coil side of grille.

Retain option in "Motors" paragraph below unless external controller (disconnect switch) is indicated on Drawings. Coordinate with Project's Electrical Engineer.

* + - * 1. Motors: Reversible-type motor[**with controller (disconnect switch)**] for motor exposure indicated for each grille assembly.

Speed in "Electrical Characteristics" subparagraph below is for standard-speed grilles. Consult manufacturer and revise for higher-speed operation.

Electrical Characteristics: Minimum as indicated for each grille assembly. If not indicated, large enough to start, accelerate, and operate grille in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.

Revise "Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring" subparagraph below if required; coordinate requirements with Project's Electrical Engineer. Verify which electrical devices, connections, and wiring, if any, are furnished or installed by other than coiling-grille manufacturer; these devices must comply with requirements for electrical devices and connections specified elsewhere.

Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.

Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.

* + - * 1. Limit Switches: Equip each motorized grille with adjustable switches interlocked with motor controls and set to automatically stop grille at fully opened and fully closed positions.

Retain "Obstruction-Detection Devices" paragraph below if required or revise to suit Project and according to requirements of authorities having jurisdiction.

* + - * 1. Obstruction-Detection Devices: External entrapment protection consisting of indicated automatic safety sensor capable of protecting full width of grille opening. Activation of sensor immediately stops and reverses downward grille travel.

Retain one of or both "Photoelectric Sensor" and "Electric Sensor Edge" subparagraphs below to suit Project.

Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in grille opening without contact between grille and obstruction.

Retain "Self-Monitoring Type" subparagraph below if a self-monitoring system to detect failure of sensing device is required.

Self-Monitoring Type: Designed to interface with grille operator control circuit to detect damage to or disconnection of sensing device. When self-monitoring feature is activated, grille closes only with sustained or constant pressure on close button.

Electric Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.

Retain "Self-Monitoring Type" subparagraph below if a self-monitoring system to detect failure of sensing device is required.

Self-Monitoring Type: Four-wire-configured device designed to interface with grille operator control circuit to detect damage to or disconnection of sensor edge.

Device in "Pneumatic Sensor Edge" subparagraph below may be limited to a width of 18 feet; verify availability with manufacturer.

Pneumatic Sensor Edge: Automatic safety sensor edge, located within astragal mounted to bottom bar. Contact with sensor activates device.

Retain "Control Station" paragraph below for control stations in fixed locations. A sustained- or constant-pressure (in lieu of a momentary-contact) switch is required for closing according to UL 325 for commercial gates and may also be required for opening cycles according to authorities having jurisdiction; revise requirements and gate assembly articles retained in Part 2 as needed.

* + - * 1. Control Station: Three-button control station in fixed location with momentary-contact push-button controls labeled "Open" and "Stop" and sustained- or constant-pressure push-button control labeled "Close."

Retain "Interior-Mounted Units" subparagraph below for interior, clean, and dry installations. Revise to suit Project.

Interior-Mounted Units: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.

Retain "Exterior-Mounted Units" subparagraph below for exterior, dusty, wet, or humid installations. Revise to suit Project.

Exterior-Mounted Units: Full-guarded, standard-duty, surface-mounted, weatherproof type; NEMA ICS 6, Type 4 enclosure, key operated.

* + - * 1. Emergency Manual Operation: Equip electrically powered grille with capability for emergency manual operation. Design manual mechanism so required force for grille operation does not exceed [**25 lbf**] [**30 lbf**] <**Insert value**>.
				2. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
				3. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

Insert additional equipment for grille operation if required; verify availability with manufacturer. Remaining paragraphs are examples only; retain or revise to suit Project.

* + - * 1. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with the accessibility standard.

Retain one of or both "Emergency-Egress Release" and "Self-Opening Mechanism" paragraphs below if required. Verify requirements with authorities having jurisdiction.

* + - * 1. Emergency-Egress Release: Flush, wall-mounted handle mechanism, for accessibility-code-compliant egress feature, not dependent on electric power. The release allows an unlocked grille to partially open without affecting limit switches to permit passage, and it automatically resets motor drive on return of handle to original position.
				2. Self-Opening Mechanism: Automatic release mechanism triggered by [**smoke detector,**] [**emergency push-button station,**] fire alarm or power failure. When activated, the grille self-opens by means of a fail-safe operator to the fully open position without the need for power operation or battery backup systems. When the[**emergency push-button is reset, and the**] alarm is cleared and power is restored, the grille will operate normally.
			1. GENERAL FINISH REQUIREMENTS
				1. Comply with NAAMM/NOMMA 500 for recommendations for applying and designating finishes.
				2. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
			2. ALUMINUM FINISHES

Retain finishes in this article to suit Project. If retaining more than one for different grilles and to identify optional requirements for a single grille, revise requirements below and insert text as needed in grille assembly articles retained in Part 2. Revise finish designation if custom-anodized finish is required and availability is verified.

* + - * 1. Mill Finish: Manufacturer's standard.

Retain one of two options in "Clear Anodic Finish" paragraph below. Class II finish is standard with many manufacturers; Class I finish is heavy anodized. Verify availability with manufacturer.

* + - * 1. Clear Anodic Finish: AAMA 611, [**AA-M12C22A41, Class I, 0.018 mm**] [**AA-M12C22A31, Class II, 0.010 mm**] or thicker.

Retain one of two options in "Color Anodic Finish" paragraph below. Verify availability with manufacturer.

* + - * 1. Color Anodic Finish: AAMA 611, [**AA-M12C22A42/A44, Class I, 0.018 mm**] [**AA-M12C22A32/A34, Class II, 0.010 mm**] or thicker.

"Baked-Enamel or Powder-Coat Finish" paragraph below references AAMA standard for pigmented organic coating on extrusions and panels.

* + - * 1. Baked-Enamel or Powder-Coat Finish: AAMA 2603. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
			1. STEEL AND GALVANIZED-STEEL FINISHES

Revise article title if galvanized surfaces are not finish painted.

Retain "Factory Prime Finish" or "Baked-Enamel or Powder-Coat Finish" paragraph below, or both. If retaining both paragraphs for different grilles and to identify optional requirements for a single grille, revise requirements below and insert text as needed in grille assembly articles retained in Part 2.

* + - * 1. Factory Prime Finish: Manufacturer's standard primer, compatible with field-applied finish. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

Verify, with manufacturer, availability and suitability for grille design of finish in "Baked-Enamel or Powder-Coat Finish" paragraph below.

* + - * 1. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

For exact finish, insert names of coating manufacturers and products.

* + - 1. STAINLESS STEEL FINISHES
				1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

Retain one of or both "Polished Finishes" and "Bright, Cold-Rolled, Unpolished Finish" paragraphs below. Directional satin finish is the standard stainless steel finish for all manufacturers. Verify availability of other finishes with manufacturer. If retaining more than one for different grilles and to identify optional requirements for a single grille, revise requirements below and insert text as needed in grille assembly articles retained in Part 2.

* + - * 1. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

Retain first subparagraph below for directional finishes.

Run grain of directional finishes with long dimension of each piece.

When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

Directional Satin Finish: No. 4.

Retain "Bright, Cold-Rolled, Unpolished Finish" paragraph below for nondirectional finish.

* + - * 1. Bright, Cold-Rolled, Unpolished Finish: No. 2B.
1. EXECUTION
	* + 1. EXAMINATION
				1. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
				2. Examine locations of electrical connections.
				3. Proceed with installation only after unsatisfactory conditions have been corrected.
			2. INSTALLATION
				1. Install overhead coiling grilles and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports, according to manufacturer's written instructions and as specified.
				2. Install overhead coiling grilles, hoods, controls, and operators at the mounting locations indicated for each grille.
				3. Accessibility: Install overhead coiling grilles, switches, and controls along accessible routes in compliance with the accessibility standard.

Retain "Power-Operated Grilles" paragraph below to suit Project; option is according to minimum IBC requirement for "automatic garage door openers." Delete option to include all power-operated grilles.

* + - * 1. Power-Operated Grilles: Install[**automatic garage grille openers**] according to UL 325.
			1. STARTUP SERVICE
				1. Engage a Company Service Advisor to perform startup service.

Complete installation and startup checks according to manufacturer's written instructions.

Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

Retain subparagraph below if required. Verify whether testing is required by authorities having jurisdiction; revise accordingly.

Test grille opening when activated by detector, fire-alarm system, emergency-egress release, or self-opening mechanism as required. Reset grille-opening mechanism after successful test.

* + - 1. ADJUSTING
				1. Adjust hardware and moving parts to function smoothly, so that grilles operate easily, free of warp, twist, or distortion.

Retain subparagraph below for exterior components of grilles.

Adjust exterior components to be weather resistant.

* + - * 1. Lubricate bearings and sliding parts as recommended by manufacturer.
			1. MAINTENANCE SERVICE

Verify with Director’s Representative that maintenance service is required for Project.

* + - * 1. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service is to include [**three**] [**six**] [**nine**] [**12**] months' full maintenance by skilled employees of coiling-grille Installer. Include [**monthly**] [**quarterly**] preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper grille operation. Parts and supplies are to be manufacturer's authorized replacement parts and supplies.

Retain one of two subparagraphs below. Second subparagraph, which adds appreciable cost, is typically used only for critical locations.

Perform maintenance, including emergency callback service, during normal working hours.

Include 24-hour-per-day, 7-day-per-week, emergency callback service.

* + - 1. DEMONSTRATION
				1. Engage a Company Service Advisor to train Facility’s maintenance personnel to adjust, operate, and maintain overhead coiling grilles.

END OF SECTION 083326