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USACE / NAVFAC / AFCEC / NASA | UFGS-08 33 23 (August 2020)
Change 1 - 02/22

Preparing Activity: USACE | Superseding
UFGS-08 33 23 (November 2019)
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UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
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SECTION 08 33 23

OVERHEAD COILING DOORS
08/20, CHG 1: 02/22

****
NOTE: This guide specification covers the requirements for manually-operated, power-operated overhead coiling doors, and overhead coiling counter doors.

Verify drawings indicate door location, opening dimensions, wall thickness, side room and headroom clearances, structural framing above the door track, jamb conditions, location and type of electrical service, and remote-control stations, power characteristics, elevations, sections, details, materials, finishes, conditions for anchorage and support of each door. For fire-rated pass doors, comply with NFPA 80, Section 5.2.3.1.

Coordinate the weight of the door with the structural engineer if additional framing is required.

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

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 Reference Identifier (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.
****

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

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7-16	(2017; Errata 2018; Supp 1 2018) Minimum Design Loads and Associated Criteria for Buildings and Other Structures

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE FUN IP	(2021) Fundamentals Handbook, I-P Edition

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B29.400	(2001; (R 2008) (R 2013) (R 2018) (R 2023)) Combination, "H" Type Mill Chains, and Sprockets

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M	(2019) Standard Specification for Carbon Structural Steel
ASTM A47/A47M	(1999; R 2022; E 2022) Standard Specification for Ferritic Malleable Iron Castings
ASTM A48/A48M	(2003; R 2021) Standard Specification for Gray Iron Castings
ASTM A53/A53M	(2022) Standard Specification for Pipe,

	Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M	(2023) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A307	(2021) Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A653/A653M	(2023) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A666	(2023) Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar
ASTM A780/A780M	(2020) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A924/A924M	(2022a) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM B209	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B209M	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B221	(2021) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B221M	(2021) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
ASTM E84	(2023) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E330/E330M	(2014; R 2021) Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
ASTM F568M	(2007) Standard Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners

DOOR AND ACCESS SYSTEM MANUFACTURERS ASSOCIATION (DASMA)

ANSI/DASMA 108	(2017) Standard Method for Testing Sectional Garage Doors, Rolling Doors and Flexible Doors: Determination of Structural Performance Under Uniform Static Air Pressure Difference

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 1	(2022) Standard for Industrial Control and Systems: General Requirements
NEMA ICS 2	(2000; R 2020) Industrial Control and Systems Controllers, Contactors, and Overload Relays Rated 600 V
NEMA ICS 6	(1993; R 2016) Industrial Control and Systems: Enclosures
NEMA MG 1	(2021) Motors and Generators
NEMA ST 1	(1988; R 1994; R 1997) Specialty Transformers (Except General Purpose Type)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2023) National Electrical Code
NFPA 80	(2022) Standard for Fire Doors and Other Opening Protectives

UNDERWRITERS LABORATORIES (UL)

UL 325	(2017; Reprint Feb 2020) UL Standard for Safety Door, Drapery, Gate, Louver, and Window Operators and Systems
UL 674	(2022) UL Standard for Safety Electric Motors and Generators for Use in Hazardous (Classified) Locations

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.

****

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

Overhead Coiling Doors[; G[, [____]]]

Counterbalancing Mechanism[; G[, [____]]]

Manual Door Operators[; G[, [____]]]

Electric Door Operators[; G[, [____]]]

Bottom Bars[; G[, [____]]]

Guides[; G[, [____]]]

Mounting Brackets[; G[, [____]]]

Hood[; G[, [____]]]

Installation Drawings[; G[, [____]]]

SD-03 Product Data

Overhead Coiling Doors[; G[, [____]]]

Hardware[; G[, [____]]]

Counterbalancing Mechanism[; G[, [____]]]

Manual Door Operators[; G[, [____]]]

Electric Door Operators[; G[, [____]]]

Fire-Rated Door Assembly[; G[, [____]]]

Recycled content for steel curtain slats; S

Recycled content for stainless steel curtain slats; S

SD-05 Design Data

Overhead Coiling Doors[; G[, [____]]]

Hardware[; G[, [____]]]

Counterbalancing Mechanism[; G[, [____]]]

Manual Door Operators[; G[, [____]]]

Electric Door Operators[; G[, [____]]]

Fire-Rated Door[; G[, [____]]]

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals, Data Package 2[; G[, [____]]]

SD-11 Closeout Submittals

Warranty[; G[, [____]]]

1.3 QUALITY CONTROL

****

NOTE: Select the appropriate design and fire rating classification. Depending on the size of the fire door, labeling and oversize certificates or labels vary with the individual manufacturers. Generic installation of a rolling fire door, as shown in NFPA 80 is applicable to masonry type fire walls and the manufacturer's listed procedures, or the authority having jurisdiction. Other wall construction listings such as non-masonry (drywall) are accomplished per the individual manufacturer's listed procedures or as approved by the authority having jurisdiction. Manufacturer's catalogs should be consulted for required headroom and side room.

Class A is typically 3 hours; Class B is typically 1 1/2 hours.

****

Provide fire-rated door assemblies bearing the Underwriters Laboratories, Warnock Hersey, Factory Mutual or other nationally recognized testing laboratory label for [Class [_____] rating.] [the rating listed on the drawings.] Provide a permanent label for each door showing the manufacturer's name and address, and the model/serial number of the door.

Provide oversized fire-rated door assemblies with a listing agency

oversize label, or a certificate signed by an official of the manufacturing company certifying that the door and operator are designed to meet the specified requirements.

1.3.1 Warranty

Furnish a written guarantee that the helical spring and counterbalance mechanism are free from defects in material and workmanship for not less than [two] [_____] years after completion and acceptance of the project.

Warrant that upon notification by the Government, any defects in material, workmanship, and door operation are immediately correct within the same time period covered by the guarantee, at no cost to the Government.

1.3.2 Operation And Maintenance Submittals

Submit [6] [_____] copies of the operation and maintenance manuals 30 calendar days prior to testing the Overhead Coiling Door Assemblies. Update and resubmit data for final approval no later than 30 calendar days prior to cContract completion.

Submit Operation and Maintenance Manuals for Overhead Coiling Door Assemblies, including the following items:

[Manual Door Operators

] Electric Door Operators

[Hood

] Counterbalancing Mechanism

Painting

Provide operation and maintenance manuals which are consistent with manufacturer's standard brochures, schematics, printed instructions, operating procedures, and safety precautions.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver doors to the jobsite wrapped in a protective covering with the brands and names clearly marked thereon. Store doors in an adequately ventilated dry location that is free from dirt and dust, water, or other contaminants. Store in a manner that permits easy access for inspection and handling. Handle doors carefully to prevent damage. Remove damaged items that cannot be restored to like-new condition and provide new items.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

****

NOTE: To provide maximum protection from the weather, exterior doors normally are installed on the interior face of the wall. Weather protection features should be considered for doors installed on the exterior face of the wall. In the following paragraph, edit as appropriate to identify if door(s) are for exterior or interior openings, and

also to either require exterior doors to be mounted on interior face of walls or as indicated on drawings. Additionally, select the desired means of operating the door(s), either by lifting handles, hand chain, hand crank, or electric power with auxiliary hand chain - designer needs to coordinate with building tenant for desired door operation.

Indicate the following information on the project drawings:

a. Size of door openings.

b. Type and details of door frames or jambs plus side room, jamb loads and door curtain deflection under pressure load.

c. All wire and conduit from source of power to the operators and controls for electric power operated doors.

****

Provide overhead coiling doors with interlocking slats, complete with anchoring and door hardware, guides, hood, and operating mechanisms, and designed for use on openings as indicated. Doors must be spring counterbalanced, rolling type, and designed for use on [exterior] [or] [interior] openings, as indicated. Doors must be operated [by means of lifting handles] [by hand chain with gear or sprocket reduction] [by hand crank with gear or sprocket reduction] [by electric-power with auxiliary hand chain operation]. Doors to be surface-mounted type with guides at jambs set back a sufficient distance to provide a clear opening when door is in open position. [Mount exterior doors [as indicated] [on interior face of walls].] [Where doors are indicated to be chain- or crank-operated, the door design and construction must allow for future installation of electric-power operation.]

2.1.1 Design Requirements

2.1.1.1 Door Detail Shop Drawings

Provide installation drawings for door assemblies which show: elevations of each door type, shape and thickness of materials, finishes, details of joints and connections, details of guides and fittings, rough opening dimensions, location and description of hardware, anchorage locations, and counterbalancing mechanism and door operator details. Show locations of replaceable fusible links on wiring diagrams for power, signal and controls.[For motor-operated doors include supporting brackets for motors, location, type, and ratings of motors, and safety devices.] Include a schedule showing the location of each door with the drawings.

2.1.2 Performance Requirements

****

NOTE: The IBC establishes criteria for wind loadings for buildings in hurricane-prone locations.

****

2.1.2.1 Wind Loading

Design and fabricate door assembly to withstand the wind loading pressure of at least [_____] kilopascal pounds per square foot in accordace with ANSI/DASMA 108. Provide test data showing compliance with ASTM E330/E330M. Sound engineering principles may be used to interpolate or extrapolate test results to door sizes not specifically tested. Ensure that the complete assembly meets or exceeds the requirements of ASCE 7-16.

2.1.2.2 Fire-Rated Doors, Frames, and Hardware

Provide fire-rated doors, frames, and hardware that are tested, rated, and labeled in accordance with Underwriters Laboratories, Factory Mutual or Warnock Hersey. Fire doors must be complete with hardware, accessories, and automatic closing device as required by NFPA 80. Indicate on the labels the rating in hours, per NFPA 80, of fire exposure duration. Additionally, ensure a letter follows the hourly rating to designate the location for which the assembly is designed and the temperature rise on the unexposed door face at the end of 30 minutes of fire exposure is required. The construction details necessary for labeled doors take precedence over details indicated or specified for non-labeled doors.

Provide and attach metal UL labels to the bottom bar.

2.1.2.3 Oversized Coiling Fire-rated Door Assemblies

Where fire-rated doors and frames exceed the size for which testing and labeling services are offered, furnish certificates of inspection from either UL, Factory Mutual or Warnock Hersey. State within certificates that except for size; doors, frames, and hardware are identical in design, materials, and construction to a door that has been tested and rated.

2.1.2.4 Operational Cycle Life

****

NOTE: The particular needs of the project are those that will be used to determine frequency of usage. The normal operating frequency for overhead coiling doors is 10 cycles per day. Typical rolling doors are designed for 15,000-20,000 spring cycles. If doors are expected to operate at a significantly higher frequency, the number of cycles per day or hour should be specified.

****

Design all portions of the door, hardware and operating mechanism that are subject to movement, wear, or stress fatigue to operate through a minimum number of [10] [_____] cycles per [day] [hour]. One complete cycle of door operation is defined as when the door is in the closed position, moves to the fully open position, and returns to the closed position.

2.2 COMPONENTS

2.2.1 Overhead Coiling Doors

2.2.1.1 Curtain Materials and Construction

****

NOTE: Unless required for security reasons or

impact resistance, such as an industrial storage warehouse, for corrosion protection reasons select stainless steel or aluminum curtain materials for project locations with Environmental Severity Classifications (ESC) of C3 thru C5. See UFC 1-200-01 for determination of ESC for a project location.

NOTE: For security applications, steel slats as heavy as 1.2 mm thick 18 gage may be specified.
****

****
NOTE: Use materials with recycled content where appropriate for use. Verify suitability, availability within the region, cost effectiveness and adequate competition (including verification of bracketed percentages included in this guide specification) before specifying product recycled content requirements.

Where minimums are stated, research shows the product is available among US manufacturers above the minimum recycled content of the first bracket. Some manufacturers and regions have higher percentages. If desired, insert higher percentages into the second set of brackets and delete the first set of brackets.
****

[Provide curtain slats fabricated from Grade A steel sheets conforming to ASTM A653/A653M, with the additional requirement of a minimum yield point of 228 Megapascal 33,000 psi. Provide [22][20][18] gauge sheets, Grade 40 steel with galvanized steel zinc coating in conformance with ASTM A653/A653M and ASTM A924/A924M. Provide steel curtain slats containing a minimum of [20][_____] percent recycled content. Submit data identifying percentage of recycled content for steel curtain slats.

][Provide curtain slats fabricated from Type 304 stainless steel sheets conforming to ASTM A666; sheet thickness as required by the size of the door to meet the required windload. Provide stainless steel curtain slats containing a minimum of [60][_____] percent recycled content. Submit data identifying percentage of recycled content for stainless steel curtain slats.

][Provide curtain slats fabricated from aluminum sheets conforming to ASTM B209M ASTM B209, or ASTM B221M ASTM B221 extrusions, alloy and tempering standard from the manufacturer for type of use and finish indicated; with a thickness as required by the size of the door to meet the required windload.

] Fabricate doors from interlocking cold-rolled slats, with section profiles as specified, designed to withstand the specified wind loading. Ensure the provided slats are continuous without splices for the width of the door.

Provide slats filled with manufacturer's standard thermal insulation, complying with the maximum flame-spread and smoke-developed indexes of 75

and 450, respectively, according to ASTM E84. Enclose the insulation completely within the slat faces on the interior surface of the slats.

2.2.1.2 Non-Insulated Curtains

****
NOTE: Where physical abuse of the doors may be a problem, the minimum decimal thickness of material (bare metal) should be specified for the various door widths. If physical abuse is not a factor, the decimal thickness of material may be determined by wind pressure alone and delete the references to door width. The referenced bare metal thicknesses do not include galvanization or paint coating thicknesses.
****

Form curtains from the manufacturer's standard shapes of interlocking slats.

2.2.1.3 Insulated Curtains

****
NOTE: Several manufacturers can provide insulated slats that comply with all specified requirements. Check manufacturers' literature for information on R-value. For severe climates, 38 mm 1 1/2 inch thick insulated slats with a "U" factor of 0.11 (R of 9) are available from some manufacturers. At least one manufacturer makes an oversize slat that provides increased insulation.

Do not specify insulated slats for fire doors.
****

Form curtains from manufacturer's standard shapes of interlocking slats. Supply a slat system with a minimum R-value of [4] [_____] when calculated in accordance with ASHRAE FUN IP. Slats to consist of a [urethane] [polystyrene] core not less than 17 mm 11/16 inch thick, completely enclosed within metal facings. Slat steel thickness as required by the size of the door to meet specified performance requirements. The insulated slat assembly requires a flame spread rating of not more than 25 and a smoke development factor of not more than 50 when tested in accordance with ASTM E84.

2.2.1.4 Curtain Bottom Bar

Install curtain bottom bars as pairs of angles or using extrusions from the manufacturer's standard steel, stainless and aluminum extrusions not less than 50 by 50 millimeter by 4.8 millimeter 2.0 by 2.0 inches by 0.188 inch. Do not use aluminum on doors more than 1877 mm 16 feet wide. Ensure steel extrusions conform to ASTM A36/A36M. Stainless steel extrusions conforming to ASTM A666, Type 304. Aluminum extrusions conforming to ASTM B221M ASTM B221. Galvanize angles and fasteners in accordance with ASTM A653/A653M and ASTM A924/A924M. Coat welds and abrasions with paint conforming to ASTM A780/A780M.

[Provide two minimum 50 mm by 50 mm by 3.2 mm 2 inch by 2 inch by 1/8 inch structural steel angles.

][2.2.1.5 Vision Lites

****
NOTE: Indicate on drawings the size and location of vision panels.
****

Provide complete manufacturer's standard vision panels assembly consisting of clear acrylic glazing panels or fire-rated glass as required for the type door.

]2.2.1.6 Endlocks (and Windlocks)

Provide endlocks of Grade B cast steel conforming to ASTM A47/A47M, galvanized in accordance with ASTM A153/A153M. Secure locks at every other curtain slat. [In addition to endlocks, exterior doors which are more than 4877 mm 16 feet wide or which have a design wind load of more than 0.96 kilopascal 20 pounds per square foot, must have windlocks of manufacturer's standard design. Windlocks must prevent curtain from leaving guide because of deflection from wind pressure or other forces.]

2.2.1.7 Weather Stripping

Provide a hood baffle inside the hood that is a minimum 1.6 millimeter 1/16 inch thick sheet of vinyl, neoprene rubber or equivalent. Provide guide weather stripping that is a minimum 1.6 millimeter 1/16 inch thick sheet of vinyl, neoprene rubber, or equivalent.

Provide bottom bar weather-stripping that is a minimum 1.6 millimeter 1/16 inch thick sheet of vinyl, neoprene rubber, or equivalent.

2.2.1.8 Locking Devices

Ensure that the slide bolt engages through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.

Provide a locking device assembly which includes cylinder lock, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

[Provide a chain lock keeper suitable for a standard padlock.

]2.2.1.9 Safety Interlock

Equip power-operated doors with a safety interlock switch to disengage power supply when the door is locked, or provide an operator with an internal lock sensing device to prevent the door opening when the door is locked.

2.2.2 Hardware

Ensure that all hardware conforms to ASTM A153/A153M, ASTM A307, and ASTM F568M.

2.2.2.1 Guides

****

NOTE: Indicate on drawings jamb-guide anchorage details.
****

Fabricate curtain jamb guides from the manufacturer's standard angles or channels of same material and finish as curtain slats unless otherwise indicated. Provide guides with sufficient depth or incorporate a steel locking bar to retain the curtain in place under the wind pressure specified. Ensure curtain operates smoothly. Slot bolt holes for track adjustment. Securely attach guides to adjoining construction with not less than 10 mm 3/8 inch diameter bolts, spaced near each end and not over 762 mm 30 inches apart.

[Ensure guides are roll-formed steel channel bolted to angle or structural grade, three angle assembly of [steel][stainless steel][aluminum] to form a slot of sufficient depth to retain curtains in guides to achieve 13.8 kilopascal 20 psf windload standard. Guides may be provided with integral windlock bars and removable bottom bar stops.

][Fabricate with [structural steel][stainless steel][aluminum] angles. Provide windlock bars of same material when windlocks are required to meet specified wind load. Flare the top of inner and outer guide angles outwards to form bellmouth for smooth entry of curtain into guides. Provide removable guide stoppers to prevent over travel of curtain and bottom bar.

]2.2.2.2 Hood

Provide a hood with a minimum[24-gauge][aluminum 18-gauge B&S][galvanized][stainless steel] sheet metal, flanged at top for attachment to header and flanged at bottom to provide longitudinal stiffness. The hood encloses the curtain coil and counterbalance mechanism.

[Hoods for openings more than 3658 mm 12 feet in width must have intermediate support brackets to prevent excessive sag.] [Provide a weather baffle at the lintel or inside the hood of each exterior door.

]2.2.3 Counterbalancing Mechanism

Counterbalance doors 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 or self-lubricating bearings for rotating members.

2.2.3.1 Brackets

Provide the manufacturer's standard mounting brackets with one located at each end of the counterbalance barrel conforming to ASTM A36/A36M. Provide brackets of hot-rolled steel.

[Brackets will be of[5 mm 3/16 inch][6.35 mm 1/4 inch] minimum thick steel plates, with permanently sealed ball bearings. Designed to enclose ends of coil and provide support of counterbalance pipe at each end.

]2.2.3.2 Counterbalance Barrels

Curtain must roll up on a barrel supported at head of opening on brackets and be balanced by a torsion spring system in the barrel. Fabricate

spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, conforming to ASTM A53/A53M or equivalent. Ensure the barrel is of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats. Limit barrel deflection to not more than 2.5 mm per meter 0.03 inch per foot of span under full load.

a. Barrel

Provide steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches per foot 2.5 mm per meter of width.

b. Spring Balance

Provide an oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door. Ensure that effort to operate manually operated units does not exceed 110 N 25 lbs. At least 80 percent of the door weight must be counterbalanced at any position. Provide wheel for applying and adjusting spring torque.

2.2.3.3 Spring Balance

****
NOTE: Delete the paragraph heading and the following paragraphs if Metal Rolling Counter Doors are not being used.
****

Install one or more oil-tempered, heat-treated steel helical torsion springs within the barrel, capable of producing sufficient torque to assure easy operation of the door curtain. Provide and 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.

2.2.3.4 Torsion Rod for Counter Balance

Fabricate rod from the manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

[2.2.3.5 Counterbalance Shaft Assembly

[a. Barrel

Provide steel pipe capable of supporting the curtain load with maximum deflection of 2.5 mm per meter 0.03 inches per foot of width.

][b. Spring Balance

Provide an oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door. Ensure that maximum effort to operate does not exceed 110 Newton 25 pounds. Provide wheel for applying and adjusting spring torque.

]]2.2.4 Manual Door Operators

****
NOTE: Select desired method of manual operation paragraph from the following three paragraphs and

delete the remaining two paragraphs.
****

[2.2.4.1 Manual Push-Up Door Operators

Provide lifting handles on both sides of door and counterbalance in a manner to provide easy operation while raising or lowering the curtain by hand. Adjust counterbalance mechanisms so that the required lift or pull for operation does not exceed 11 kilogram 25 pounds unless another type of door operator is indicated. Provide pull-down straps or pole hooks on bottom rail of doors over 2134 mm 7 feet high.

][2.2.4.2 Manual Chain-Hoist Door Operators

Provide door operators which consist of an endless steel hand chain, chain-pocket wheel, guard, and a geared reduction unit [of at least a 3 to 1 ratio] [with a maximum lifting force of[111 N 25 lbf][133 N 30 lbf]]. Required pull for operation cannot exceed 16 kilogram 35 pounds. Chain must extend to within 914 mm 3 feet of floor.

Provide chain hoists with a mechanism allowing the curtain to be stopped at any point in its upward or downward travel and to remain in that position until moved to the fully open or closed position. Provide hand chains of galvanized steel. Ensure that the yield point of the chain is at least three times the required hand-chain pull.

Provide chain sprocket wheels of cast iron conforming to ASTM A48/A48M.

][2.2.4.3 Manual Crank-Hoist Door Operators

Provide door operators which consist of crank and crank gearbox, steel crank drive shaft, and gear-reduction unit with a maximum[111 N 25 lbf][133 N 30 lbf] force to turn crank. Fabricate gearbox to be oil tight and to completely enclose operating mechanism. Gears must be high-grade gray iron, cast from machine-cut patterns.

]2.2.5 Electric Door Operators

****
NOTE: Delete the paragraph heading and the following paragraphs if electric door operation is not required.

Refer to DIVISION 26 ELECTRICAL, for electrical requirements and equipment with a fire-protection system.

Delete bracketed paragraph relating to hazardous locations where it does not apply. Doors to which it is applicable should be identified in the specifications.
****

Provide electrical wiring and door operating controls conforming to the applicable requirements of NFPA 70 and UL 325. The door manufacturer must furnish automatic control and safety devices, including extra flexible type SO cable and spring-loaded automatic takeup reel or equivalent device, as required for proper operation of the doors. Conduit, wiring, and mounting of controls are specified in Section 26 20 00 INTERIOR

DISTRIBUTION SYSTEM.

[Electrical materials, equipment, and devices for installation in hazardous locations, as defined by NFPA 70, must be specifically approved by Underwriters Laboratories or an independent testing agency using equivalent standards, for the particular chemical group and the class and division of hazardous location involved.

] Electric door-operator assemblies need to be the sizes and capacities recommended and provided by the door manufacturer for specified doors. Furnish complete assemblies with electric motors and factory-prewired motor controls, starter, gear reduction units, solenoid-operated brakes, clutch, remote-control stations, manual or automatic control devices, and accessories as required for proper operation of the doors.

Design the operators so that motors may be removed without disturbing the limit-switch adjustment and affecting the emergency auxiliary operators.

Provide a manual operator of crank-gear or chain-gear mechanisms with a release clutch to permit manual operation of doors in case of power failure. Arrange the emergency manual operator so that it may be put into and out of operation from floor level, and its use does not affect the adjustment of the limit switches. Provide an electrical or mechanical device that automatically disconnects the motor from the operating mechanism when the emergency manual operating mechanism is engaged.

2.2.5.1 Door-Operator Types

[Provide an operator mounted to the right or left door head plate with the operator on top of the door-hood assembly and connected to the door drive shaft with drive chain and sprockets. Headroom is required for this type of mounting.]

[Provide an operator mounted to the right or left door head plate with the operator on coil side of the door-hood assembly and connected to the door drive shaft with drive chain and sprockets. Front clearance is required for this type of mounting.]

[Provide an operator mounted to the inside front wall on the left or right side of door and connected to door 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.]

[Provide a bench mounted operator mounted to the right or left door head plate and connected to the door drive shaft with drive chain and sprockets. Side room is required for this type of mounting.]

[Provide a through-wall operator which is mounted on other side of wall from coil side of door.]

2.2.5.2 Electric Motors

Provide motors which are the high-starting-torque, reversible, constant-duty electrical type with overload protection of sufficient torque and wattage horsepower to move the door in either direction from any position. Ensure they produce a door-travel speed of not less than 0.2 nor more than 0.3 meter 8 nor more than 12 inches per second without exceeding the wattage horsepower rating.

Provide motors which conform to NEMA MG 1 designation, temperature rating, service factor, enclosure type, and efficiency to the requirements specified. Motors must be suitable for operation on current of the characteristics indicated.[Single-phase motors must not have commutation or more than one starting contact.][Motor enclosures must be the drip-proof type or NEMA TEFC and TENV type.] Install motors in approved locations.

[Certify and label explosion-proof motors to indicate conformance to the following:

[UL 674, Class I, Groups C and D]

[UL 674, Class II, Groups F and G]]

2.2.5.3 Motor Bearings

Select bearings with bronze-sleeve or heavy-duty ball or roller antifriction type with full provisions for the type of thrust imposed by the specific duty load.

Pre-lubricate and factory seal bearings in motors less than 375 watts 1/2 horsepower.

Equip motors coupled to worm-gear reduction units with either ball or roller bearings.

Equip bearings in motors 375 watts 1/2 horsepower or larger with lubrication service fittings. Fit lubrication fittings with color-coded plastic or metal dust caps.

In any motor, bearings that are lubricated at the factory for extended duty periods do not need to be lubricated for a given number of operating hours. Display this information on an appropriate tag or label on the motor with instructions for lubrication cycle maintenance.

2.2.5.4 Motor Starters, Controls, and Enclosures

Provide each door motor with: a factory-wired, unfused, disconnect switch; a reversing, across-the-line magnetic starter with thermal overload protection; 24-volt operating coils with a control transformer limit switch; and a safety interlock assembled in a NEMA ICS 6 type enclosure as specified herein. Ensure control equipment conforms to NEMA ICS 1 and NEMA ICS 2.

Provide adjustable switches, electrically interlocked with the motor controls and set to stop the door automatically at the fully open and fully closed position.

2.2.5.5 Control Enclosures

Provide control enclosures that conform to NEMA ICS 6 for [NEMA Type 4][NEMA Type 4X][general purpose NEMA Type 1]. [oil-tight and dust-tight NEMA Type 12.] [explosion-proof, NEMA Type 7, group as indicated.] [explosion-proof NEMA Type 9, group as indicated.]

2.2.5.6 Transformer

Provide starters with 230/460 to 115 volt control transformers with one secondary fuse when required to reduce the voltage on control circuits to 24volts or less. Provide a transformer conforming to NEMA ST 1.

2.2.5.7 Sensing-Edge Device

****
NOTE: Coordinate location of devices on drawing elevations.
****

Provide each door with a pneumatic or electric sensing device that meets UL 325, extends the full width of the door, and is located within a U-section neoprene or rubber astragal, mounted on the bottom rail of the bottom door section. Device needs to immediately stop and reverse the door upon contact with an obstruction in the door opening or upon failure of the device or any component of the control system and cause the door to return to its user-defined open position. Any momentary door-closing circuit must be automatically locked out and the door must be operable manually or with constant pressure controls until the failure or damage has been corrected. A sensing device is not a substitute for a limit switch.

Connect sensing device to the control circuit through a retracting cord and reel.

2.2.5.8 Remote-Control Stations

[Remote control stations must be at least 1500 mm 5 feet above the floor line, and all switches must be located so that the operator will have complete visibility of the door at all times. Provide interior remote control stations that are full-guarded, momentary-contact three-button, heavy-duty, surface-mounted NEMA ICS 6 type enclosures as specified. Mark buttons "OPEN," "CLOSE," and "STOP." The "OPEN" and "STOP" buttons must be of the type requiring only momentary pressure to operate. The "CLOSE" button must be of the type either requiring constant pressure to maintain the closing motion of the door or momentary pressure when installed with a monitored entrapment detection device which, upon failure of the device or any component of the control system, cause the door to return to its full open position. When the door is in motion and the "STOP" button is pressed, ensure the door stops instantly and remains in the stopped position. From the stopped position, the door may then be operated in either direction by the "OPEN" or "CLOSE" buttons. When the door is in motion, and the "CLOSE" button of the constant pressure type is released, the door must stop and remain in the stop position or reverse to the user set up position; from the stop position, the door may then be operated in either direction by the "OPEN" or "CLOSE" buttons. Controls must be adjustable to automatically stop the doors at their fully open and closed positions. Open and closed positions must be readily adjustable.]

[Provide exterior control stations that are full-guarded, momentary-contact three-button standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosures, key-operated, with the same operating functions as specified herein for interior remote-control stations.]

2.2.5.9 Speed-Reduction Units

Provide speed-reduction units consisting of hardened-steel worm and bronze worm gear assemblies or planetary gear reducers running in oil or grease and inside a sealed casing, coupled to the motor through a flexible coupling. Drive shafts need to rotate on ball- or roller-bearing assemblies that are integral with the unit.

Provide minimum ratings of speed reduction units in accordance with AGMA provisions for class of service.

Ground worm gears to provide accurate thread form; machine teeth for all other types of gearing. Surface harden all gears.

Provide antifriction type bearings equipped with oil seals.

2.2.5.10 Chain Drives

Provide roller chains that are a power-transmission series steel roller type conforming to ASME B29.400, with a minimum safety factor of 10 times the design load.

Heat-treat or otherwise harden roller-chain side bars, rollers, pins, and bushings.

Provide high-carbon steel chain sprockets with machine-cut hardened teeth, finished bore and keyseat, and hollow-head setscrews.

2.2.5.11 Brakes

Provide 360-degree shoe brakes or shoe and drum brakes. Ensure the brakes are solenoid-operated and electrically interlocked to the control circuit to set automatically when power is interrupted.

2.2.5.12 Clutches

Ensure clutches are friction type or adjustable centrifugal type.

2.2.5.13 Weather/Smoke Seal Sensing Edge

Provide automatic stop control by an automatic sensing switch within neoprene astragal extending the full width of door bottom bar.

Provide an electric sensing edge device. Ensure the door immediately stops downward travel when contact occurs before door fully closes. Provide a self-monitoring sensing edge connection to the motor operator.

2.2.6 Fire-Rated Door Assembly

Provide fire-rated door assemblies with the dimensions, fire rating, and operating type indicated with electric operators and assemblies that do not interfere with manufacturer's standard interconnecting fusible links. Equip fire doors with an automatic closing mechanism. Doors must be forced into a closed position at a rate of descent of not more than 0.61 meters 2 feet per second and not less than 0.15 meters 6 inches per second without impact. The curtain must be held against the sill until the release mechanism has been reset. The automatic closing mechanism must not interfere with normal operation of the door.

[Provide the door manufacturer's standard interconnecting fusible links for door assemblies on both sides of the wall opening.

]2.2.6.1 Fire Ratings

Provide fire-rated door assemblies complying with NFPA 80 Standard for Fire Doors and Other Opening Protectives. Fire doors must be complete with hardware, accessories, and automatic closing device as required by NFPA 80.

2.2.7 Surface Finishing

Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Noticeable variations in the same metal component 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.

2.2.7.1 Galvanized and Shop-Primed Finish

****
NOTE: Include the bracketed item below for projects in locations with Environmental Severity Classifications of ESC C1 or C2 (noncorrosive locations) or where the internal space is conditioned and the coiling door will be maintained in a closed position. Refer to UFC 1-200-01 for determination of ESC for project locations.
****

Surfaces specified must have a zinc coating, a phosphate treatment, and a shop prime coat of rust-inhibitive paint. The galvanized coating must conform to ASTM A653/A653M, coating designation Z275 (G90), for steel sheets[, except that hoods located on interior of the building may be Z180 (G60)], and ASTM A123/A123M for iron and steel products. The weight of coatings for products must be as designated in Table I of ASTM A123/A123M for the thickness of base metal to be coated. The prime coat must be a type especially developed for materials treated by phosphates and adapted to application by dipping or spraying. Repair damaged zinc-coated surfaces by the materials and methods conforming to ASTM A780/A780M and spot prime. At the option of the Contractor, a two-part system including bonderizing, baked-on epoxy primer, and baked-on enamel top coat may be applied to slats and hoods before forming, in lieu of prime coat specified.

2.2.7.2 Baked-Enamel or Powder-Coat Finish

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NOTE: Baked-Enamel is less expensive than a Powder-Coat Finish. The benefits of powder coatings are a smoother, more durable finish and availability in a variety of colors.
****

Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with the coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 EXECUTION

3.1 INSTALLATION

Install overhead coiling door assembly, anchors and inserts for guides, brackets, motors, switches, hardware, and other accessories in accordance with approved detail drawings and manufacturer's written instructions. Upon completion of installation, ensure doors are free from all distortion.

Install overhead coiling doors, motors, hoods, and operators at the mounting locations as indicated for each door in the Contract Documents and as required by the manufacturer.

Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility and as required by the manufacturer.

3.1.1 Field Painted Finish

Ensure field painted steel doors and frames are in accordance with Section 09 90 00 PAINTS AND COATINGS and the manufacturer's written instructions. Protect the weather stripping from paint. Ensure that the finishes are free of scratches or other blemishes.

3.2 ADJUSTING AND CLEANING

3.2.1 Acceptance Provisions

After installation, adjust the hardware and moving parts. Lubricate bearings and sliding parts as recommended by manufacturer to provide smooth operating functions for ease movement, free of warping, twisting, or distortion of the door assembly.

Adjust seals to provide a weather-tight fit around entire perimeter.

Engage a factory-authorized service representative to perform startup service and checks according to the manufacturer's written instructions.

Test the door opening and closing operation when activated by controls[or alarm-connected fire-release] system. Adjust controls and safeties. Replace damaged and malfunctioning controls and equipment. Reset the door-closing mechanism after a successful test.

Test and make final adjustment of new doors at no additional cost to the Government.

3.2.1.1 Maintenance and Adjustment

Not more than 90 calendar days after completion and acceptance of the project, examine, lubricate, test, and re-adjust doors as required for proper operation.

3.2.1.2 Cleaning

Clean doors in accordance with manufacturer's approved instructions.

-- End of Section --