
USACE / NAVFAC / AFCEC / NASA UFGS-08 33 23 (July 2007)
Change 1 - 11/12

Preparing Activity: NASA Superseding
UFGS-08 33 23 (June 2006)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2014

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OVERHEAD COILING DOORS

07/07

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SECTION 08 33 23

OVERHEAD COILING DOORS 07/07

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, elevations, sections, details, materials, finishes, conditions for anchorage and support of each door. See limitation on the use of revolving doors in NFPA 101, chapter 5, section 2.1.3.2.

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 items(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 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 (2010; Errata 2011; Supp 1 2013) Minimum Design Loads for Buildings and Other Structures

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

ASHRAE FUN IP (2013) Fundamentals Handbook, I-P Edition

ASME INTERNATIONAL (ASME)

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

ASTM INTERNATIONAL (ASTM)

ASTM A153/A153M (2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A27/A27M (2013) Standard Specification for Steel Castings, Carbon, for General Application

ASTM A307 (2012) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength

ASTM A36/A36M (2012) Standard Specification for Carbon Structural Steel

ASTM A48/A48M (2003; R 2012) Standard Specification for Gray Iron Castings

ASTM A53/A53M (2012) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated,

Welded and Seamless

ASTM A653/A653M	(2013) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A666	(2010) Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar
ASTM A780/A780M	(2009) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A924/A924M	(2013) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM B209	(2010) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B209M	(2010) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B221	(2013) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B221M	(2013) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
ASTM D2000	(2012) Standard Classification System for Rubber Products in Automotive Applications
ASTM E330	(2002; R 2010) Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
ASTM E84	(2014) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM F568M	(2007) Standard Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 2	(2000; R 2005; Errata 2008) Standard for Controllers, Contactors, and Overload Relays Rated 600 V
NEMA ICS 6	(1993; R 2011) Enclosures
NEMA MG 1	(2011; Errata 2012) Motors and Generators

NEMA ST 1 (1988; R 1994; R 1997) Specialty
Transformers (Except General Purpose Type)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2014; AMD 1 2013; Errata 1 2013; AMD 2
2013; Errata 2 2013; AMD 3 2014; Errata 3
2014) National Electrical Code

NFPA 80 (2013) Standard for Fire Doors and Other
Opening Protectives

UNDERWRITERS LABORATORIES (UL)

UL 674 (2011; Reprint Jul 2013) Electric Motors
and Generators for Use in Division 1
Hazardous (Classified) Locations

UL Bld Mat Dir (2012) Building Materials Directory

1.2 SUBMITTALS

NOTE: Review Submittal Description (SD) definitions
in Section 01 33 00 SUBMITTAL PROCEDURES and edit
the following list to reflect only the submittals
required for the project.

The Guide Specification technical editors have
designated 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 submittals requiring Government approval on Army
projects, a code of up to three characters within
the submittal tags may be used following the "G"
designation 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.

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" designation;
submittals not having a "G" designation are [for Contractor Quality Control
approval.][for information only. When used, a designation following the
"G" designation 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][; G, [____]]
Counterbalancing Mechanism[; G][; G, [____]]
Manual Door Operators[; G][; G, [____]]
Electric Door Operators[; G][; G, [____]]
Bottom Bars[; G][; G, [____]]
Guides[; G][; G, [____]]
Mounting Brackets[; G][; G, [____]]
Overhead Drum[; G][; G, [____]]
Hood[; G][; G, [____]]
Painting[; G][; G, [____]]
Installation Drawings[; G][; G, [____]]

SD-03 Product Data

Overhead Coiling Doors[; G][; G, [____]]
Hardware[; G][; G, [____]]
Counterbalancing Mechanism[; G][; G, [____]]
Manual Door Operators[; G][; G, [____]]
Electric Door Operators[; G][; G, [____]]
Fire-Rated Door Assembly[; G][; G, [____]]

SD-05 Design Data

Overhead Coiling Doors[; G][; G, [____]]
Hardware[; G][; G, [____]]
Counterbalancing Mechanism[; G][; G, [____]]
Manual Door Operators[; G][; G, [____]]
Electric Door Operators[; G][; G, [____]]
Fire-Rated Door[; G][; G, [____]]

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals[; G][; G, [____]]

Materials[; G][; G, [____]]
Devices[; G][; G, [____]]
Procedures[; G][; G, [____]]
Manufacture's Brochures[; G][; G, [____]]
Parts Lists[; G][; G, [____]]
Cleaning[; G][; G, [____]]

1.3 OVERHEAD COILING DOOR DETAIL SHOP DRAWINGS

Provide installation drawings for overhead coiling 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. Include a schedule showing the location of each door with the drawings.

1.4 WARRANTY, OPERATION AND MAINTENANCE DATA

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

Materials
Devices
[Manual Door Operators
]
Electric Door Operators
[Hood
]
Counterbalancing Mechanism
Painting
Procedures
Manufacture's Brochures
Parts Lists

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.

1.5 DELIVERY AND STORAGE

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.

PART 2 PRODUCTS

2.1 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.

Select the appropriate design and fire rating classification. Depending on the size of the fire door, labeling and oversize certificates and/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.

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/or controls for electric power operated doors.

Doors to be coiling type, with interlocking slats, complete with anchoring and door hardware, guides, hood, and operating mechanisms, and designed for use on openings as indicated. Use grease-sealed or self-lubricating bearings for rotating members.

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.

2.2 PERFORMANCE REQUIREMENTS

2.2.1 Wind Loading

Design and fabricate door assembly to withstand the wind loading pressure of at least [_____] kilopascal pounds per square foot with a maximum deflection of 1/120 of the opening width. Provide test data showing compliance with ASTM E330. Sound engineering principles may be used to interpolate or extrapolate test results to door sizes not specifically tested. Ensure complete assembly meets or exceeds the requirements of ASCE 7.

2.2.2 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. 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.

Provide and attach metal UL labels to each item of hardware in accordance with requirements specified in the UL Bld Mat Dir.

2.2.3 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.

2.2.4 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.

2.3 OVERHEAD COILING DOORS

2.3.1 Curtain Materials and Construction

[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 sheets, galvanized in accordance with ASTM A653/A653M and ASTM A924/A924M.

] [Provide curtain slats fabricated from Type 304 stainless steel sheets conforming to ASTM A 666; sheet thickness of 0.64 mm 0.025 inch [_____] [as specified].

] [Provide curtain slats fabricated from aluminum sheets conforming to ASTM B209M ASTM B209, or ASTM B221M ASTM B221 extrusions, alloy and tempering standard from manufacturer for type of use and finish indicated; with a thickness of 1.27 mm 0.050 inch [_____] [as specified].

] 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 maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E84. Enclose insulation completely within slat faces on interior surface of slats.

2.3.2 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 manufacturer's standard shapes of interlocking slats.

2.3.3 Insulated Curtains

NOTE: Several manufacturers can provide insulated slats that comply with all specified requirements. Check manufacturers' literature for information on R-value. 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 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. Ensure the exterior face of slats are the same gauge as specified for curtains. Select an interior face not lighter than 0.56 mm 0.0219 inches. 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.

2.3.4 Curtain Bottom Bar

Install curtain bottom bars as pairs of angles 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. 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 50 mm x 50 mm x 3.2 mm 2 inch x 2 inch x 1/8 inch structural steel angles.

]2.3.5 Vision Panels

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. Set panels in a neoprene channel with a galvanized-steel frame not less than 0.91 millimeter 0.0359-inch uncoated thickness.

2.3.6 Locks

Provide end and/or wind locks of Grade B cast steel conforming to ASTM A27/A27M, galvanized in accordance with ASTM A653/A653M, ASTM A153/A153M and ASTM A924/A924M. Secure locks at every other curtain slat.

2.3.7 Weather Stripping

Ensure weather-stripping at the door-head and jamb is 3.2 millimeter 1/8-inch thick sheet of natural or neoprene rubber with air baffles. Secure weather stripping to the insides of hoods with galvanized-steel fasteners through continuous galvanized-steel pressure bars at least 15.9 millimeter 5/8-inch wide and 3.2 millimeter 1/8-inch thick.

Ensure threshold weather-stripping is 3.2 millimeter 1/8-inch thick sheet natural or neoprene rubber secured to the bottom bars.

Provide weather-stripping of natural or neoprene rubber conforming to ASTM D2000.

2.3.8 Locking Devices

Ensure 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, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

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

]2.3.9 Safety Interlock

Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.3.10 Overhead Drum

[Fabricate drums from nominal 0.71-mm 0.028-inch thick, hot-dip galvanized steel sheet with G90 (Z275) zinc coating, complying with ASTM A653/A653M.

] [Fabricate drums from nominal 0.64-mm 0.025-inch thick stainless-steel sheet, Type 304, complying with ASTM A666.

] [Fabricate drums from nominal 1.02-mm 0.040-inch thick aluminum sheet complying with ASTM B209M ASTM B209. Aluminum of alloy and temper recommended by manufacturer. Select finish for type of use and finish indicated.

] [2.3.11 Slats

No. 5F, [22][20][18] gauge, Grade 40 steel, ASTM A653/A653M galvanized steel zinc coating.

]2.4 HARDWARE

Ensure all hardware conforms to ASTM A153/A153M, ASTM A307, ASTM F568M, and ASTM A27/A27M.

2.4.1 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 and strength to retain curtain, and to withstand loading. Ensure curtain operates smoothly. Slot bolt holes for track adjustment.

[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 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.

]2.4.2 Equipment Supports

Fabricate door-operating equipment supports from the manufacturer's standard steel shapes and plates conforming to ASTM A36/A36M, galvanized in accordance with ASTM A653/A653M and ASTM A924/A924M. Size the shapes and

plates in accordance with the industry standards for the size, weight, and type of door installation.

2.4.3 Hood

Provide a hood with a minimum[24-gauge][aluminum 22-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.

[Provide a[24-gauge galvanized steel][24-gauge stainless steel][1.016 mm 0.040 inch aluminum] hood with reinforced top and bottom edges. Provide minimum 6.35 mm 1/4 inch steel intermediate support brackets as required to prevent excessive sag.

]2.5 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.

2.5.1 Brackets

Provide the manufacturer's standard mounting brackets with one located at each end of the counterbalance barrel conforming to ASTM A48/A48M. Provide brackets of either cast iron or cold-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.

] [Fabricate brackets from minimum 5 mm 3/16 inch steel plate. Permanently lubricate ball or roller bearings at rotating support points to support counterbalance shaft assembly and form end closures.

]2.5.2 Counterbalance Barrels

Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, conforming to ASTM A53/A53M. 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.

[Curtain to be coiled on a pipe of sufficient size to carry door load with deflection not to exceed 0.033 inches per foot of door span and to be correctly balanced by helical springs, oil tempered torsion type. Use cast iron barrel plugs to anchor springs to tension shaft and pipe.

]2.5.2.1 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.

2.5.2.2 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. Provide wheel for applying and adjusting spring torque.

2.5.3 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.

2.5.4 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.

[2.5.5 Counterbalance Shaft Assembly

[2.5.5.1 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.

] 2.5.5.2 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 Newtons 25 pounds. Provide wheel for applying and adjusting spring torque.

] 2.6 MANUAL DOOR OPERATORS

NOTE: Select desired method of manual operation paragraph from the following three paragraphs and delete the remaining two paragraphs.

[2.6.1 Manual Push-Up Door Operators

Equip door with manufacturer's recommended lifting handles, locks, and latches. 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. Design operating mechanisms so that the curtain can be stopped at any point in its upward or downward travel and remains in that position until pushed to the fully open or closed position.

] [2.6.2 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.

Provide chain hoists with a self-locking 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 cadmium-plated alloy steel conforming to ASME B29.400. Ensure 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.

] [2.6.3 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. Provide manufacturer's standard crank-locking device with a self-locking mechanism allowing the curtain to be stopped at any point in its upward or downward travel and remain in that position until moved to the fully open or closed position.

] 2.7 ELECTRIC DOOR OPERATORS

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

Refer to Division 16, "Electrical," for electrical requirements.

Provide electrical wiring and door operating controls conforming to the applicable requirements of NFPA 70.

Electric door-operator assemblies needs 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.

2.7.1 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.

] 2.7.2 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.

[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]

] 2.7.3 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.

2.7.4 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; 120-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 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.

2.7.5 Control Enclosures

Provide control enclosures that conform to NEMA ICS 6 for [general purpose NEMA Type 1.] [oil-tight and dust-tight NEMA Type 13.] [explosion-proof, NEMA Type 7, group as indicated.] [explosion-proof NEMA Type 9, group as indicated.]

2.7.6 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 120 volts or less. Provide a transformer conforming to NEMA ST 1.

2.7.7 Safety-Edge Device

Provide each door with a pneumatic safety device extending the full width of the door and 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 during downward travel and cause the door to return to full-open position. A safety device is not a substitute for a limit switch.

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

2.7.8 Remote-Control Stations

[Provide interior remote control stations which are full-guarded, momentary-contact three-button, heavy-duty, surface-mounted NEMA ICS 6 type enclosures as specified. Mark buttons "OPEN," "CLOSE," and "STOP." Ensure the "CLOSE" button requires a constant pressure to maintain the closing motion of the door. 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.

] [Provide exterior control stations which 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.

]2.7.9 Speed-Reduction Units

Provide speed-reduction units consisting of hardened-steel worm and bronze worm gear assemblies 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.

2.7.10 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.

2.7.11 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.

2.7.12 Clutches

Ensure clutches are either the 100 millimeter 4-inch diameter, multiple face, externally adjustable friction type or adjustable centrifugal type.

2.7.13 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 wireless sensing edge connection to the motor operator; eliminating the need for a physical traveling electric cord connection between bottom bar sensing edge device and motor operator. Supervised system alters normal door operation; preventing damage, injury or death due to an inoperable sensing edge system.

2.8 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.

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

]2.8.1 Fire Ratings

Provide fire-rated door assemblies complying with NFPA 80 Standard for Fire Doors and Other Opening Protectives and UL Fire Resistance - Volume 3.

2.9 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.

PART 3 EXECUTION

3.1 GENERAL

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.

3.2 FIELD PAINTED FINISH

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

3.3 ACCEPTANCE PROVISIONS

After installation, adjust 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 weather-tight fit around entire perimeter.

Engage a factory-authorized service representative to perform startup service and checks according to 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 door-closing mechanism after successful test.

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

Government.

3.3.1 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.

3.3.2 CLEANING

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

Clean [aluminum][stainless steel] doors in accordance with manufacturer's approved instructions.

3.4 OPERATION AND MAINTENANCE

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 contract completion.

Provide operation and maintenance manuals which are consistent with manufacturer's standard brochures, schematics, printed instructions, general operating procedures, and safety precautions. Provide test data that is legible and of good quality.

-- End of Section --