
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
NASA-08160 (June 2004)
NASA
Superseding NASA-08160
(December 2003)

SECTION TABLE OF CONTENTS
DIVISION 08 - DOORS AND WINDOWS

SECTION 08160

SLIDING METAL DOORS

06/04

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 PERFORMANCE REQUIREMENTS
 - 1.2.1 Door Performance
 - 1.2.2 Seal Performance
- 1.3 SUBMITTALS
- 1.4 GENERAL REQUIREMENTS
- 1.5 DRAWINGS
- 1.6 OPERATION AND MAINTENANCE

PART 2 PRODUCTS

- 2.1 INSULATION
- 2.2 DOORS
- 2.3 ELECTRICAL POWER OPERATORS FOR SLIDING DOORS
 - 2.3.1 Controls
 - 2.3.2 Transformer
 - 2.3.3 Safety Device
- 2.4 PNEUMATIC SEALS AND WEATHERSTRIPPING
- 2.5 PERSONNEL DOORS
- 2.6 RAILS
- 2.7 HARDWARE AND ACCESSORIES
 - 2.7.1 Hardware
 - 2.7.2 Top Guide Rollers
 - 2.7.3 Bottom Rollers
 - 2.7.4 Track Cleaners
 - 2.7.5 Toe Guards
 - 2.7.6 Warning Device
 - 2.7.7 Track Bumpers
 - 2.7.8 Drive Clutch
 - 2.7.9 Manual Operators
- 2.8 SPECIAL FINISHES
- 2.9 SHOP PAINTING

PART 3 EXECUTION

- 3.1 INSTALLATION
- 3.2 TESTING

-- End of Section Table of Contents --

NASA-08160 (June 2004)
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION NASA
Superseding NASA-08160
(December 2003)

SECTION 08160

SLIDING METAL DOORS
06/04

NOTE: Delete, revise, or add to the text in this section to cover project requirements. Notes are for designer information and will not appear in the final project specification.

This section covers electrically operated horizontal and biparting sliding doors.

PART 1 GENERAL

1.1 REFERENCES

NOTE: The following references should not be manually edited except to add new references. References not used in the text will automatically be deleted from this section of the project specification.

The publications listed below form a part of this section to the extent referenced:

ASTM INTERNATIONAL (ASTM)

- | | |
|-----------------|---|
| ASTM A 307 | (2003) Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength |
| ASTM A 325 | (2004) Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength |
| ASTM A 325M | (2004) Standard Specification for High Strength Bolts for Structural Steel Joints (Metric) |
| ASTM A 36/A 36M | (2003a) Standard Specification for Carbon Structural Steel |
| ASTM B 136 | (2003) Standard Method for Measurement of Stain Resistance of Anodic Coatings on Aluminum |

ASTM B 137	(1995; R 2000) Standard Test Method for Measurement of Mass of Coating on Anodically Coated Aluminum
ASTM B 209/B 209M	(2004) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM F 568M	(2002) Standard Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(2003) Enclosures for Electric Equipment (1000 Volts Maximum)
NEMA ICS 1	(2000) Industrial Control and Systems: General Requirements
NEMA ICS 2	(2000) Industrial Control Devices and Assemblies
NEMA ICS 6	(1993) Enclosures for Industrial Control and Systems

U.S. DEPARTMENT OF DEFENSE (DOD)

MS MIL-A-8625	(2003f) Anodic Coatings, for Aluminum and Aluminum Alloys
MS MIL-R-3065	(2000e) Rubber, Fabricated Products

UNDERWRITERS LABORATORIES (UL)

UL 506	(2004) UL Standard for Safety Specialty Transformers
--------	--

1.2 PERFORMANCE REQUIREMENTS

Design Analysis and Calculations shall meet design specifications as required by referenced standards within this section.

Equipment and Performance data for Sliding Door Assemblies and Hardware and Accessories shall meet design specifications as required by referenced standards within this section.

1.2.1 Door Performance

Doors shall be electrically operated with manual mechanism, industrial type constructed of ASTM A 36/A 36M [structural steel sections] [formed plates] sized for loads specified.

Doors of the [one-way sliding] [and] [biparting double-leaf] type shall be provided as indicated [supported on recessed rails set in floor with top guides]. Furnish doors complete with hardware, tracks, guides, and accessories.

Leaves of exterior biparting doors shall be designed as follows:

- a. Windload of [50] [_____] pounds per square foot (psf) [2400] [_____] pascal
- b. Windload deflection not to exceed [_____] [the door height in inches millimeter divided by 120] [_____].
- c. Interior horizontal sliding doors shall withstand designed an internal pressure of [10] [_____] psf, [500] [_____] pascal, both directions.
- d. Door operating speed shall be [30] [_____] feet per minute (fpm) [0.15] [_____] meter per second maximum and [15] [_____] fpm [0.08] [_____] meter per second minimum.

Doors shall require operating personnel to walk with leaf as it moves. Each door leaf shall have separate drive units, [driving one or more wheels]. Each leaf shall have [motor-mounted, spring-set,] [_____] [solenoid-released] motor brake. Each leaf shall move independently from other leaves.

[Personnel door shall be interlocked to prevent movement of the leaf, or group in which it is located, when the personnel door is open.]

1.2.2 Seal Performance

Pressure shall keep doors closed and hold center seals tight. When power fails, a braking device shall hold each door shut and maintain seals.

When pressure is applied to the OPEN button, seals shall automatically deflate before doors open. Upon deflation of pressure in each seal switches [connected in series] shall energize door-open controller. Every seal must deflate properly before permitting doors to move. Coordinate controls with this operating sequence for seals and door movement.

1.3 SUBMITTALS

NOTE: Review submittal description (SD) definitions in Section 01330, "Submittal Procedures," and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control. Include a columnar list of appropriate products and tests beneath each submittal description.

The following shall be submitted in accordance with Section 01330, "Submittal Procedures," in sufficient detail to show full compliance with the specification:

SD-05 Design Data

Equipment and performance data for the following items shall be in accordance with the requirements stated in the paragraph entitled, "Performance Requirements," of this section.

- Sliding Door Assemblies
- Hardware and Accessories

SD-02 Shop Drawings

The following drawings shall be submitted in accordance with paragraph entitled, "Drawings," of this section.

Fabrication Drawings
Installation Drawings

The following shall be submitted for electrical door operating units in accordance with paragraph entitled, "Electrical Power Operators for Sliding Doors," of this section.

Connections Diagrams
Schematics

SD-03 Product Data

Manufacturer's catalog data shall be submitted for the following items:

Insulation
Doors
Electric Power Operators
Pneumatic Seals
Weatherstripping
Flush Doors
Rails
Hardware and Accessories
Paint

SD-05 Design Data

Design Analysis and Calculations shall be submitted in accordance with paragraph entitled, "Performance Requirements," of this section.

SD-07 Certificates

Certificates shall be submitted for the following showing conformance with referenced standards contained in this section.

Insulation
Doors
Electric Power Operators
Pneumatic Seals
Rails
Hardware and Accessories
Paint

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals for sliding door assemblies shall be submitted in accordance with paragraph entitled, "Operation and Maintenance," of this section.

1.4 GENERAL REQUIREMENTS

NOTE: If Section 16003, "General Electrical Provisions," is not included in the project specifications, applicable requirements therefrom should be inserted and the following paragraph deleted.

Section 16003, "General Electrical Provisions," applies to work specified in this section.

Motors shall conform to the requirements of Section 16225, "Motors," and shall have applicable Underwriters Laboratories, Inc. (UL) listing.

Wiring shall conform to the requirements of Section 16145, "Standard Wiring Systems," and shall have applicable UL listing.

Controls shall conform to the requirements of Section 16286, "Overcurrent Protective Devices," and shall have applicable UL listing.

1.5 DRAWINGS

Fabrication Drawings shall include framing member details, welding details, and finish and painting details for sliding door assemblies.

Installation Drawings shall include type and location of hardware, framing details, and rough opening dimensions and details for horizontal door and biparting door systems.

1.6 OPERATION AND MAINTENANCE

Contractor shall submit [6] [_____] copies of the Operation and Maintenance Manuals for sliding door assemblies. Data shall be updated and resubmitted for final approval no later than 30 calendar days prior to contract completion.

Operation and Maintenance Manuals shall be consistent with manufacturer's standard brochures, schematics, printed instructions, general operating procedures, and safety precautions. Test data shall be legible and of good quality. Light-sensitive reproduction techniques are acceptable, provided finished pages are clear, legible, and not subject to fading. Pages for vendor data and manuals shall have 3/8 inch 10 millimeter holes and be bound in 3-ring, loose-leaf binders. Data shall be organized by separate index and tabbed sheets, in a loose-leaf binder. Binder shall lie flat with printed sheets that are easy to read. Caution and warning indications shall be clearly labeled.

Contractor shall provide classroom and field instructions in operation and maintenance of systems equipment where required by the technical provisions. These services shall be directed by the Contractor, using the manufacturer's factory trained personnel or qualified representatives. Contracting Officer shall be given 7 calendar days written notice of scheduled instructional services. Instructional materials belonging to the manufacturer or vendor, e.g., lists, static exhibits, visual aids, shall be made available to the Contracting Officer.

PART 2 PRODUCTS

2.1 INSULATION

Cement insulation with U-factor of [0.13] [_____] a thermal conductance of [0.74] [_____] watt per square meter per degrees C using [mastic] [_____] applied to the interior face of exterior doors.

2.2 DOORS

Leaf sections shall be welded construction. Joints shall develop 100 percent of the strength of the framing members. Members may be prefabricated for field assembly. When using bolts conform to ASTM A 325 ASTM A 325M for fastening main members. Bolts conforming to ASTM A 307 ASTM F 568M are permitted for fastening secondary members.

Vertical members shall be continuous throughout the height of the door. Members adjoining each other at splices shall be made to facilitate field assembly. Framing members shall be true to dimensions and square in all directions. No leaf shall be out of line in vertical or horizontal plane of the door opening by [1/8 inch in 20 feet 3 millimeter in 6100 millimeter] [_____] maximum.

[Full-depth members] [Gusset plates at the one-third points] shall be provided for lateral support to all main vertical members. Diagonal bracing shall support the leaf assembly to withstand shipping, assembly, and operational loads. Welds shall be ground smooth.

Fabricate cover sheets from [0.050] inch [1.2] millimeter [_____] thick (minimum) [aluminum] [_____] facing, [Alloy 3003] [_____] meeting ASTM B 209/B 209M requirements. Finish shall be [ribbed] [fluted]. Joints shall be the [butt] [_____] type showing a minimum crack. Reinforce to ensure rigid construction and prevent warping and sagging.

Cover sheets shall be sealed with an approved calking compound. Fasten to frame with corrosion-resistant [steel] [_____] fasteners [9] inches [230] millimeter [_____] on center. Where flat sheets are attached as either covering or linear sheets, unsupported areas shall not exceed [25] square feet [2.3] square meter [_____] .

2.3 ELECTRICAL POWER OPERATORS FOR SLIDING DOORS

Connections Diagrams for electric-power operators shall show complete wiring details.

Schematics shall indicate recommended voltages and amperage for wiring systems.

Furnish electric power operators complete with electric motor, reduction gearing, brackets, cables, brakes, controls, starter, limit switches, and accessories for door operation.

Door operator shall allow motor to be removed without affecting limit switch system and auxiliary operators. Provision shall be made for manual door operation.

Motors shall operate at [480] [_____] volts, [3] [_____] -phase, 60 hertz and shall be sized to move the doors in either direction from any position.

Motor overload relays shall be provided as indicated. Enclosures for motors and gear systems shall be weatherproof.

2.3.1 Controls

Each door motor shall have an enclosed, reversing [across-the-line magnetic] starter and include: disconnect switches, thermal overload protection, limit switches, [two remote control switches,] and [solenoid operated] brake. Enclosure shall be NEMA 250, Type 1 or Type 12. Control equipment shall conform to NEMA ICS 1 and NEMA ICS 2.

Control doors shall be equipped with [_____] [constant pressure pushbuttons mounted on door leaves. Removing pressure from button shall stop movement of leaves]. [Pushbuttons shall be full-guarded.] [Interior pushbuttons shall be mushroom head type, mounted in heavy duty, oil tight enclosures conforming to NEMA ICS 6, Type 13.] [Exterior pushbuttons shall be in watertight enclosures conforming to NEMA ICS 6, Type 4.]

[Remote control switches mounted on exterior of a building shall be weatherproof, key operated type having a [corrosion resistant metal] cover.]

Limit switches shall stop doors in the fully opened and closed positions. Limit switches shall be readily adjustable.

2.3.2 Transformer

Control transformers shall conform to UL 506.

2.3.3 Safety Device

Bottom [7] feet [2100] millimeter [_____] of door leaf shall have door edge devices. Attach at each end of each leaf. Devices shall stop door upon contact with obstructions. Safety devices shall not be substituted for limit switches. Safety devices shall be coordinated with the sealing requirements at the meeting rails of the door.

2.4 PNEUMATIC SEALS AND WEATHERSTRIPPING

Fabric reinforced seals fabricated from butyl compound shall meet the requirements of MS MIL-R-3065 [and shall be capable of withstanding 3 parts per million ozone in air for 50 hours, elongated 100 percent at 100 degrees F 38 degrees C].

Operate seals using a [_____] [175-pound per square inch (psi) 1200 kilopascal] pressure system regulated to [0-15] psi [0 to 100] kilopascal [_____] operating pressure. System shall be capable of inflating [1-1/2] inches [40] millimeter [_____] from a deflated height of 1 inch 25 millimeter to seal an overall gap of 2 inches 50 millimeter maximum.

Corners of seals shall be molded to form bonded corners. Seals shall be held in place by [extruded aluminum] [_____] retainers and shall be anchored to an [adjusting angle] [_____] with [corrosion resistant steel] [_____] fasteners [set in calking] and spaced at intervals of [6] inches [150] millimeter [_____] .

Center seals between leaves on biparting doors shall be [smooth-surfaced compressible rubber strips] [_____] at leading edges. [Rubber shall have a compressibility of [25] [_____] percent with recovery factor of [90] [_____] percent.]

Weatherstripping shall be provided with [aluminum] [corrosion-resistant steel] [_____] brake metal strips at head, sills, and jambs of doors.

[Aluminum] [_____] hood over each door track and door operating mechanism shall be removeable. [Aluminum hood shall be same as for door cover sheets].

Sliding doors shall have a deflating valve for pneumatic seals.

A release shall be provided for "hold shut" brake.

Hand-operated valves in each air line shall permit manual deflation of each door seal.

2.5 PERSONNEL DOORS

NOTE: Delete the following paragraph when personnel doors are not required.

Manufacturer's standard Flush Doors shall be [aluminum type,] [_____] size as indicated, complete with hardware and airtight seals.

2.6 RAILS

[Steel] [_____] rails for horizontal sliding doors shall be [40-pound 18 kilogram ASCE] [as indicated].

2.7 HARDWARE AND ACCESSORIES

2.7.1 Hardware

Hardware shall consist of top guide rollers, bottom rollers, track cleaners, toe guards, and manual operators as part of the finished door, with other items noted or required for a complete installation.

2.7.2 Top Guide Rollers

Top guide rollers shall be the [horizontal] [_____] type [with single wheel] [as indicated]. Rollers shall be [steel] [malleable iron] [cast iron] and sized for load conditions. Rollers shall have [permanently lubricated] [_____] anti-friction bearings. Construct assemblies allowing removal. Construct top roller assemblies to transmit the load from the door to the building structure.

2.7.3 Bottom Rollers

Bottom rollers shall be [double-flanged cast steel] [welded pressed steel] [_____] having minimum tread diameter of [18] inches [455] millimeter [_____] . When the door leaf height-to-width exceeds 3, adjustable rollers shall be provided. Construct rollers for removal without removing the door leaf from rail.

Treads shall have bearing seats. Horizontal clearance between the wheel and the rail shall be [1/8] inch [3] millimeter [_____] maximum at the bottom and [1/4] inch [6] millimeter [_____] maximum at edge of flanges.

Bearing seats shall fit meeting the bearing manufacturer's requirements. Bearings shall be [ball] [roller] type arranged to ensure that vertical loads and horizontal wind loads will be transmitted from leaves to wheels. Bearings with seals shall retain grease and prevent the entrance of dirt. Equip bearings with high-pressure grease fittings.

2.7.4 Track Cleaners

Door leaves shall have cleaners to clear debris from the rail head and wheel flange grooves as the leaf is moved.

2.7.5 Toe Guards

An adjustable full-length flexible toe guard reaching to the floor shall be attached to the exterior bottom edge of each leaf of biparting doors.

2.7.6 Warning Device

Each leaf which signals door movements shall have alarms. Device shall be [electronically] [electrically] [mechanically] activated.

2.7.7 Track Bumpers

When limit switch fails, bumpers shall limit door travel and will automatically stop the door.

2.7.8 Drive Clutch

When power is not applied, a clutch shall disengage the door drives.

2.7.9 Manual Operators

A manual [removable crank] [hand wheel] device shall open doors. [Door leaf shall have readily accessible brackets for crank storage.]

2.8 SPECIAL FINISHES

Surfaces of [aluminum] [_____] doors shall be given [an anodic] [_____] coating conforming to [MS MIL-A-8625, Type II] [_____] ; coating shall be sealed. Weight and effectiveness of sealing and coating(s) shall be determined in accordance with [ASTM B 137 and ASTM B 136] [_____] . Apply [_____] coat(s) of [a clear [methacrylate lacquer] [_____]] to [_____] surfaces prior to shipment.

2.9 SHOP PAINTING

Paint [steel] [_____] portions of doors with [_____] coats of manufacturer's standard [rust-inhibitive] Paint.

Paint [aluminum] [_____] surfaces which contact dissimilar metals with bituminous paint.

PART 3 EXECUTION

3.1 INSTALLATION

Prepare openings prior to door installation in accordance with drawings. Install doors in accordance with manufacturer's directions and as shown on drawings.

3.2 TESTING

Doors shall be tested in the presence of a representative of the door manufacturer and the Contracting Officer. Testing shall consist of [10] complete opening and closing cycles for each individual door, each pair of doors, and [three] complete manual cycles. On the fifth and tenth cycles, the inflatable seals shall be checked for wear and leakage. Switches shall function properly, and operation of doors shall be smooth.

A successful soap-bubble test made with the doors closed shall show an airtight condition.

-- End of Section --