**BOTTOM ROLLING HORIZONTAL SLIDING HANGAR DOORS**

**SECTION 08342 – HORIZONTAL SLIDING HANGAR DOORS**

1. **– General**
	1. **Related Documents**
		1. References: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

 AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

 AISC S335 (1989) Structural Steel Buildings Allowable Stress Design and Plastic Design

 AMERICAN IRON AND STEEL INSTITUTE (AISI)

 AISI SG-673 (1989: Errata 1990) Cold Formed Steel Design Manual

 AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

 ASTM A36/A36M (1994) Carbon Structural Steel

 ASTM A194/A194M (1996) Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service

 ASTM A275/A275M (1996) Magnetic Particle Inspection

 ASTM A307 (1994) Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength

 ASTM A325 (1997) Structural Bolts, Steel, Heat Treated

 ASTM A366/A366M (1991: R 1993) Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality

 ASTM A563 (1996) Carbon and Alloy Steel Nuts

 ASTM A569/A569M (1991; Rev. A, R 1993) Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality

 ASTM A653/A653M (1995) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process

 ASTM F436 (1993) Hardened Steel Washers

 ASTM E84 (1995; Rev. A) Surface Burning Characteristics of Building Materials

 AMERICAN WELDING SOCIETY, INC. (AWS)

 AWS D14.1 (1985, R 1991) Welding of Industrial and Mill Cranes and Other Material Handling Equipment

 NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

 NEMA ICS 1 (1993) Industrial Control and Systems

 NEMA ICS 2 (1993) Industrial Control and Systems Controllers, Contractors and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC

 NEMA ICS 6 (1993) Industrial Control and Systems Enclosures

 NFPA 70 (1996) National Electrical Code

 SSPC Paint 25 (1991) Red Iron Oxide, Zinc Oxide, Raw Linseed Oil and Alkyd Primer (Without Lead and Chromate Pigments)

 UNDERWRITERS LABORATORIES INC. (UL)

 UL 506 (1994; R 1994, Bul. 1994 and 1995) Specialty Transformers

* 1. **Summary**
		1. Sections includes: Rolling Steel Hangar Doors – Door leaf structure, rails, electro-mechanical drive/brake control systems – fabrication installation – operation, testing and inspection.
		2. Scope of Work:

 Work Included:

1. Doors shall be \_\_ leafs in a bi-parting or single side or all moving configuration.
2. Stacking configuration shall be Northern stacking or Southern stacking.
3. Structural framework, including all brackets, bracing, and field fasteners.
4. Rolling hardware, including bottom rollers and top guide rollers
5. Miscellaneous hardware, including bumpers, stops, and locks.
6. Flexible weathering for door head, jambs, and sills.
7. Electric Motor drives and accessories.
8. Electric control, warning devices and emergency safety devices.
9. Electric power feed, SO cable Draped, or Festoon or Trolley Duct.
10. Bottom rails, leveling plates, and anchor bolts.
11. Top guides.
	1. **Quality Assurance**
		1. Manufacturer’s Qualifications
			1. Only Hangar door manufacturers who have had at least 10 years of experience in the Manufacture of similar type doors.
			2. Doors supplied by metal building manufacturers are not acceptable.
			3. Acceptable Manufacturers
				1. Alamo door Systems of Texas, Inc.
				2. Fleming Steel
				3. WelBilt Industries
		2. Installer’s Qualifications

 The installation supervisor shall be an authorized representative of the door manufacturer. Mechanics shall be skilled and experienced in the erection of hangar doors of type and size required for this project.

* 1. **Submittals**
		1. Product data includes but not limited to the following:
			1. Submit Drawings showing details of construction, installation, and operation; Size, shape and thickness of materials; joints and connections; reinforcing; hardware; mechanical devices; electrical devices; and design and detail data for work of other trades affected by hangar doors.
			2. Shop painting and finishing specifications.
			3. Engineering design calculations for mechanical & door drive system. Structural design calculations to be signed and sealed by an independent 3rd part registered engineer.
			4. Submit complete schematic wiring diagram, with complete location of controls with the runs of conduit, location of junction boxes, and full details of control mountings.
			5. Submit complete manuals containing instructions for proper operation and maintenance of the doors to the owner.

 They shall contain complete:

1. Operating Instructions
2. Maintenance & Lubrication Instructions
3. Suggested List of Spare Parts
4. Manufacturer’s Catalog for Each Component in or on the doors
	1. **Guarantee**

 The equipment furnished under the specifications shall be guaranteed for a period of 5 years, from the date of acceptance against defective materials and workmanship. 1 year for electrical components.

* 1. **Design Requirements**
		1. Door Design: The hangar doors shall be designed by the manufacturer in accordance with the criteria specified. Doors shall operate without binding interference, or damage to weather stripping. Doors shall fit closely and be free from warping.
		2. Loading: Design doors as a system to withstand an external load in accordance with Uniform Building Code design wind loads indicated for the building. An internal wind load of not less than one-half of the external wind load shall be used. In both cases, the deflection shall not exceed the height of the door divided by 150. Loads due to combined dead load and wind load shall not exceed the recommended yield strength for the material used and type of loading sustained.
		3. Connection: Design connections at top and bottom guide rails to withstand an external and internal wind load of not less than 20 psf, or the design wind load for the building, whichever is greater.
		4. Cold-Formed Steel Members: Shall not be used as primary framing members.
1. **– Products**
	1. **Hangar Doors**
		1. Structural Steel: AISC S335 and ASTM A36/A36M or ASTM A572 Grade 50.
		2. Formed Steel: AISI SG-673.
		3. Sheet Steel: ASTM A569/A569M hot-rolled steel sheet, commercial quality, or ASTM A366/A366M cold-rolled steel sheet, stretcher grade, commercial quality.
		4. Galvanized Steel: ASTM A569/A653M, coating designation G90 galvanized steel sheet, commercial quality.
		5. Exterior Covering: See architectural drawings and exterior metal wall specification(s).
		6. Hardware: Provide hangar door hardware to accommodate actual dead loads plus wind loads specified. Provide top guide rollers, bottom wheels, bumpers, tractor-pulls, and bottom rail/top guide bumpers as required for a complete and operational installation.
		7. Wheel Assemblies: Bottom wheels shall be of steel plate having a minimum tread diameter as required for the actual wheel loading where the height-to-width ratio of the door leaf exceeds three. The wheels assemblies shall be vertically adjustable where the width-to-height ration exceeds 3-to-1. Construct wheel assemblies to permit removal of the wheel without removing the door leaf from its position on the rail.
			1. Treads: Machine wheel treads concentric with bearing seats. The clear distance between flanges shall not exceed the width of the rail by more than 1/8 inch at the tread nor more than 1/4 inch at the edge of the flange. Machine internal b earing seats accurately for a press fit. Heat treat wheels 18 inches or greater in diameter to obtain a rim hardness of 320 Brinnel.
			2. Wheel Bearings: Provide tapered rollers, arranged so that both horizontal and vertical loads shall be transferred to the rail only through the bearing. Bearings shall be tightly sealed and equipped with high-pressure grease fittings.
		8. Bottom Rails shall be ASCE 30lb minimum as defined in the AISC Manual of Steel Construction and shall be of the size and weight as shown on the drawings, unless heavier rails are required as a result of the Hangar Door Supplier’s analysis.
		9. Top Guide Rollers: Horizontal type with single or double steel rollers of a suitable diameter and thickness for a satisfactory performance under the designated load conditions including live and dead loads, and rise and fall of the door truss. Provide permanently factory-lubricated and sealed ball or roller bearings. Include both horizontal and vertical rollers built into a frame which is connected in such a manner as to transmit the specified wind loads from the door to the hangar structure and to prevent disengagement of the door from the top of the guide.
		10. I-Beam Captured Fixed or Floating Top Guide Hardware: Top guide system to consist of a wide flange beam designed to transmit lateral wind loads to building structure and prevent the door from falling if the door is derailed from the bottom track. Top guide hardware is to be designed to accommodate building roof live load deflections. Fixed Type up to a maximum of 5 inches. Telescoping type up to 10 inches. For openings over 110ft wide use telescoping type.
		11. Personnel Doors: The hangar door manufacturer shall provide structural frames and electrical interlock for personnel doors where indicated.
		12. Doors and Frames: Per Specification Section \_\_\_\_\_\_\_\_\_, “Steel Doors and Frame”.
		13. Hardware for Personnel Doors: Per Specification Section \_\_\_\_\_\_\_\_\_, “Finish Hardware”.
		14. Weather Stripping: Provide adjustable and readily replaceable material. Provide on vertical edges, sills and heads to afford a weathertight installation.
		15. Weather Seal Fabric: Urethane coated polyester scrim reinforced material. On vertical edges use foam core bulb with corresponding seal plate. Weather seals shall not come in contact with finished door sheeting, bottom seals shall be single or dual flap type. Top seals shall not interfere with roof deflection design requirements.
		16. Fasteners: Either zinc-coated or cadmium plated steel.
		17. Primer: One coat Red Oxide.
	2. **Fabrication**
		1. Doors
			1. Frames and Framing: Door leaves shall be of welded or bolted construction. Joints shall develop 100 percent of the strength of the frame members. Vertical members shall be continuous throughout the height of the door. When required, prepare splices to facilitate field assembly in accordance with standard practice. Frames and framing members shall be true to dimensions and square in all directions; no leaf shall be bowed, warped or out of line in the vertical or horizontal plane of the door opening by more than 1/8 inch in 20 feet. Provide diagonal bracing so that the completed leaf assembly will be braced to withstand shipping, assembly, and operational loads. Exposed welds and welds which interfere with the installation of various parts such as cover sheets shall be ground smooth.
			2. Exterior Covering and Interior Liner Sheets: Where flat sheets are attached as either exterior covering or interior liner sheets, the clear unsupported area attached as either exterior covering or interior liner sheets, the clear unsupported area shall not exceed 25 square feet.
			3. Locking Devices: Provide wheel mounted brake for locking of door panels.
			4. Tractor Pulls: Provide tractor pulls so that leaves can be pulled by a tractor.
	3. **Operation**
		1. Doors shall be Manually Operated
		2. Doors shall be Motor Operated
2. **– Execution**
	1. **Protective Coatings**
		1. Shop Painting

 Before shipment all steel members and hardware shall be painted one (1) sprayed on coat of rust inhibitive primer. All steel shall be thoroughly cleaned prior to painting to remove all oil, rust and other foreign material. Machined surfaces and neoprene weathering shall not be painted.

* 1. **Erection**

 Assemble doors and accessories in accordance with approved shop drawings. Do not erect door until the work of other trades in preparing the opening has been completed, the hangar roof is under full dead load, and the top guide and rail systems are within specified tolerances. After completing erection and before starting field painting, clean interior and exterior door surfaces. Clean abraded surfaces, field welds, and field bolts, and coat with priming paint. Field painting as specified per specification section \_\_\_\_\_\_\_\_, “Painting”.

* 1. **Field Quality Control**
		1. Manufacturer’s Field Services: Doors shall be erected by manufacturers authorized dealer.
		2. Acceptance Test
			1. Contractor shall perform complete operating tests for all door leaves. Perform no less than three complete opening and closing cycles, all safety controls, emergency manual operational system, and such other tests as specified in the Contractor’s approved door test procedure plan.
			2. Any defects disclosed by the test shall be corrected, final adjustments of the doors and operating equipment shall be turned over to the Owner in a completely acceptable and proper operating conditions. Tests of previously defective items repaired or replaced by the Contractor shall be accomplished at no additional cost to the owner.

**END OF SECTION 08342**