

THIS IS A SAMPLE SPECIFICATION ONLY. IDC WILL CUSTOMIZE YOUR SPECIFICATION FOR ANY TYPE OF HANGAR DOOR SYSTEM YOUR PROJECT WILL REQUIRE.

STEEL SLIDING HANGAR DOORS

PART 1 - GENERAL

1.1 INTENT

- A. It is the intent of this Specification to define the nature and quality of required doors and their minimum standards of construction and operation.

1.2 GENERAL

- A. One (1) steel sliding _____ hangar door system shall be furnished for one clear opening of _____wide x _____high. The hangar door system shall consist of _____door leaves. The hangar door system shall be complete with wheels, top guide rollers, motor operators, brakes, electrical controls, trolley duct electrification, hardware, weathering, top guides, etc all as more specifically described below.
 - 1. Doors and operating mechanisms shall be manufactured by a hangar door manufacturer who has been continuously engaged in the design, manufacture, and installation of aircraft hangar doors for over 25 years. In order to meet the qualifications for this project, the door manufacturer must support with written evidence (if requested) that they have designed, manufactured and installed a minimum of 50 Motor Operated Hangar Door systems which have been in satisfactory operation for a minimum of ten years, with a minimum of 25 installations that are equal in size and scope to the above referenced hangar door system.
 - 2. The hangar door manufacturer must demonstrate that they have the ability and intent to design and fabricate 90% or more of the door system with their personnel and in their own production facilities.
 - 3. Industrial Door Contractors, Inc. – Columbia, Tennessee (Tel: 931-380-0463, Fax: 931-380-3658, Website www.HangarDoor.com) has been identified as the preferred hangar door manufacturer for this project.

1.3 DEFINITION

- A. The steel sliding hangar door system shall be designed so that each door leaf shall be supported on its own bottom wheels and guided with its own top rollers.
 - 1. Each door leaf shall require operating personnel to walk alongside of the door as it moves.

1.4 COORDINATION

- A. Furnish for other trades all drawings and details for any structural steel, bracing, holes required and the like that will be part of building construction performed under other Divisions of the Project Specifications, but which will be required for proper installation of the doors. Drilling of holes, cutting or any other work affecting the structural framing of the building shall be subject to approval of the Architect or Owner's Representative.

1.5 SCOPE

- A. Furnish all supervision, labor, materials, tools, equipment and services required for and incidental to fabrication and erection of the motor operated steel sliding hangar doors, complete and in strict accordance with these Specifications and the applicable drawings.
- B. Without restricting the generality of the foregoing, the following shall be included in the door manufacturer's scope of work for each door system.
 - 1. A-36/A992 Grade 50 hot-rolled structural steel framing and bracing for door leaves. Mill certifications for steel shall be provided.
 - 2. All welding to be done in accordance with AWS D1.1 by certified welders.
 - 3. Structural steel framed openings in each hangar door system to receive hollow metal personnel door units if required.
 - 4. Complete bottom wheel assemblies for hangar doors.
 - 5. Telescopic top guide roller assemblies.
 - 6. Complete steel and EPDM weatherstripping and floating head wind curtain weatherstripping.
 - 7. Complete operating hardware; including bumpers, tractor pulls and track cleaners.
 - 8. Electronic Motor operator system.
 - 9. Complete electrical controls.
 - 10. Complete trolley duct electrification system.
 - 11. Field wiring materials (wire, conduit and fittings, J-boxes) and field wiring labor on the doors, including installation of the trolley duct systems.
 - 12. Top guides, closure plate, duct supports, and door stops.
 - 13. Bottom rails, cross ties, and anchor bolts.
 - 14. Prime coat of shop paint as specified hereinafter.
 - 15. Complete drawing and calculation submittals sealed by the door manufacturer's registered professional engineer.
 - 16. Maintenance and operating manuals.
 - 17. Door and top guide installation.
 - 18. Guarantee: One (1) year.

1.6 WORK UNDER OTHER DIVISIONS

- A. The following items of work and/or materials shall be furnished and installed by other trades in accordance with the directions contained in this and other Divisions of the Project Specifications.

1. Any preformed metal wall panels, siding, insulation, liner panels, jamb and corner flashing, trim and any siding accessories.
2. Hollow metal personnel doors, frames, finished hardware, glass and glazing and master keyed cylinders.
3. Any exit and exterior lights.
4. Any field wiring materials (wire, conduit and fittings, J-boxes) and field wiring labor to bring power to and connect to the door's trolley duct systems.
5. Vertical and horizontal supports, bracing and miscellaneous supporting steel for Top Guides.
6. Installation of bottom rails, cross ties and anchor bolts and furnishing of end of rail wood bumpers.
7. Field paint, field painting and touch-up of shop coat, field welds and field bolts.
8. Preparation of building jambs and head for attachment door weatherstripping materials.

1.7 DESIGN DRAWINGS AND CALCULATIONS

- A. The door manufacturer shall submit for approval all design and shop drawings and complete calculations of all structural, mechanical, electrical and operational features of the doors, operators and brakes. Field wiring diagrams, schematic wiring diagrams and physical location of electrical controls drawings shall be provided. The drawings shall name and list in detail each and every component used in and on the doors, including the manufacturer's name, catalog number and a full description of the component.
 1. Details of other trades affecting any door requirements shall be submitted to the door manufacturer for review, coordination and approval.
 2. Two complete manuals containing instructions for proper operation and maintenance of the doors shall be furnished by the door manufacturer to the Owner. They shall contain complete:
 - a. Operating instructions and Maintenance instructions.
 - b. A chart showing all points to be lubricated, type of lubricant and frequency of lubrication. A chart giving a check list of parts to be serviced and adjusted with frequency.
 - c. A complete list of spare parts.
 - d. A manufacturer's catalog for each component used on the doors.

1.8 DESIGN CRITERIA

- A. Leaves shall be designed and constructed in accordance with the latest American Institute of Steel Construction Specifications as a main wind force resistant system. They shall consist of standard structural sections of ample size and strength for the loads and stresses imposed under the specified conditions. Rolled shapes and/or hot rolled flat plates shall be in accordance with ASTM Designation A-36 / A992, Grade 50 Specifications.
 1. Door leaves as completed units shall be designed to withstand the minimum external and/or internal wind load of ___ miles per hour wind velocity; ASCE 7-05 Building Code; Exposure C, Importance Factor of 1.15, Fully Enclosed,

under the Main Wind-Force Resistant system provisions. Seismic Loads per ASCE 7-05, $SDS = 1.01$, $SD1 = 0.45$, $I = 1.0$, Design Category "D". The wind load deflection shall not exceed the door height in inches divided by 120. The fiber stresses in the door members due to combined dead and wind loads shall be in accordance with the current AISC Design manual.

1.9 MATERIALS

- A. All framing members shall be new hot rolled A-36 / A992 Grade 50 standard hot rolled structural sections and shall comply with AISC Specifications. All materials shall be of grades which equal or exceed the requirements established by ASTM. No member shall be less than 3/16" thick. Cold-formed "C", "Z" and similar shapes are not acceptable for any vertical or horizontal frame members, girts or bracing.

1.10 DOOR LEAF CONSTRUCTION

- A. Door members in sizes suitable for convenient shipping shall be of bolted and/or welded construction. Vertical members shall be continuous throughout the height of the door; structural splices on the vertical members are prohibited. The sections and framing members of which they are composed shall be true to dimension and square in all directions and shall not be out of line more than 1/8-inch in 20 feet. Vertical and horizontal members adjacent to each other and/or being joined together in the field shall be accurately prepared to facilitate field assembly. Full depth members spaced vertically shall be provided for proper lateral support of inside and outside flanges for all main members. Diagonal bracing shall be provided so that the completed leaf assembly will be adequately braced to withstand shipping, assembly and operational loads. Horizontal siding girts shall be on a maximum 5'-0" spacing.
 - 1. Fabrication of door sections shall be done in jigs so as to hold the sections to specified tolerances. Exposed welds and welds which interfere with the installation of various parts, such as siding, shall be ground smooth. All welding shall be in accordance with AWS D1.1 by certified welders. Mill certifications shall be provided on all steel. Door framing design shall not rely upon siding diaphragm effect.
 - 2. The exterior door covering shall be 3" depth preformed metal panels of the type and gauge as specified and shall be furnished and installed by the Siding Division of the project Specifications.
 - 3. The interior door covering shall be 1 1/4" depth preformed metal panels of the type and gauge as specified and shall be furnished and installed by the Siding Division of the project Specifications.

1.11 PERSONNEL DOORS

- A. Door manufacturer shall provide structural framed openings to receive personnel doors in each hangar door system. The Hollow metal personnel doors to be furnished by others, shall be of the swing type, 3'-0" wide by 7'-0" high, standard 1 3/4" thick industrial steel doors.
 - 1. An electrical interlock switch shall be provided for each personnel door to prevent motor operation of the group in which it is located when the

personnel door is opened or left ajar. Exit lights for each personnel door, if required, are specified to be furnished and installed by others.

1.12 WEATHERING

- A. Material which is adjustable and readily replaceable shall be provided at all necessary vertical edges, heads and sills to afford a substantially weathertight installation.
 - 1. Material on jambs, vertical interface between leaves and sill shall be flap wipe-type 2-ply cloth-inserted EPDM 1/8" thick. EPDM weathering shall be retained continuously by 1 1/2" x 3/16" steel keeper bars for its full length, secured with 1/4" rust resistant fasteners on 12" centers.
 - 2. Vertical weatherstripping at the jambs and the interface between the door leaves shall close against metal flashings that are cold formed to the configuration and located on the door leaves and jambs as shown on the contract drawings. They shall be attached to the door leaves and jambs on 12" centers with standard rust resistant fasteners. The metal flashing rub strips shall be the same color as the door covering and shall be furnished and installed by the Siding Subcontractor.
 - 3. Sill weathering shall be provided on the exterior sides of the leaves. Each shall consist of a single flap of 1/8", 2-ply cloth inserted EPDM neoprene material. It shall be retained by continuous clamp-type keeper bars bolted with 1/4" plated fasteners at 12" centers.
 - 4. Head weathering shall consist of two parts. The floating head wind curtain weatherstripping flashing, which is attached to the top guide rollers, shall consist of support angles which move up and down with the telescoping top roller to accommodate the live load roof movement and a 16-gauge sheet curtain attached to the angles across the exterior face of the door and returning around the leading edge of the door leaf. The flexible weathering part attached to the top of the door leaves shall be 1/8", 2-ply cloth inserted EPDM to mate with the floating head weathering portion. It shall be attached at 12" centers with 1/4" plated fasteners.
 - 5. Where hangar door leaves butt against each other at the centerline of the hangar opening, the abutting door edges each shall have dual compression weathering bulbs.
 - a. Bulb weathering shall be full height of the door and shall be composed of 1/8" thick, 2-ply cloth-inserted EPDM/neoprene mounted on 3" structural channels.
 - b. The neoprene bulbs shall be retained on the channel flanges with continuous retainer bars 1" x 3/16" and 1/4" plated self-tapping screws at not over 12" centers.
 - 6. Clearances between metal parts on vertical edges of leaves and between leaves and jambs, which are to be weathered, shall not be less than 4 inches.

1.13 HARDWARE

- A. Hardware shall be designed and manufactured expressly for use on a steel sliding hangar doors system. The door manufacturer shall provide telescoping top guide

roller assemblies, bottom wheels, bumpers, tractor pulls and track cleaners as part of the finished door, all as more specifically described below.

1. Telescoping type top guide roller assemblies shall be designed to move up and down to accommodate a maximum of 6" negative deflection and 6" uplift of the roof under live load. Each door leaf section shall be provided with two such assemblies. Each assembly shall have four horizontally mounted chamfered steel rollers with permanently lubricated bushings and bronze thrust washers. The rollers shall be mounted on hardened and turned steel pins sized to resist the loads imposed on them. Each assembly shall also have four vertically mounted steel rollers equipped with permanently lubricated bushings.
 - a. The assembly of horizontal and vertical rollers shall be mounted in a rigid welded steel housing which shall be connected to a steel telescoping post of adequate size and design to transmit the specified wind loads from the door leaves to the top guides.
 - b. The post shall be designed to resist all bending loads and stresses. Nylon or composite type rollers are prohibited.
2. The door manufacturer shall furnish and install the top guide tracks, horizontal closure plate, and door stops onto the structural supporting steel (at 10'-0" max centers) that has been furnished and installed by others. Supporting steel shall be fabricated and installed in accordance with the door manufacturer's approved drawings and shall be verified prior to installation of the guides.
3. Bottom rollers shall be made of plate steel having a minimum tread diameter of 15". They shall be high strength steel meeting or exceeding the minimum ASTM Designation A-36 requirements for plate wheels. Rollers shall be designed to permit removal without taking the door leaves from their position on the rails. Treads shall be machined concentric with bearing seats. The horizontal clearance between wheel and rail shall not be more than 1/8" at the bottom nor more than 1/4" at the edge of the flange.
 - a. Two internally or externally mounted tapered roller bearings shall be provided for each wheel.
 - b. Bearings shall be arranged so that both the vertical loads from the leaves and the horizontal wind loads can only be transmitted from the leaf to the wheel through the bearings.
 - c. Bearings shall be provided with seals to retain the grease and prevent the entrance of dirt and shall be equipped with approved type of high pressure grease fittings.
4. The hangar doors shall not be equipped with locking devices, except as specified for personnel doors.
5. Heavy duty rubber bumpers shall be provided for the bottom stops as required.
6. Substantial and adequate tractor pull brackets shall be provided on the leading and trailing edges of the drive leaves so that the doors can be towed by a tractor or other suitable equipment in the event of power failure.

7. Suitable and adjustable EPDM track cleaners shall be provided at leading and trailing edges of door leaves to wipe clear the rail head and the wheel flange grooves as the leaves move.

1.14 SHOP PAINTING

- A. Door framing members shall be thoroughly cleaned of loose scale, shavings, filings, dirt, dust or other objectionable materials which would interfere with the bond of paint with the steel. Blasted per SSPC-SP-6
 1. All shop painting shall be done in accordance with good practice for such work. No painting shall be done in freezing weather. All painting shall be done in dry weather or under cover and surfaces of steel shall be free from moisture when painted. All metal surfaces shall be given a priming coat of Kem Kromic Universal Metal Primer.
 2. Special care shall be taken in painting mechanisms, electrical controls, etc., so that no paint is applied to finished or bearing surfaces. Components having pre-painted surfaces need not be repainted. The Painting Subcontractor shall be directed to thoroughly mask the trolley duct, electrical controls, mechanical hardware, motor operators, and all EPDM weatherstripping, prior to applying the finish paint, so that absolutely no paint or overspray can foul the above stated door parts and systems.

1.15 OPERATING SYSTEM

- A. The steel sliding hangar door leaves shall be mechanically operated by an electronic motor drive system mounted internally within the door framing. The motor operator shall traction drive through a roller chain and sprocket arrangement one or more of the bottom wheels of each "drive" leaf directly. The power drives shall be designed to move the door leaves in either direction at a maximum speed of 60 feet per minute at zero wind load conditions and shall be operable up to and including a wind load of eight pounds per square foot.
 1. The power drive units shall consist of a motor with high speed shaft brake coupled to separate gear reducer. The necessary roller chains, sprockets, jack shafts, bearings and take-up devices necessary to drive the leaves shall be provided.
 2. Each operator system shall be provided with an acceptable means of emergency conversion to tractor towing. (Doors shall not be pushed when manually operated due to safety precautions).
 3. The drive motors shall be squirrel cage induction type, sized to operate the leaves under zero wind load conditions at not more than 75% of their rated capacity; motors shall be rated for door operation duty and shall be normal starting torque type. They shall be wound for service at 460/230-volts, 3-phase, 60-hertz.
 4. The gear reduction units shall be of the highest quality helical worm gear double reduction of commercial manufacture and shall have internal continuous lubrication. The units shall be a type which allows a reversal of effort through the gears without damage to the gears. The gears shall be rated AGMA standard with a safety factor of 1.

5. The high speed shaft brakes shall be integral with the motors and shall be of the spring set solenoid release self-adjusting disc type with an auxiliary auto-resetting manual release.
6. Access to the power drives shall be provided by a 16-gage cover located on the inside of the leaves. The covers shall have a latch to prevent opening during operation.

1.16 ELECTRICAL CONTROLS

- A. The door manufacturer shall furnish the steel sliding hangar door system with the proper electrical equipment and controls, built in accordance with the latest NEMA Standards. All equipment, power and control circuits shall be installed in accordance with the National Electrical Code, Article 513. Any equipment located 18 inches or less above the floor shall be explosion proof. Control circuits shall not exceed nominal 110-volts.
 1. Adjustable frequency drives shall be enclosed in a NEMA 12 enclosure with a three pole fused lockable disconnect switch and shall be factory wired and equipped with overload and under-voltage protection, mechanical and electrical interlocks, relays, timing devices and transformers for the control circuits.
 2. Push button stations shall be provided at the leading and/or trailing edges of the steel sliding hangar door system. The station shall be mounted at approximately 10" from the leading and/or trailing edge of the drive leaf on the interior surface. Each door shall be controlled by a two-button constant pressure push button station. Removing pressure from the buttons shall stop the motor drive units and set the brakes. The push buttons shall be NEMA 4 watertight units with 2 1/2" mushroom head buttons.
 3. The doors shall have an adjustable timer relay. Depression of a push button will start the timing delay function. The door will not move until the time delay has completed its full cycle. Release of a push button will reset the time delay cycle. The timer relay shall be adjustable from 0 to 60 seconds. The minimum time delay value the doors shall be set for is 5 seconds.
 4. Limit switches shall be provided to stop the travel of the doors in their fully opened or fully closed position.
 5. A clearly audible signal shall be provided on each group and shall operate when the push buttons are actuated for movement of the doors in either direction. The signal device shall be not less than a 6-inch diameter bell or equivalent decibel rated horn loud enough to be clearly heard in the hangar and on the apron. The signal shall sound continuously when the group is in motion.
 6. Personnel door interlocks shall be provided.
 7. Each control enclosure shall be completely shop wired and be provided with a numbered terminal strip for the convenience of the Electrical Contractor.

1.17 SAFETY EDGE

The steel sliding hangar door system shall be provided with a pneumatic safety edge from the bottom of the door panel to the top of the door leaf. The safety edge shall be designed to provide the necessary amount of overtravel after activation before solid

resistance is met. Safety edge circuitry is to be active only when the CLOSE pushbutton is depressed. Activation shall lock out the motor in the direction of travel until reset but shall permit the door to be reversed away from the obstruction which tripped the safety edge. When the opposite pushbutton is depressed to reverse the door away from the obstruction it will automatically reset the system. Pneumatic safety edge shall be used on the steel sliding hangar door system and shall operate by means of displaced air actuating suitable air switches. A minimum of one air pressure switch shall be provided every 20 feet of vertical edge. The pneumatic hose shall be natural gum rubber with $\frac{3}{4}$ inch inside diameter. The electrical service to the pneumatic air pressure switch will be no more than 115 volts.

1.18 TROLLEY DUCTS

- A. Trolley duct shall be provided for the steel sliding hangar door system. Ducts shall have four solid copper conductors in a protective PVC housing. They shall be located as shown on the drawings. They shall be rated for 600-volt, minimum 80-amp continuous duty.
 - 1. Each run shall consist of the required number of sections of straight track, feed boxes, end caps, couplings, hangers and other accessories to make the system complete and workable.
 - 2. One top roller supported trolley shall be supplied for each door leaf complete with brush contacts. One trolley support bracket shall be mounted on each door leaf.
 - 3. Structural support for the electrification system shall be provided by the Door Manufacturer.
 - 4. All components for the trolley duct system shall be supplied by the door manufacturer and installed by the Electrical Subcontractor.

1.19 ELECTRICAL WIRING AND SOURCE OF POWER

- A. All trolley ducts, conduit and fittings, multi-conductor cables, junction boxes and all labor to wire and connect to and between all electrical equipment on the doors shall be installed in accordance with the manufacturer's approved wiring drawings.
 - 1. If permanent electrical power is not available when the doors are installed, the General Contractor shall make provision for and obtain a temporary source of electrical power so the doors may be tested and adjusted under power.
 - 2. The door manufacturer's wiring diagrams shall include a schematic and field wiring diagram; a complete physical location drawing showing the controls with the runs and size of conduit, number and size of wires, location of junction boxes and details of control mountings.

1.20 ERECTION

- A. The door opening shall be completely prepared in advance of the actual door installation by the proper contractors for the respective trades. No doors shall be erected until the hangar roof has been completed and is in its proper position under

full dead load. When the hangar roof is completed and in position, the door guides shall be adjusted in relationship to the rails to the proper line, gauge and elevation in accordance with the approved tolerances stated herein.

- B. All doors and accessories shall be assembled in a thoroughly workmanlike manner in strict accordance with the approved drawings. The doors shall be installed under the supervision of the door manufacturer, who shall be responsible for proper and satisfactory operation. Third party installers are prohibited.

1.21 INSPECTION AND TESTING

- A. Inspection of the hangar door installation will be made by the Owner's representative immediately after erection is completed. Any defects disclosed by the test shall be corrected by the door manufacturer and the installation delivered in an acceptable operable condition. Immediately after approval of the installation, a separate written acceptance of the doors shall be given the door manufacturer by the Owner's representative.

1.22 GUARANTEE

- A. The Owner shall be given a written statement by the door manufacturer guaranteeing the hangar doors against all defects in material and workmanship for a period of two years after the date of completion of door installation. Except in cases of negligence, abuse, and lack of lubrication.

END OF SECTION