SECTION 08350

HYDRAULIC FOUR FOLD DOORS
MODEL 49 – WOOD CLAD

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to the Work of this Section.

1.02 SUMMARY

A. This Section describes the requirements for providing hydraulic four-fold doors as shown on the Drawings and as specified.

B. Provide complete operating door assemblies including door sections, guides, hardware, operators, controls, and installation accessories.

C. Concrete or grout work is specified in Division 3, and is by others.

D. Opening framing is specified in Division 5, and is by others.

E. Finish painting is specified in Division 9, and is by others.

F. Electrical connections, including disconnects, conduit, wire, junction boxes, and field wiring of high and low voltage systems for powered operators and accessories are specified in Division 26, and are by others.

NOTE: Be sure to specify work in Sections 3, 5, 9, 26, and any others.

1.03 SUBMITTAL

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product Data: Submit manufacturer's product data, roughing-in diagrams, and installation instructions for each type and size of hydraulic four-fold door.

Provide operating instructions, maintenance information, and electrical rough-in instructions.

C. Shop Drawing: Show construction details; clearance requirements, metal gauges, finish, electrical requirements, and interface requirements for Work of other Sections of this Specification.

D. Door Manufacturer shall submit a reference list including names and telephone numbers of five (5) successful installations of the specified type within the past two (2) years.

1.04 QUALITY ASSURANCE

A. Furnish each hydraulic four fold door as a complete unit produced by one manufacturer, including hardware, accessories, mounting and installation components.

B. Door manufacturer shall have at least 10 years experience in manufacturing doors of this type.

C. Single Source: Furnish hydraulic four-fold door units by one manufacturer for entire Project.

D. Inserts and Anchorages: Furnish setting drawings and information for installation of anchorage devices. Coordinate delivery with other Work to avoid delay. See concrete and masonry Sections of these Specifications for installation of inserts and anchorage devices.

E. Design Criteria: The door panels will be designed such that they will not deflect more than L/120 of their span under a minimum windload of 20 pounds per square foot with calculations based on the premise that the door panels are supported on the two non-spanning edges. Loads shall be applied to the vertical perimeter members. Door components shall be designed in accordance with the following specifications of latest adoption:

1. Shapes, Plates, and Bars – AISC Specification for the design, fabrication, and erection of structural steel for buildings.

****Check Local Codes for actual wind loads****

F. Submit written certification verifying door assembly ability to support specified loads.

PART 2 – PRODUCTS

2.01 MANUFACTURER

A. Project design is based on materials and systems of:

Electric Power Door, 522 West 27th Street, Hibbing, MN 55746, 1-800-346-5760, www.electricpowerdoor.com

B. Similar materials and systems of other manufacturers will be considered for substitution, providing that all items of the specification are complied with and subject to the requirements in Division 1, "Substitutions".

2.02 MATERIALS AND FABRICATION

A. General: Comply with the following standards for forms and type of materials for required items of work.

1. Steel Tubing, Electric Welded: ASTM A513
2. Steel Tubing, Structural Welded: ASTM A500 Grade B
3. Structural Shapes and plates: ASTM A36
4. Castings, Cast Iron: ASTM A48
5. Face Sheets: Steel sheet metal, flat, hot rolled, 14 gauge minimum ASTM A1011.
6. Wood Cladding: **Specify wood type and design.**

B. Door Panel Construction: Custom metal fabrications as indicated.

1. Door panel frames shall have both horizontal and vertical structural framing, and shall be constructed of standard structural steel, square steel tubing, or rectangular steel tubing sections of ample size and strength for loads and stresses imposed under the specified conditions. Minimum steel tube thickness of the vertical perimeter members shall be 14 gauge. Interior door panel frame members shall be steel tubing spaced at no more than 2'-0" on center and shall run horizontally. Pan style door construction will not be allowed.

2. Door panel frames shall be of welded construction and all joints shall develop the full strength of the framing members. Frame members shall be true to dimension and square in all directions and shall not be bowed, warped, or out of line by more than 1/8" in 20 feet.

3. Door panel frames shall be sheeted on both sides with 14 gauge flat hot rolled steel which is welded to the door panel frame. All exposed seams of the door panel sheeting shall be caulked with adhesive caulk after fabrication and prior to prime painting.

4. Wood cladding shall be attached to the exterior side of the door panels. **Specify wood type and design.**

5. Door sections shall be insulated with a minimum of 2" of fibrous glass batt-type insulation providing a U-value of .12 or less. The insulating

material shall be fitted to cover the entire surface of the door panel between the structural members.

6. Exposed welds and welds which interfere with the installation of various parts shall be ground smooth

2.03 HARDWARE

A. Provide hardware necessary for a complete installation. Hardware shall be heavy duty type, including all bolts and fittings for the hardware as follows:

1. Door Guides:

   a. For doors up to 16'-0" wide: The door guides shall be an upside down channel shape fabricated from 3/16" thick steel plate. Include wall support brackets. Guides shall be capable of being mounted within 4-1/2" of headroom.

   b. For doors 16'-0" or wider: The door guides shall be steel "S" beams S4 x 7.7 minimum. Include wall support brackets. Guides shall be capable of being mounted within 9" of headroom.

2. Guide Roller Assemblies:

   a. For doors up to 16'-0" wide: The door shall have a minimum of two anti-friction bearing guide rollers. The guide rollers shall be of sufficient size to transmit the wind load from the door panel to the steel door guides.

   b. For doors 16'-0" or wider: The door shall have a minimum of two anti-friction guide roller assemblies. The guide roller assemblies shall be of sufficient size to transmit the wind load from the door panels to the steel door guides. Provide two (2) 3" diameter minimum rollers in each assembly with bearings to take vertical load and four (4) 1" diameter minimum steel rollers which take the horizontal load.

3. Jamb Hinges: Door shall be complete with shop-applied strap type jamb hinges. Jamb hinge seams must be welded. Each hinge shall be supported on roller bearings. Hinges shall be through bolted on panel. Grease zerk fittings shall be provided on all hinges for greasing hinge pintles.

4. Hinge Pintles: Jamb hinges shall have continuous 7/8" diameter steel pintles the full height of the opening. Pintles shall be stainless steel on exterior mounted applications.

5. Fold Hinges: Door shall be complete with strap type fold hinges. Fold hinge seams must be welded. Fold hinges shall be of dual capture design

and have no less than two (2) shear planes. Fold hinges shall be equipped with a hinge pin with grease chase and grease zerk for lubrication. All fold hinges shall be equipped with two (2) roller bearings.

6. Weatherstrip: Doors shall be completely weather stripped with snap-on type weather seal at the jambs and head, cloth inserted rubber sweep at sill, combination reversing edge and rubber seal at meeting edges, and sponge rubber and metal astragal between door sections.

7. Operating Unit: Doors shall be hydraulically operated using one (1) jamb mounted cylinder actuator per side. Note: Two (2) jamb mounted actuators per side may be required for larger doors – consult the factory. There shall be no more than five pivot points in the mechanism with no sliding or rolling contact points. Operators shall not use a geared "rack and pinion" system of any type. Overhead rotary or jamb mounted rotary actuators will not be allowed. The hydraulic cylinder rods shall extend from the hydraulic cylinder and be in the retracted position when the door is closed. The operator shall be furnished complete and shall consist of a hydraulic power unit complete with integral pump, hydraulic reservoir, hydraulic control manifold block, and attached electric motor. Provide control panel, adjustable limits, hydraulic cylinders, pushbutton stations, and all necessary brackets, hydraulic hoses, and fittings to provide smooth and satisfactory operation.

   Operator shall open or close the door, starting the door in motion smoothly and then accelerating to mid-swing and bring it to an adjustable slow and smooth stop. The operator mechanism shall be instantly reversible and capable of functioning without chatter and/or vibration.

   The hydraulic actuators shall be mounted onto the wall adjacent to the jamb panel hinges. Approximately 2'-6" of side-room (from edge of door jamb) or 1'-8" of side room (from jamb panel hinge centerline) shall be required to swing the jamb panel 105 degrees for full operation. Actuators shall not extend out from the door more than 19-1/2" when the door is closed.

   Provide an emergency override system of the hydraulic system that will enable the door to be manually operated in case of power failure. Door panels shall be free to operate manually after the emergency override system is activated. The system shall automatically reset itself after returning to power operation without readjusting any limit switches.

   a. Pump Unit: Each pump unit shall be rated by the manufacturer to provide a minimum flow rate of 3 gallons per minute at 1,100 psi hydraulic pressure. Pump units shall consist of the following:

      1). Electric Motor: Electric motor driving the pump shall be suitable for operation on 3 phase, 460 volts AC power and of sufficient horsepower and torque to move door in either

direction from any position to produce an average door travel speed measured from the leading edge of the jamb panel of not less than two-thirds, nor more than one foot per second, without exceeding the rated capacity of the motor. The motor shall be totally enclosed with fan cooling (TEFC) and conform to NEMA Design "B" (Code J) standards with an insulation class of F4. Motor horsepower rating shall be 2 H.P. minimum, with a service factor rating equal to or greater than 1.15. **Specify different voltage if required.**

2). Hydraulic Reservoir Tank: Each reservoir shall have a hydraulic oil capacity of 4.5 gallons and be equipped with an oil level sight glass and removable lid. An additional combination electronic low level/high temperature hydraulic oil sensing switch shall be factory wired to a NEMA 4 electrical junction box permanently attached to the reservoir unit.

3). Pump: A precision hydraulic gear pump with a screened oil strainer shall be connected to the suction side of the pump. The pump shall be mounted inside the reservoir and connected to the motor with a suitable self- aligning coupling.

4). Hydraulic control valves shall be incorporated into a single machined aluminum manifold block that is attached to the lid of the hydraulic reservoir and shall be removable without removing the lid from the reservoir. The manifold shall be designed to smoothly start the doors into motion and then increase the speed to the maximum at mid-cycle, and then slow the doors to a smooth stop. All movements shall be smooth and controlled. The valves in the manifold shall be capable of independently adjusting the operator's over-all speed, the closing speed, and the deceleration (checking speed) near the end of opening and closing cycles. Needle type flow control valves shall be provided in the manifold to allow for manual operation of the doors without disconnecting cylinder actuators from the door panels. Additional hydraulic components consisting of pressure relief valve, back-flow check valve, manual operation valves, synchronization valve, oil filter, oil filled pressure gage with snubber and shut-off valve shall be incorporated into the manifold. Solenoid operated directional control and cushioning valves shall be installed into the manifold and factory wired into the NEMA 4 electrical junction box. Each solenoid shall be connected with a field detachable weather resistant DIN connector

that includes a red LED indicator. The use of individual hydraulic flow control valves to synchronize the operator speeds, or hydraulic fittings to connect the required valves will not be allowed.

5). **Optional Items: Consult factory for details**

a). Pump Enclosure: Provide ventilated, lockable steel enclosure with hinged door to fully surround the pump unit assembly.

b). Wall Mounting: Provide wall-mounting brackets for motor pump assembly and/or pump enclosure assembly.

b. Hydraulic Hose: A sufficient quantity of hydraulic hose shall be supplied to interconnect the pump unit to the door operators. The hydraulic hose shall be 3/8" minimum inside diameter and consist of an inner synthetic rubber tube with one braid of high-tensile strength steel wire reinforcement and an outer synthetic rubber cover which is resistant to oil, weather and abrasion. The hose shall be capable of operation in temperatures ranges between –40 to +250 degrees F. Minimum burst pressure to be 9,000 PSI. Hose to be equivalent to SAE 100 R1 type "AT".

c. Hydraulic Fluid: Supply all-temperature hydraulic fluid (-70 to +120 degree F) to fill the pump unit, hydraulic lines and operators. Hydraulic fluid shall be Lubriplate 231052-70.

2.04 ELECTRICAL CONTROLS

A. Control Panel: Each door shall be furnished with a NEMA 4 control panel enclosure, housing a reversing across-the-line type magnetic motor starter having thermal-overload protection along with relays, fuses, terminal strips, and other electronic components as required to provide the specified operating sequences. All components shall be prewired to the terminal strips and neatly labeled. Power circuits in excess of 200 volts shall be provided with control transformers to reduce voltage in the control circuit to either 24 volts or 120 volts. Control panel assembly shall be U.L. labeled. **Specify other NEMA Classes if required.**

B. Pushbuttons: Pushbuttons shall be located on the interior of the building where shown and shall be the three-button type, with the buttons marked "OPEN", "CLOSE", and "STOP". The "OPEN" button shall be of the type requiring only momentary pressure by the operator to cause the door to go from the closed to the fully open position. The "CLOSE" button shall require constant pressure from the operator to maintain the closing motion of the door. When the door is in motion and the "STOP" button is pressed, the door shall stop instantly and remain in the stop position; from the stop positions, the door may then be operated in

either direction by pushing the "OPEN" or "CLOSE" button. Pushbuttons shall be NEMA 4 rated. **Specify other controls and sequences of operation if required.**

C. Limit Switches: Shall be NEMA rated switches mounted to the cylinder actuators.

D. Photo Eyes: A fail-safe photo electric eye shall be located on both sides of the opening. These photo eyes will automatically reverse the door if an obstruction is in the door opening during closing. Photo eyes shall be through beam type. Photo eye enclosures to be NEMA 4X or IP6.

E. Reversing Device: Pneumatic-type reversing edges shall be located full length of the door on the leading edges of the two center sections. Reversing edges will automatically reverse the doors should they come in contact with an obstruction during closing. This reversing edge shall not substitute for a limit switch.

F. **Optional Items: Consult factory for details**

1. Programmable logic controller (PLC)
2. Variable frequency drive (VFD)
3. Loop detectors – open, close, and/or safety
4. Radio controls with transmitters
5. Card reader
6. Timed auto closing
7. Selector switch – Auto, Manual, Off
8. Electrical disconnect switch – non-fused, fused, or circuit breaker types available
9. Door interlocks – with other doors or equipment
10. Door position indicators

2.05 SHOP FINISHING

A. General: Thoroughly clean, pre-treat and prime surfaces of door assembly including fixed panels, trim, support, and closure pieces.

1. Pre-treatment: As required by primer manufacturer.

2. Primer must be compatible with field finish coating as specified in Division 9.

PART 3 – EXECUTION

3.01 INSPECTION

A. Verify that conditions are satisfactory for installation of hydraulic four fold doors.

B. Do not proceed with the Work of this Section until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. The installation of doors shall be by a Door Company that is factory trained and certified by the door manufacturer or supervised by an authorized representative of the door manufacturer.

B. Install door and operating equipment complete with necessary hardware, jamb and head weather strips, anchors, inserts, hangers, and equipment supports in accordance with final Shop Drawings, manufacturer's instructions, and as specified herein.

C. Upon completion of installation including work by other trades, lubricate, test and adjust doors to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.