

PART 1 - GENERAL

1.1 PRICING

- .1 All costs associated with the work required by and associated with this Section shall be included as part of the Contract Price and in the price listed in item #1 of the Bid Form.

1.2 GENERAL INSTRUCTIONS

- .1 Read and conform to:
 - .1 the General Conditions and the Supplementary Conditions of the Contract.
 - .2 Division 01 requirements and documents referred to therein.

1.3 SUMMARY

- .1 Work Included: Provide labour, materials, Products, equipment and services to complete the hangar doors work specified herein. This includes, but not limited to following:
 - .1 Bi-fold hangar doors.
 - .2 Auxiliary materials required for a complete installation .
- .2 Related Requirements: Specifications throughout the entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.4 REFERENCES

- .1 Reference Standards: Latest published editions of reference standards listed in this Section in effect as of the closing date and time of the Request for Tenders for the Contract, including any amendments adopted, are applicable unless otherwise indicated.

1.5 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-Installation Meetings:
 - .1 Prior to starting work of this Section, convene a pre-installation meeting at Project site to review Project requirements and site conditions with pertinent parties. Conform to requirements of Section 01 30 00.
 - .2 Required Attendance: Subcontractor performing work of this Section, representatives from manufacturers and fabricators involved in or affected by installation.
 - .3 Notification: Notify Consultant and Owner of scheduled meeting dates in advance; minimum 72 hour notice required.
 - .4 Agenda:
 - .1 Review progress of related construction activities and preparations for particular activity under consideration.
 - .2 Make note of required sequencing and coordination with materials and activities that have preceded or will follow.
 - .5 Reporting: Record significant discussions, agreements, and disagreements, including required corrective measures and actions.
 - .6 Distribution: Distribute minutes of the meeting to each party present and to other parties requiring information not more than 72 hours after meeting.

- .2 Coordination:
 - .1 Coordinate installation of doors with framing provided under other Sections to ensure proper allowance is provided in header to accommodate deflections and support door in all positions. Reinforce door opening to carry required loads.

1.6 SUBMITTALS

- .1 Product Data: Submit manufacturer's literature and data sheets for each type of material provided under this Section for Project in accordance with requirements of Section 01 30 00. Submit manufacturer's product characteristics, catalogue cuts, installation instructions and other relevant information for each material and product used for hangar doors work specified in this Section.
- .2 Safety Data Sheets (SDS): Submit SDS for inclusion in Operation and Maintenance Manual specified in Section 01 70 00, for adhesives, sealants and any other material designated by Consultant.
- .3 Shop Drawings: Submit Shop Drawings indicating material layouts, details of construction, connections, and relationship with adjacent construction. As a minimum indicate following:
 - .1 Include equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - .2 Include points of attachment and their corresponding static and dynamic loads imposed on structure.
 - .3 Include details of provisions for assembly expansion and contraction and for excluding and draining moisture to the exterior.
 - .4 Include plans, elevations, sections and details as applicable.
 - .5 Indicate field-measured dimensions on Shop Drawings.
 - .6 Wiring Diagrams: Submit for power, signal, and control wiring.
- .4 Delegated Design Submittals:
 - .1 Engineering design completion of hangar doors work is delegated to Contractor based on structural design criteria indicated in Contract Documents.
 - .2 Submit Shop Drawings for work of this Section that bear the stamp of a Professional Engineer registered in Province of Ontario.
 - .3 Submit copy of structural calculations upon request by Consultant.
- .5 Samples: Submit selection and verification samples for Products requiring colour, texture, or design selection. Submit manufacturer's list of finishes or colour swatches for Consultant's selection.
- .6 Welding Certificate: Submit certification for welding firms and welders to verify compliance with welding qualifications specified in this section.

1.7 CLOSEOUT SUBMITTALS

- .1 Closeout Submittals, generally: in accordance with Section 01 70 00, Closeout Submittals.
- .2 Operating and Maintenance Data: Submit care and maintenance instructions for hangar doors to be included in building operation and maintenance manual.
- .3 Warranty Documentation: Submit a copy of extended warranties specified in this Section.

1.8 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Manufacturers: Provide Products for Work of this Section by manufacturer with minimum 10 years' experience in the manufacture of such materials.
 - .2 Installers: Provide work of this Section executed by competent installers with minimum 5 years' experience installing, erecting, or assembling work similar in material, design, and extent to that shown on Drawings and Schedules, and whose work has resulted in construction with a track record of successful in-service performance.
 - .1 Certifications: Installer must be approved and certified by manufacturer. Submit proof of certification upon request.
- .2 Welding Qualifications: Qualify procedures and personnel in accordance with the following:
 - .1 Steel: to CSA W47.1 and CSA W59
 - .2 Aluminum: to CSA W47.2 and CSA W59.2
 - .3 Stainless Steel: to CSA W47.1 (Annex K) and CSA W59.
- .3 Professional Engineer's Qualifications: Employ Professional Engineer licensed to practice in Province of Ontario who carries professional liability insurance and has at least five years' experience providing engineering services of similar kind, scope, and complexity.
 - .1 Professional Engineer's Responsibility:
 - .1 production and review of Shop Drawings,
 - .2 design and certification of hangar doors, including attachments for building construction, in accordance with applicable codes and regulations,
 - .3 stamping and signing of each Shop Drawing and associated calculations.
- .4 Single Source Responsibility: Ensure primary materials provided in this Section are obtained from 1 source by a single manufacturer and secondary materials are obtained from sources recommended by primary materials manufacturers.
- .5 Mock-ups/ First Installation Review: Construct mock-ups to verify selections made under submittals, demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 - .1 Location: In-situ (i.e. first installation), as directed on site by Consultant.
 - .2 Purpose: To set benchmarks for installation and to judge subsequent work. Maintain Mock-ups during construction in undisturbed condition.
 - .3 Reviewed mock-ups: May become part of the completed work if undisturbed at the time of Substantial Performance of The work, provided they are undisturbed, and comply with requirements outlined in Contract Documents.

1.9 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle hangar doors materials in accordance with manufacturer's written instructions.
- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Store materials off-ground, in clean, dry, well-ventilated area.
- .4 Replace defective or damaged materials with new.

1.10 FIELD CONDITIONS

- .1 Field Measurements: Verify actual dimensions of construction contiguous with hangar doors by field measurements before fabrication.

1.11 WARRANTY

- .1 Extended warranty: Submit for Owner's review and acceptance, manufacturer's extended warranty in which manufacturer commits to repair or replace components of hangar doors that fail within specified warranty period. Manufacturer's extended warranty is in addition to, and does not supersede, any other rights that Owner may have under Contract Documents.
- .2 Warranty Period: Not less than 2 years from date of Substantial Performance of The work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- .1 Products of following manufacturers may be acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:
 - .1 Schweiss Doors,
 - .2 Equivalent.

2.2 REGULATORY REQUIREMENTS

- .1 Accessibility Standard: Comply with applicable provisions in CSA B651, the Ontario Building Code and the AODA .

2.3 DESIGN AND PERFORMANCE REQUIREMENTS

- .1 Provide lift-strap bifold hangar door suitable for aircraft hangar applications. Hydraulic door systems are not acceptable.
- .2 Doors must operate smoothly, efficiently, and safely under all anticipated load conditions.
- .3 Provide complete system including door panels, operating mechanism, electrical controls, safety features, and necessary accessories.
- .4 Engineer door to resist anticipated loads without sagging, bowing, or structural failure.
- .5 Water Management: Design doors with slopes in open position to direct water away from building. Provide solid footing with sill to prevent water flow under door.
- .6 Ensure door frame and components can handle operational stresses and vibrations without deformation or damage. Provide 5:1 safety factor for all lift straps and drive components.
- .7 Seismic Performance: Bi-fold hangar doors shall withstand the effects of earthquake motions determined according to the requirements of the Ontario Building Code and CAN/CSA S832.
- .8 Electrical Components, Devices, and Accessories: Listed and labeled as defined in CSA C22 Series, by a qualified testing agency, and marked for intended location and application.
- .9 Air Infiltration: Maximum rate of 5 L/s per sq. m (1 cfm/sq. ft.) at 75 Pa when tested according to ASTM E283 or DASMA 105.

2.4 BI-FOLD HANGAR DOORS

- .1 **[Material Tag: This item is noted as "OHD-#" on Drawings and Schedules.]**
- .2 Description: electrically operated bifold canopy doors.

- .1 Size: As noted on Drawings.
- .2 Insulation: Provide insulated core filled with CFC-free closed-cell urethane foam insulation having flame spread of 25 or less when measured in accordance with CAN/ULC S102.
 - .1 R-value: Not less than adjacent panels.
- .3 Operation: Door opens horizontally at top and center, opening by moving frame out and up. Align top hinges with building truss members.
- .4 Ensure the door is self-contained with top hinges, bottom door rollers, and column followers/wind rails.
- .5 Construct door framing from jig-welded steel tube sections engineered to resist loads without sagging or bowing.
- .6 Steel: ASTM A500 Grade B square structural welded steel tubing for door framing members.
- .7 Door Cladding: to match building panels specified in Section **07 42 46 - Insulated-Core Metal Wall Panels (non-fire-rated) [XX-XX-XX]** in all respects. Preform hangar exterior wall from siding panels over rigid insulation boards, assembled in accordance with cladding manufacturer's standard specifications. Provide panels with factory finish; AAMA 2605 PVDF fluoropolymer finish.
 - .1 Flashing: Provide manufacturer's standard sheet metal flashings, trim molding, closure strips, caps, subgirts and other similar sheet metal accessories used in conjunction with preformed panels in same material and finish as panels. Flashing metal to be of thickness not less than that used for the panels.
- ~~.8 Liner Panels: Galvanized steel sheets conforming to ASTM A653/A653M, coating designation Z275 (G90), with flush interior face, and thickness to meet design loads and purlin spacing, but not less than 22 ga.~~
- ~~.9.8~~ Weld shop connections; bolt or weld field connections as applicable.
- .3 Structural Performance: Ensure exterior Bi-fold hangar doors can withstand wind loads, gravity effects, and stresses in accordance with requirements of Ontario Building Code, within conditions and limits indicated on Drawings and Schedules.
 - .1 Wind Loads: to be determined in accordance with geographical location of project, but not less than uniform pressure of 0.96 kPa (20 lbf/sq. ft.), acting inward and outward. Bi-fold hangar doors must remain functional under design wind loads.
 - .2 Deflection Limits: Bi-fold hangar doors must resist design wind load without permanent deformation or component disengagement. Engineer doors to resist loads without sagging or bowing.
- .4 Motorized Door Operation: CSA or UL listed and labeled, Provide manufacturer's standard warning devices.
 - .1 Standard Service: **120, 208 or 600208, 240, 480 or 575** VAC, 60 Hz three-phase, 4-wire service; Coordinate with Division 26. Use totally enclosed motors, size as recommended by manufacturer.
 - .2 Gear Motor: Equip gear motor with electric brake to stop and hold door in any position. Provide high starting torque, reversible, continuous duty, class A insulated electric motors complying with NEMA MG 1, with overload protection. Ensure operator design allows motor removal without disturbing limit switch adjustment or affecting emergency auxiliary operator.

- .3 Motor Exposure: Exterior, wet, and humid. Provide operator cover to protect operator from weather.
- .4 Explosion Resistance: Motor must be certified for use in hazardous locations, in accordance with UL 1203 and dust-ignition classification.
- .5 Horsepower: Variable, to be determined by door manufacturer based on door size and operational requirements, but not less than 1/3 hp.
- .5 Control Stations Provide two-button constant hold control station for opening and closing bifold door, with "dead man switch" that stops door immediately when operator releases the button.
 - .1 Additional Access Control: Refer to Division 28 for additional requirements regarding access control and interlocking with vehicle detection mechanisms.
 - .2 Ensure the door stops immediately when operator releases remote control transmitter.
- .6 Electrical Disconnect: Provide electrical disconnect to disable door for service, maintenance, and emergency backup operations. Mount disconnect for floor-level accessibility.
- .7 Warning Lights: Provide warning lights and horns to alert area when door is opening or closing.
 - .1 Emergency Operation:
 - .1 Manual Chain Hoist: For manual override in case of power or operational failure. Provide automatic engagement/disengagement feature with motor activation for models designed for continuous and explosion-proof use.
 - .2 Battery Backup: For doors intended for use in emergency situations, provide battery backup with programmable logic for minimum 10 operational cycles and extended standby.
 - .2 Obstruction-Detection Device: to UL325.
 - .1 Photo Eye: Provide electric photo eye sensors at floor level to stop and reverse door when an obstruction breaks detection beam.
 - .3 Limit Switches: Provide heavy-duty weatherproof limit switch box with adjustable switches interlocked with motor controls to stop door at fully opened and closed positions.
 - .4 Safety Switches: Install top limit override safety switches to disconnect power if upper limit fails or is overridden.
 - .5 Interlock Switch (motorized doors): provide interlock switch to prevent operation when lock is engaged to prevent damage.
- .8 Basis-of-Design: "Designer Bifold Doors" by Schweiss or approved equivalent.

2.5 DOOR COMPONENTS

- .1 Top Driveshaft / Lift Drums: solid steel driveshaft with lift drums on subframe, running continuously along door width. Attach driveshaft to subframe with greaseable bearing mounts at each strap drum location. Engineer solid driveshaft and lift drums with minimum 5:1 safety factor.
- .2 Bottom Driveshaft / Lift Drums: solid steel driveshaft with lift drums on bottom cord of door, running continuously along door width. Attach driveshaft to door frame with greaseable bearing mounts at each strap drum location. Engineer solid driveshaft and lift drums with minimum 5:1 safety factor.
- .3 Hinges: heavy duty steel hinges complete, with each set 267 mm (10.50 inches) wide, pins 17.5 mm (11/16 inch) diameter minimum.

- .4 Door Truss: standard internal truss, with extra heavy-duty center truss on interior side and truss at door base.
- .5 Side Rollers: Heavy-duty, minimum 76 mm (3 inches) guide rollers with sealed bearings on door bottom at jamb location.
- .6 Column Followers / Wind Rails: Provide system to hold door base securely against building when closed, with solid square columns for wind rails.
- .7 Wind Pins
 - .1 Manual Wind Pins: 25 mm (1 inch) diameter minimum.
 - .1 Automatic Wind Pins: Center wind pins 25 mm (1 inch) diameter minimum with automatic side latches.
- .8 Latching System: Provide automatic latch system on both sides, unlocking and locking door before opening and after closing.
- .9 Top and Bottom Rubber Seals: Provide standard seal continuous at top and bottom of each door. Equip door with neoprene weather stripping at heads and jambs. Ensure sills have fabric-reinforced high-grade rubber astragal. Ensure door perimeter is weather-tight.
- .10 Weather Seal Kit: Seal sides and center of each bifold door with weather stripping. Include self-sticking foam cushion seal at center. Ensure the door perimeter is weather-tight.
- ~~.11 Walk-In Doors: Provide insulated walk-in door minimum dimensions of 914 mm x 1829 mm (36 inches x 72 inches).~~
 - ~~.1 Locations and Quantity: As noted on Drawing.~~
 - ~~.2 Color: to match adjacent building color.~~
 - ~~.3 Equip door with cylindrical lock, master keyed to building keying system. Coordinate with Section 08 71 00. Provide safety interlock switch to prevent operation when door is open or ajar.~~
- .11 Windows: Provide window frames and vision glazing (VG1) in bi-folding doors in sizes and locations as indicated on Drawings.
- .12 Fasteners: Hot dipped galvanized.

2.6 GENERAL FINISH REQUIREMENTS

- .1 Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- .2 Appearance of Finished Work: Noticeable variations in same piece 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.
- .3 Concealed Steel Finish: galvanized Z275 (G90) coating to ASTM A653/A653M.
- .4 Exposed Steel Finish: Manufacturer's standard factory-applied PVDF fluoropolymer coating meeting AAMA 2605.
 - .1 Colour: to be selected by Consultant at a later date

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Site Verification of Conditions:

- .1 Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation. Commencement of work implies acceptance of previously completed work.
- .2 Examine locations of electrical connections.

3.2 INSTALLATION

- .1 Installation, generally: Install work of this Section in strict accordance with manufacturer's written installation instructions and reviewed Shop Drawings. Supplement manufacturer's installation instructions with additional installation requirements specified in this Section to produce specified work results.
- .2 Install door, track, and operating equip support necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports according to Shop Drawings, manufacturer's instructions, and as specified.
- .3 Provide sway bracing, diagonal bracing, and reinforcement for rigid installation of track, hinges, and door-operating equipment.
- .4 Do not exceed manufacturer's recommended clear opening setting for each bifold door.
- .5 Door Cladding - Metal Building Panels: Coordinate with pre-engineered metal building erector to install exterior wall panels on bifold doors to match panels used on remainder of building. Use trims recommended by manufacturer.
- .6 Accessibility: Install hangar doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.
- .7 Motorized Doors: Install according to UL 325.
- .8 Apply proper markings for potentially hazardous locations related to door operation. Fasten warning labels to bifold door frame and operator's station according to manufacturer's instructions.

3.3 STARTUP SERVICE

- .1 Engage a factory-authorized service representative to perform startup service.
 - .1 Perform installation and startup checks according to manufacturer's written instructions.
 - .2 Test and adjust controls and safety. Replace damaged and malfunctioning controls and equipment.
 - .3 Test door release, closing, and alarm operations when activated by smoke detector or building's fire-alarm system. Test manual operation of closed door. Reset door-closing mechanism after successful test.
- .2 Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- .3 Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

3.4 ADJUSTING

- .1 Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
- .2 Lubricate bearings and sliding parts as recommended by manufacturer.
- .3 Adjust seals to provide weathertight fit around entire perimeter.

3.5 DEMONSTRATION

- .1 Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain hangar doors.

3.6 PROTECTION

- .1 Protect hangar doors from damage, soiling and contaminating substances resulting from construction activities or caused by work of other trades.
- .2 Where soiling or spills have occurred, remove spills and soiling from adjacent surfaces using cleaning procedures recommended in writing by the affected material's manufacturer. Do not use materials or processes that can damage finishes, surfaces, or construction.
- .3 Promptly replace hangar doors work damaged during construction that cannot be satisfactorily repaired.

3.7 CLEANING AND WASTE MANAGEMENT

- .1 Cleaning: Maintain clean construction area at the end of each day. When the activities of this Section are complete, remove materials, tools, equipment and rubbish.
- .2 Waste Management and Disposal: sort waste for reuse, recycling, or disposal, as specified. Remove recycling bins and containers from site and dispose of contents at the appropriate waste disposal facilities.

END OF SECTION