PART 1: GENERAL

1.01 Related Documents:

A. All applicable provisions of the Bidding and Contract Requirements, and Division 1 - General Requirements shall govern the work under this section.

1.02 Description of Work:

A. Provide all labor, materials, necessary equipment and services to complete the Automatic, Vertically Folding, Thermally Broken, Exterior Glass Partitions (from here on called Operable Wall), as indicated on the drawings, or as specified herein or both.

B. Related work by others:

1. Section: Masonry/Concrete.

2. Section: Construction of building envelope, including insulation, air & vapor barrier, as per local building codes.

3. Section: Primary structural support, including steel beam for the operable wall as well as the miscellaneous support steel for the lifting machinery for the operable wall.

4. Section: Ceiling storage pockets along axis of the operable wall.

5. Section: Painting of trim, gypsum drywall and other adjacent materials.

6. Section: All site wiring and connections for main power, including disconnect switches at each motor location. All site wiring and connections for control, including installation of key switches.

7. Water drainage trench and plumbing.

1.03 Quality Assurance:

A. The products herein specified establish the standard of quality for the Operable Wall based on Skyfold Mirage®XT Custom Powerlift Partitions by Railtech Ltd. of Baie d'Urfe (Montréal), Québec, Canada. Proposals for substitution of products or techniques not conforming to these specifications must be submitted at least ten (10) days prior to bidding. Any proposed substitute wall must be manufactured by a certified ISO-9001-2008 company or an equivalent quality control system and independent test reports which meet the requirements and design specified herein must be submitted to obtain approval.

B. The Operable Wall herein specified shall be furnished and installed by an authorized local distributor licensed by the Operable Wall manufacturer. Local distribution is required to ensure prompt project coordination and future customer service.

C. Performance requirements: The Operable Wall shall be designed to have a design life of at least 10,000 complete closed to opened to closed cycles. The Operable Wall shall comply with applicable manufacturer's independently certified testing results. Testing results include air infiltration in accordance with ASTM E283, water penetration in accordance with ASTM E547 and E331, structural loading in accordance with ASTM E330, forced entry in accordance with AAMA 1303.5 and condensation as per CSA A440-00.

D. Thermal Performance: The Operable Wall shall comply with the U value, rated, certified and labeled or simulated in accordance with NFRC 100, shown in manufacturer's latest published data for the glazing specified.

E. Solar Heat Gain Coefficient: The Operable Wall shall comply with the solar heat gain coefficient, simulated in accordance with NFRC 200, shown in manufacturer's latest published data for glazing specified.

SPECIFIER NOTE: *Air infiltration and water penetration testing results can only be applicable if the unit matches the test unit's type of sill and drainage. Structural load testing results are only applicable for the test unit size.*

1.04 References:

A. American Architectural Manufacturers Association (AAMA):
   1. AAMA 1303.5, Voluntary Specification for Forced Entry Resistant Aluminum Sliding Glass Doors.

B. American Society for Testing and Materials (ASTM):
   1. ASTM E 283, Test Method for Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
   2. ASTM E 330, Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
   3. ASTM E 547, Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.
   4. 4. ASTM E 331, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

C. National Fenestration Rating Council (NFRC):
   1. NFRC 100, Procedure for Determining Fenestration Product Thermal Materials.
   2. NFRC 200, Procedure for Determining Solar Heat Gain Coefficient.

D. American National Standards Institute (ANSI):
   1. ANSI Z97.1, Safety Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings.

E. Consumer Product Safety Commission (CPSC):
   1. CPSC 16CFR-1201, Safety Standard for Architectural Glazing Materials.

F. Canadian Standards Association (CSA):
   1. Condensation test as per CAN/CSA A440-00 Windows.

1.05 Site Conditions:

A. The floor underneath the Operable Wall along its axis shall be flat to within +/- 1/4" (6 mm) over the entire length of an operable wall. The peak to valley undulation of +/-1/4" (6 mm) shall not be closer together than 24" (610 mm) and a peak to valley undulation of +/-1/8" (3 mm) shall not be closer than 12" (305 mm). If no sill is specified, the surface finish shall be smooth and continuous. Due to varying site conditions and requirements, the drainage must be prepared by others in strict accordance with the design and instructions provided by the Operable Wall manufacturer and in accordance with proper waterproofing techniques. If these guidelines are not followed or drainage is not provided, the system may leak with driven rain.

B. Support steel above the Operable Wall along its axis shall be parallel to the floor within +/- 1/2" (12.7 mm) for the entire length of the Operable Wall. This includes loaded deflection. The beam must also be parallel to the center line of the Operable Wall within ± 1/8" (3 mm), left to right.

C. The fixed walls and/or columns at either end of the operable wall shall be within +1/4" (6 mm)-0", from plumb vertical.

D. The fixed walls and/or columns at either end of the operable wall shall be flat to within +0", -1/4" (6 mm).

1.06 Submittals:

A. Submit manufacturer's technical data for each type of Operable Wall specified herein.

B. Submit shop drawings showing complete layout of the Operable Wall system based on field verified dimensions. The drawings shall include dimensional relationship to adjoining work. Include details indicating materials, finishes, and tolerances, methods of attachment to building steel and electrical requirements.

1.07 Warranty:

A. The Operable Wall shall be warranted free from defects in material and workmanship for a period of two years or five thousand cycles, whichever occurs first from date of shipment.

B. Parts and labor required to maintain the Operable Wall and parts subject to normal wear and tear are not covered under the warranty and are the owner's responsibility. (Refer to Manufacturer's Recommended Maintenance Program).

PART 2: PRODUCT

2.01 Acceptable Manufacturer:

A. Manufacturer:
Railtech Ltd. Baie d'Urfe (Montréal), Québec, Canada and
Railtech Composites Inc., Plattsburgh, New York, USA
(514) 457-4767.

B. Product:
Skyfold Mirage®XT Custom Powerlift Partitions

2.02 Operation:

A. The Operable Walls shall refer specifically to the Automatic Vertically Folding, Thermally Broken, Exterior Glass Partitions that, when in the down position (closed) are hard, rigid, flat, plumb walls, made of a grid of rectangular panels, and when are lifted (opened), fold upward (vertically) without the use of any manual labor, in a manner similar to an accordion, into a pocket in the ceiling, between roof joists, or up between built in bulkheads.

B. The operable wall shall be opened and closed using two spring return, 3 position key switches, wired in series. Simultaneously turning the key from the "off" position shall cause the wall to move in the designated direction "up" or "down". When hand pressure is removed, the wall shall immediately stop. The operable wall shall stop in a quick and positive fashion without coasting. As a normal part of the operation, it shall be possible to partially open (or close) the wall, stop it and then reverse the operation. There shall be 2 key switches per operable wall, on either end of the axis of the wall located on the interior of the building.

C. Electric motor shall be supplied for a three phase power supply. The motor assembly is mounted directly above the centre line of the operable wall. Support steel is only required at one location, OR an offset motor assembly is mounted on a separate support steel from the operable wall

D. There shall be no exposed hinges, brackets and screws visible when the operable wall is in the down (closed) position. The operable wall shall be visibly plumb vertical and rigid in the down (closed) position.

E. Joints between panels, vertical and horizontal, shall be no more than approximately ½" (12.7mm) wide. All joints shall be sealed with finned brush seals and/or bulb seals.

F. The operable wall shall not weigh more than approximately 8 lbs/ft^2 (39.1 Kg/m^2), not including the lifting equipment.

G. Safety Equipment:

1. The operable wall shall employ an electromagnetic type of brake which shall activate firmly, without hesitation, when power is lost to the system. This brake shall have a minimum retarding torque rating equal to 200% of the power drive full load torque. A manual break release lever is supplied on the motor. The operable wall shall employ a dynamic brake, distinct and separate from the brake above, in order to lower the wall at a controlled speed of no more than approximately 150% of the normal down speed, in the case of a catastrophic failure in the power train. Alternately, the operable wall shall employ a brake, distinct and separate from the brakes above, in order to completely halt the downward motion of the wall in the case of a catastrophic failure in the power train.

2. The operable wall shall employ electrical or other limit switches in order to stop the wall at the up and down travel limits.

3. The operable wall shall employ an over torque detector in order to sense a jam in the system and to act as an over travel limit in the up direction should the primary limit switch fail to act. This over torque sensor shall be mechanical and use the motor's torque arm in it's over torque detection.

4. The lifting equipment shall use the latest in industry standards in thermal protection, overload protection, quick acting fuses, etc., in order to ensure the safety and reliability of the system.

5. The operable wall shall be equipped with an optical sensor, which shall cut power to the lifting equipment if an object or person passes between the emitter(s) and receiver(s). Regular operation of the wall shall resume once the key switch has been released and the direction of the wall has been reversed and the obstruction removed.

6. The operable wall shall be equipped with multiple electro-mechanical locks to ensure maximum forced entry resistance.

2.03 Glass Panel:

A. Thermal glass panels shall be clear, single lite, double glazed, laminated annealed glass or tempered glass, or other glass available from manufacturer, approximately 1 1/8" (29mm) thick with 1/2" (13mm) air space, nominally of the same rectangular size, flat and free of sharp edges as per industry standards. All glass to comply with safety glazing requirements of ANSI Z97.1 and CPSC 16CFR 1201. Standard glass shall be provided with dry glazing.

2.04 Folding Mechanism:

A. The folding mechanisms and horizontal structural members shall be made from structural grade, thermally broken, aluminum extrusions and structural shapes. All wear surfaces, such as; bushings, spacers, pins, discs, bearings, sleeves, shall be designed to function quietly, and with minimum wear, over the 10,000 cycle, design life of the operable wall. All components shall be made of corrosion resistant

materials such as anodized or painted aluminum, galvanized steel, stainless steel, and/or high strength plastics. The hangers, which fasten the folding mechanisms to the support structure, shall be fabricated from steel and shall be welded or bolted to the support structure supplied by others.

2.05 Locking Mechanisms:

A. The locking mechanisms shall be made from corrosion resistant materials including stainless steel, galvanized steel and high strength plastics. The locking mechanisms shall automatically engage when the operable wall reaches it's down, fully closed, position and they shall automatically release prior to the operable wall commencing its assent from the fully down, closed position.

2.06 Wall Tracks (Jambs):

A. The wall tracks shall be made from manufacturer's standard, structural grade, thermally broken, painted or anodized, aluminum extrusions.

2.07 Lifting Equipment:

A. The lifting equipment shall be sized properly so that it can open and close the wall effectively over the 10,000 cycle design life of the wall, at the minimum design speed of approximately 5 to 10 vertical feet per minute.

B. The lifting equipment shall be designed to function as smoothly, quietly and safely as possible. Wherever possible, ball bearings shall be used instead of bushings and wear surfaces.

C. There shall be a wire rope cable for every set of folding mechanisms. This cable shall be of 6 x 31 construction aircraft cable and shall be made of galvanized steel. The diameter of the cables shall be sized so that they shall be able to hold the entire weight of the wall, with the appropriate safety factor. Chain or belt drive systems are not acceptable.

D. The power drive shall be sized to deliver sufficient amount of torque to safely and effectively raise and lower the operable wall over its design life.

2.08 Seals:

A. The operable wall shall provide an air and water resistant seal that shall automatically seal against the floor threshold (sill) without the need for any manual intervention. The floor seals shall leave a joint between the floor threshold (sill) and the bottom of the operable wall of not more than approximately 1/2" (12.7mm*).*

B. The operable wall shall provide an air and water resistant seal that shall automatically seal to the wall track and leave a joint between the lifting mechanism and the track of no more than approximately 1/4" (6.4 mm).

C. The operable wall shall provide an air and water resistant seal that shall automatically seal against the head jamb without any manual intervention. The top seals shall leave a joint between the top of the operable wall and the head jamb of not more than approximately 1" (25.4 mm).

D. The operable wall shall provide automatic air and water resistant seals at the vertical and horizontal joints between the moving arms of the folding mechanisms and between adjoining horizontal structural members. The seals will be finned brush seals and/or bulb seals.

2.09 Threshold:

A. Provide manufacturer's thermally broken, raised, stepped sill OR thermally broken low profile, stepped sill OR low profile saddle sill OR flush sill.

***SPECIFIER NOTE**: Air infiltration and water penetration testing results can only be applicable if the unit matches the test unit's type of sill and drainage.*

PART 3: EXECUTION

3.01 Preparation:

A. Preparation of opening shall be by general contractor. Any deviation of site conditions contrary to approved shop drawings shall be called to the attention of the architect.

3.02 Delivery and Storage:

A. Delivery to the job site shall be coordinated by general contractor. Proper storage of partitions before installation and continued protection during and after installation shall be the responsibility of the general contractor. The operable wall supplier shall not deliver or install this product until the General Contractor can ensure in writing safe storage and protection for the wall for the duration of the project.

3.03 Inspection:

A. Inspect the relevant aspects of the site such as the evenness of the floor, walls, structural steel, etc., and ensure that these are within the tolerances stated in Part – 1 (Site Conditions) of this specification. Confirm in writing to the General Contractor or contract manager any deviations from these tolerances. Do not proceed until these conditions are made good. Carry out all appropriate field measurements before manufacturing any components or assemblies.

3.04 Installation:

A. Install operable walls in accordance with the manufacturer's printed instructions. Installation shall be by an authorized factory trained installer. Installation shall be in accordance with local building codes regarding building envelope construction..

3.05 Adjusting and Cleaning:

A. Adjust and fine-tune the operable walls to ensure that all seals are operating and sealing properly and that the walls are in correct and smooth operation.

B. Clean up any dirt, oil, grime, etc., that may have found its way onto the panels. Leave the wall in a state of architectural cleanliness.

3.06 Spare Parts:

A. Ensure the manufacturer has ample stock available for repairs.

3.07 Workmanship:

A. The complete installation of the operable wall system as called for and detailed on the drawings shall be provided in strict accordance with the drawings and manufacturers standard printed specifications, instructions and recommendations.