

PART 1 – GENERAL

1.1 Work Included

- 1.1.1. Supply and installation of Automatic Vertically Folding Acoustical Wall(s) as shown on the architectural drawings. All necessary hardware, seals, lifting machinery, electrical controls are included.

1.2 Related Work (NOT INCLUDED)

- 1.2.1 The main support steel beam for the wall, as well as the miscellaneous support steel for the lifting machinery for the Automatic Vertically Folding Acoustical Wall – Section_____ .
- 1.2.2. Ceiling storage pockets along axis of Automatic Vertically Folding Acoustical Wall – Section_____ .
- 1.2.3. Bulkheads and sound insulation above, below, and in the fixed walls at both ends of the Automatic Vertically Folding Acoustical Wall, as per ASTM E557-77 - Section_____ .
- 1.2.4. 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 – Section _____ .

1.3 System Description

1.3.1 Definition

- 1.3.1.1 Automatic Vertically Folding Acoustical Wall (from here on called Operable Wall) shall refer specifically to acoustical partitions that, when in the down position (closed) are hard, rigid, flat, plumb walls, made of a grid of rectangular acoustical 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. In the down (closed) position, the wall shall be comprised of two vertical planes of acoustical panels, separated by an acoustical air space.

The operable wall shall open and close in a manner similar to an accordion, in that all wall panels fold and unfold at the exact same time, at the exact same rate. Walls that rely on the sequential folding of acoustical panels or acoustical panel sets are not acceptable.

There are three types of drive systems available for the operable wall:

Micro Drive System:

The motor assembly is mounted directly to the slab above the centre line of the operable wall. Support steel is only required in one location.

The size restriction for the system is maximum 36'-0" (10,975 mm) long x 9'-0" (2745 mm) to the finished ceiling (or smaller). Minimum wall length is 11'-10" (3610 mm).

Compact Drive System:

The motor assembly is mounted directly above the centre line of the operable wall. Support steel is only required at one location. Used for walls up to 30'-0" (9145 mm) finished ceiling

Remote Drive System

The motor/shaft/drum assembly is off-set from the centre line of the operable wall. The required distance depends upon the height of the wall. Support steel is required at two locations. Used for walls up to a maximum 30'-0" (9145 mm) finished ceiling height where there are space restrictions.

- 1.3.2.1. The operable wall shall be opened and closed using two spring return, 3 position key switches wired in series. Simultaneously turning the keys 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, located on opposite sides of the wall at opposite ends of the wall, wired in series.
- 1.3.2.2. From a fully open position, the wall shall be able to go through its entire cycle of closing and/or opening without any manual intervention.
- 1.3.2.3. When the operable wall is being lowered (closed) it shall come automatically to rest once it has reached the fully down (closed) position.
- 1.3.2.4. When the operable wall is being lifted (opened) it shall come automatically to rest once it has reached the fully up (open) position.
- 1.3.2.5. The operable wall shall automatically and acoustically seal against the floor without the need for any manual intervention. The floor seals shall leave a joint between the floor and the bottom acoustical panels of not more than approximately 2" (51 mm).
- 1.3.2.6. The operable wall shall automatically and acoustically seal against the two end walls without the need for any manual intervention. The end seals shall act in such a way as not to come into contact with the end walls while the operable wall is in motion. The end seals shall leave a joint between the acoustical panels and the end walls of no more than approximately 1" (25 mm). Seals that rub or brush against the end walls are not acceptable. Once the wall reaches the full down position, the end seals shall activate automatically. The key switch must be held for the duration of the operation.

- 1.3.2.7. The operable wall shall automatically and acoustically seal against the ceiling without any manual intervention. The top seals shall leave a joint between the top acoustical panels and the ceiling of the pocket of not more than approximately 2" (51 mm).
- 1.3.2.8 The operable wall shall open and close at a constant nominal speed of approximately 5 to 10 vertical feet per minute (1.5 to 3 meters per minute).
- 1.3.2.9 When the operable wall is being lowered (closed), it shall stop if the leading (bottom) edge comes into firm contact with any object between it and the floor. The 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.
- 1.3.2.10 The operable wall shall be visibly flat and rigid in the down (closed) position.
- 1.3.2.11 There shall be no exposed hinges, brackets, screws, and no part of the mechanical system shall be visible when the operable wall is in the down (closed) position.
- 1.3.2.12 All of the panel edges shall be right angled, with a minimum radius not more than 1/16" (1.6 mm).
- 1.3.2.13 All of the panels shall be rectangular, nominally of the same size, unless requested otherwise by the architect.
- 1.3.2.14 Joints between panel, vertical and horizontal, shall be no more than approximately ½" (12.7 mm) wide.
- 1.3.2.15 For operable walls using the Micro Drive System, the operable wall shall stack in the up (open) position into a space no greater than 69" (1.75 m) wide. For operable walls using the Compact Drive System or the Remote Drive System, the operable wall shall stack in the up (open) position into a space no greater than 65" (1.65 mm) wide. The operable wall shall have a stacking height ratio in the range of 1:5 to 1:10, depending on the height of the wall.
- 1.3.2.16 Each acoustical panel shall be individually removable using only a screw driver. No special tools or equipment shall be required. The removal of a single acoustical panel shall not affect, dislocate or cause the removal of any adjacent panels or other acoustical panels.
- 1.3.2.17 The operable wall shall be mechanically operable with a few of the acoustical panels removed from one, or both sides of the operable wall.
- 1.3.2.18 The operable wall shall not weigh more than 8 lbs per square foot (39.1 kg per square meter), not including the lifting equipment and the architectural finish on the acoustical panels.

- 1.3.2.19 A completely functioning operable wall, tested in full accordance and compliance with ASTM E90-90 shall achieve a Laboratory Sound Transmission Class all (STC) rating of not less than 51.
- 1.3.2.20 The operable wall shall be designed to have a design life of at least 10,000 complete closed to opened to closed cycles.

1.4. Quality Assurance

- 1.4.1. The products herein specified established the standard of quality for the Automatic Vertically Folding Acoustical Walls based on Skyfold® Classic™ 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. Independent test reports which meet the requirements and design specified herein must be submitted to obtain approval.
- 1.4.2 All work and materials specified herein, shall be installed only by qualified representatives and/or installers and/or distributors of the manufacturer, according to the manufacturers written instructions.
- 1.4.3 The operable wall must be manufactured by a certified ISO-9001-2000 company or an equivalent quality control system.

1.5 References

- 1.5.1 ASTM E90-90, Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
- 1.5.2 ASTM E413-87, Classification for Rating Sound Insulation.
- 1.5.3 ASTM E557-77, Standard Practice for Architectural Application and Insulation of Operable Partitions.

1.6 Submittals

- 1.6.1 Submit manufacturers' technical data for each type of operable wall specified herein.
- 1.6.2 Submit shop drawings showing complete layout of operable wall system based on field verified dimensions. The drawings shall include dimensional relationship to adjoining work. Include details indicating materials, finishes, tolerances, and methods of attachment to building steel and electrical requirements.
- 1.6.3 Submit certified test reports evidencing compliance to acoustical STC requirements as specified in paragraph 1.3.2.20.

1.7 Site Conditions

- 1.7.1 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).
- 1.7.2. 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 centre line of the wall within ± 1/8" (3 mm), left to right.
- 1.7.3 The fixed walls at either end of the operable wall shall be within +1/4" (6 mm)-0", from plumb vertical.
- 1.7.4 The fixed walls at either end of the operable wall shall be flat to within +0", -1/4" (6 mm).

1.8 Warranty

- 1.8.1 The operable wall shall be warranted free from defects in material and workmanship for a period of two years or five thousand cycles and the parts only will be free from defect for a period of ten years or five thousand cycles, whichever occurs first from date of shipment.
- 1.8.2 Parts and labor required to maintain the operable wall and part subject to normal wear and tear are not covered under the warranty and are the owner's responsibility. (Refer to Maintenance Program).

PART 2 – PRODUCTS

2.1. Acceptable Manufacturers

- 2.1.1 Skyfold® Classic™ Custom powerlift partitions as manufactured by Railtech Ltd. of Baie d'Urfe (Montréal), Québec, Canada and Railtech Composites Inc., Plattsburgh, New York, USA (514) 457-4767.
E-mail: skyfold@skyfold.com
Web-site: www.skyfold.com
- 2.1.2 Alternate systems can be used if they meet or exceed the performance criteria outlined in Part 1 - General above and if they are approved according to the provisions of 1.4.1 above.

2.2 Materials

2.2.1 Acoustical Panels

- 2.2.1.1 Acoustical panels shall be faced with steel that is compatible with a wide variety of architectural finishes such as paint, vinyl, specialty metals, wood veneer, etc.
- 2.2.1.2 Acoustical panels, together with all of the sound insulation, shall be, as much as possible, made of non-combustible or fire-treated materials.
- 2.2.1.3 Acoustical panels shall be fabricated to be as stiff as possible in order to satisfy the rigid criteria when the operable wall is down (closed) and to ensure that there is no interference between panels when the wall is in motion.
- 2.2.1.4 Acoustical panels shall be architecturally flat with no bowing, oil canning, warping, waviness or any other surface deformation and discontinuity.
- 2.2.1.5 Acoustical panels shall have the finish of the architect's choice, provided that the finish has been approved by the operable wall manufacturer to ensure compatibility with the wall panels. The following criteria must be met:
 - Maximum weight of material: .111 lbs/ft²
 - Maximum thickness of material: 1/8"
 - No brittle materials.
 - Typically our finishes are railroaded onto our panels. Applied horizontally along the panel length.

2.2.2 Folding Mechanism

- 2.2.2.1 The hanging, folding and extension mechanism shall be, as much as possible, made from structural grade aluminum extrusions and structural shapes, in order to minimize the weight of the system.
- 2.2.2.2 All wear surfaces, such as bushings, spacers, pins, discs, bearings, and sleeves shall be designed to function quietly and with minimum wear, over the 10,000 cycle design life of the operable wall.
- 2.2.2.3 The hangers, which fasten the lifting mechanism to the support steel, shall be fabricated from steel and shall be welded or bolted to the support steel supplied by others.

2.2.3 Lifting Equipment

- 2.2.3.1 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 specified in point 1.3.2.8.

- 2.2.3.2 The lifting mechanism 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. In no circumstance shall chain or belt drive systems be acceptable.
- 2.2.3.3 There shall be a wire rope cable for every set of lifting 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.
- 2.2.3.4 For the remote drive system, each wire rope cable shall wind and unwind on its own cable drum. The cable drums shall be grooved to accept a single layer of cable and shall have a minimum pitch diameter of 20 times the cable diameter. Length of drums shall be sufficient to accommodate 3 cable safety wraps. Cable drums shall be keyed to the line shaft. For the micro and compact drive systems, the cable wraps on yoyo drums with 2 safety wraps and multiple layers of cable.
- 2.2.3.5 The line shaft, sized to deliver the required torque with minimum deflection, shall support and rotate the cable drums.
- 2.2.3.6 Pillow block bearings (for the remote drive system), of appropriate size, support the line shaft and shall be located immediately on either side of each cable drum. Flange bearings shall be used for the compact drive system, located immediately on both sides of the drum assembly.
- 2.2.3.7 For the remote drive system, the line shaft shall be connected directly to the power drive through properly sized, load rated couplings, keyed to the line shaft.
- 2.2.3.8 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.
- 2.2.3.9 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.

2.2.4. Safety Equipment

- 2.2.4.1 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.

- 2.2.4.2 The operable wall shall employ a dynamic brake, distinct and separate from the brake in 2.2.4.1, 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 brake in 2.2.4.1, in order to completely halt the downward motion of the wall in the case of a catastrophic failure in the power train.
- 2.2.4.3. The operable wall shall employ electrical or other limit switches in order to stop the wall at its up and down travel limits.
- 2.2.4.4 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 in 1.3.2.4. This over torque sensor shall be mechanical, using the motor's torque arm in its over torque detection.
- 2.2.4.5 The entire length of the bottom edge of the operable wall shall be equipped with a continuous pressure sensing strip which shall cut power to the lifting equipment and shall activate the brake outlined in 2.2.4.1, if the sensing edge comes in firm contact with an object, before the wall is in the full down (closed) position. The power shall remain cut to the lifting equipment until the key switch has been released or the direction of the wall has been reversed and the obstruction is removed.

2.3.Fabrication

- 2.3.1 Factory assemble all components, assemblies and systems into the largest possible assemblies in order to minimize the amount of assembly on site.

PART 3 – EXECUTION

3.1 Inspection

- 3.1.1 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 of this specification.
- 3.1.2 Confirm in writing to the General Contractor or contract manager any deviations from these tolerances. Do not proceed until these conditions are made good.
- 3.1.3 Carry out all appropriate field measurements before manufacturing any components or assemblies.

3.1 Installation

- 3.2.1 Install operable walls in accordance with the manufacturer's printed instructions.
- 3.2.2 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.

3.3 Adjusting and Cleaning

- 3.3.1 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.
- 3.3.2 Clean up any dirt, oil, grime, etc., that may have found its way onto the acoustical panels. Leave the wall in a state of architectural cleanliness.

3.4. Spare Parts

- 3.4.1 Ensure the manufacturer has ample stock available for repairs.