

**Partie 1      General**

**1.1            RELATED REQUIREMENTS**

- .1      Section 05 12 23 – Structural Steel for Buildings; ceiling support beams for suspended.
- .2      Section 05 21 00 – Steel Joist Framing.
- .3      Section 06 17 53 – Shop-fabricated Wood Trusses.
- .4      Section 06 18 00 – Glued-Laminated Construction.
- .5      Section 06 20 00 – Finish Carpentry.
- .6      Section 07 92 00 – Joint Sealants.
- .7      Section 09 21 16 – Gypsum Board Assemblies.
- .8      Section 09 22 16 – Non-structural Metal Framing.
- .9      Section 09 80 00 – Acoustic Treatment.
- .10     Division 26.

**1.2            REFERENCES**

- .1      American Society for Testing and Materials (ASTM)
  - .1      ASTM C1396/C1396M-11, Standard Specification for Gypsum Wallboard.
  - .2      ASTM C423, Measurement of Sound Absorption.
  - .3      ASTM E90-09, Standard Test Method for Laboratory Measurement of Airborne-Sound Transmission Loss of Building Partitions and Elements.
  - .4      ASTM E336-10, Standard Test Method for Measurement of Airborne Sound Insulation in Buildings.
  - .5      ASTM E413, Classification for Rating Sound Insulation.
  - .6      ASTM E557, Standard Practice for Architectural Application and Insulation of Operable Partitions.
- .2      Underwriters Laboratory of Canada (ULC)
  - .1      CAN/ULC-S102-1998 R2000, Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials.
- .3      National Electrical Manufacturers Association (NEMA)
  - .1      NEMA LD 3-2000, High-Pressure Decorative Laminates.

**1.3            ACTION AND INFORMATIONAL SUBMITTALS**

- .1      Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2      Samples:
  - .1      Provide duplicate sample 300 x 300 mm showing partition finish for each colour.

#### 1.4 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 – Document Submittals.
- .2 Submit shop drawings showing full layout of automatic partition system based on site-verified dimensions. Drawings must include dimensions relative to other work. Include details of materials, finishes, tolerances, methods for attaching to structural steel and electrical requirements.
- .3 Coordinate show drawings with Section 05 12 23 – Structural Steel for holes in beams to support partitions.

#### 1.5 TEST REPORTS

##### A. Vertically operable folding walls (Room 100-20):

- .1 Submit certified test reports demonstrating compliance with CTS (Rw) acoustic requirements as specified in paragraph 1.9.18 and in compliance with references in paragraph 1.2.

##### B. Operable wall (Room 201-10, 301-10 and 402-07):

- .1 Operable walls must have a minimum sound absorption coefficient of 52, tested to ASTM E90.
- .2 Stratified plastic partition must have following characteristics:
  - .1 Flame spread index: maximum 45.
  - .2 Smoke-developed index: maximum 40; according to tests defined in CAN/ULC-S102.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions Section 01 61 00 – Common Product Requirements.
- .2 Delivery and acceptance: deliver and store materials in original containers, sealed, with labels intact.

#### 1.7 SITE CONDITIONS FOR VERTICALLY RETRACTABLE ACOUSTICAL WALLS (ROOM 100-20)

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

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**1.8 CLOSE-OUT SUBMITTALS**

- .1 Provide technical data sheets for partition operation and maintenance, and hardware, and include with operation and maintenance manual described in Section 01 78 00 – Close-out Submittals.

**1.9 DESCRIPTION OF VERTICALLY RETRACTABLE ACOUSTICAL WALLS:**

- .1 Automatic Vertically Retractable Acoustical Wall (from here on called Operable Wall) shall refer specifically to acoustical operable walls 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. Sequentially folding acoustic panels are not acceptable.

Standard Drive System:

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

Turning the key from the “off” position shall cause the wall to move in the designated direction “up” or “down” once both push buttons are depressed. 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 two (2) switches per operable wall, located on opposite sides of the wall at opposite ends of the wall, wired in series. One switch shall be equipped with an LED that flashes fault codes in case of a failure with the electrical system.

- .2 From a fully open position, the operable wall shall be able to go through its entire cycle of closing and/or opening without any manual intervention.
- .3 When the operable wall is being lowered (closed) it shall come automatically to rest once it has reached the fully down (closed) position.
- .4 When the operable wall is being lifted (opened) it shall come automatically to rest once it has reached the fully up (open) position.
- .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)..
- .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 does not need to be held during the deployment of the ends seals.

- .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).
- .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).
- .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 wall will then automatically reverse its direction and ascend for approximately 3 seconds to clear the object. The regular operation of the wall can resume once the obstruction has been removed.
- .10 The operable wall shall be visibly flat and rigid in the down (closed) position.
- .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.
- .12 All of the panel edges shall be right angled, with a minimum radius not more than 1/16" (1.6 mm).
- .13 All of the panels shall be rectangular, nominally of the same size, unless requested otherwise by the architect.
- .14 Joints between panel, vertical and horizontal, shall be no more than approximately 1/2" (12.7 mm) wide.
- .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" (1750mm) wide. For operable walls using the Standard Drive System, the operable wall shall stack in the up (open) position into a space no greater than 65" (1650mm) 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.
- .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.
- .17 The operable wall shall not weigh more than the following: 34.2 kg/m<sup>2</sup> (7.0 lbs/pi<sup>2</sup>)
- .18 A completely functioning operable wall, tested in full accordance and compliance with ASTM E90 (ISO 140-3), shall achieve, from an independent laboratory, a Sound Transmission Class (STC) rating (Rw value) of not less than the following:
  1. System: CTS 51 (Rw 51),
  2. Panel: CTS 61 (Rw 60)
- .19 The operable wall shall be designed to have a design life of at least 10,000 complete closed to opened to closed cycles.

#### **1.10 ACCEPTABLE PRODUCTS AND MATERIALS**

- .1 Where a particular brand name is stipulated, see Instructions to Bidders for procedure for requesting approval of substitute materials and products

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**Partie 2      Products**

**2.1            MATERIALS**

**A.            Vertical retractable acoustical wall (Room 100-20):**

1. Acceptable products:

- .1 Skyfold® Classic™ custom manufactured vertical retractable walls as manufactured by Railtech Ltée. Acoustical panels shall meet the following STC ratings in accordance with ASTM E90 (ISO 140-3) specification as reported by an independent laboratory.

Skyfold product	Panel	Entire partition
Skyfold® Classic 51™	61 CTS (60 Rw)	51 CTS (51 Rw)

- .2 Replacement product approved by addendum in accordance with Instructions to Bidders.

2. Acoustical panels:

- .1 Acoustical panels, together with all of the sound insulation, shall be, as much as possible, made of non-combustible or fire-treated materials.
- .2 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.
- .3 Acoustical panels shall be architecturally flat with no bowing, oil canning, warping, waviness or any other surface deformation and discontinuity.
1. Acoustical panels shall have the finish of the architect's choice. The following criteria must be met:

- Maximum weight of material: 0.111 lbs/ft<sup>2</sup> (0.542 kg/m<sup>2</sup>)
- Maximum thickness of material: 1/8" (3mm)
- Maximum thickness of material: 1/8" (3mm)
- Finishes are railroaded onto the panels, applied horizontally along the panel length.

3. Folding Mechanism

- .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 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.
- .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.

#### 4. Motor Drive

- .1 The motor drive 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 1.9.8.
- .2 The folding 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.
- .3 There shall be a wire rope cable for every set of folding mechanism. 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.
- .4 The cable wraps on yoyo drums with 2 safety wraps and multiple layers of cable.
- .5 The line shaft, sized to deliver the required torque with minimum deflection, shall support and rotate the cable drums.
- .6 Flange bearings shall be used for the drive system, located immediately on both sides of the drum assembly.
- .7 The motor drive shall be sized to deliver sufficient amount of torque to safely and effectively raise and lower the operable wall over its design life.
- .8 The motor drive 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. 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 motor drive's full load torque. The drive system shall be equipped with a manual override and a brake release lever.
- .2 The operable wall shall employ a dynamic brake, distinct and separate from the brake in 2.1.5.1, 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 motor drive's power train. Alternately, the operable wall shall employ a brake, distinct and separate from the brake in 2.1.5.1, in order to completely halt the downward motion of the wall in the case of a catastrophic failure in the power train.
- .3 The operable wall shall employ electrical or other limit switches in order to stop the wall at its up and down travel limits.
- .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 2.1.5.3.. This over torque sensor shall be mechanical, using the motor's torque arm in its over torque detection.
- .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 motor drive and shall activate the brake outlined in 2.2.4.1, if the sensing edge comes in firm contact with an object, before the operable wall is in the full down (closed) position. The operable wall will automatically reverse direction and ascend for approximately 3 seconds to clear the obstruction. The power shall remain cut to the motor drive until the switches have been released. The operation of the operable wall can resume once the obstruction is removed.

**B. Operable wall (Rooms 201-10, 301-10 and 402-07):**

1. Panel: steel cladding and acoustic insulation on steel frame, with 13 mm gypsum panels and stratified plastic laminate.
2. Gypsum board: 13 mm thick, to ASTM C1396.
3. Plastic laminate: NEMA LD 3-2000, VGS, 0.7 mm thick, finish and colour as follows:
  - .1 Acceptable products:
    - .1 Wilsonart Laminate D354K-18 Designer White, vertical pattern.
    - .2 Pionite WF181 Suede Ice Finish.
    - .3 Abet Laminati #410 Microline.
  - .2 Lines and patterns can be vertical.
4. Brushed or natural anodized aluminum H profile as indicated, to conceal plastic laminate joints.

**2.2 FABRICATION**

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

**2.3 . COMPONENTS OF MOVABLE WALLS**

- .1 Suspended walls:
  - .1 Tracks: standard aluminum profiles designed to support walls.
    - .1 Tracks with integrated supports.
    - .2 Folding mechanisms as indicated and manufacturer's standards.
    - .3 Lifting and stabilization mechanisms : threaded steel nuts and rods.
  - .2 Rollers: nylon ball bearing hangers with steel stop and stop bolt to control height of panels.
- .2 Hardware:
  - .1 Standard hardware. Finish selected from standard finishes offered by manufacturer.
  - .2 Standard locking mechanism.
- .3 Acoustic mechanisms:
  - .1 Fixed automatic acoustic mechanisms, to manufacturer's specifications and as follows.
  - .2 Acoustic inlay: removable on top and fixed on top of walls.
  - .3 Acoustic inlays designed to secure panels.
  - .4 Panels without protective edges.

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## **2.4 ACCESSORIES FOR MOVABLE PARTITION**

- .1 Standard closing panels, with adjustment lever.
- .2 Double doors for storage compartment, matched to adjacent maple veneer panels (Section 06 20 00), standard hardware and locking mechanism.
  - .1 Compartment doors installed in room with maple veneer walls and doors; coordinate work with Section 06 20 00 – Carpentry.
    - .1 Veneer, HPVA Class A, 0.80 mm thick.
    - .2 Wood type: silver maple, unfurled.
    - .3 Juxtaposition: doors and wall must be juxtaposed following ‘Blueprint’, Section 500, Architectural Woodwork Quality Standards Illustrated of the AWMAC.

### **Partie 3 Execution**

#### **3.1 EXAMINATION**

- .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.
- .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 Carry out all appropriate field measurements before manufacturing any components or assemblies.

#### **3.2 INSTALLATION**

- .1 Level and secure tracks.
- .2 Install operable walls in accordance with the manufacturer’s printed instructions.
- .3 Touch up damaged surfaces to original finish.
- .4 Clean partitions and protect from damage.
- .5 Adjust parts of moving assemblies to ensure smooth operation of partitions.
- .6 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 operable wall for the duration of the project.

#### **3.3 FIELD QUALITY CONTROL**

- .1 Sound absorption test – Have independent acoustic specialist verify sound performance of partitions on site to ASTM E336.
- .2 Submit test results to Departmental Representative for approval.

#### **3.4 ADJUSTING AND CLEANING**

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

**END OF THE SECTION**