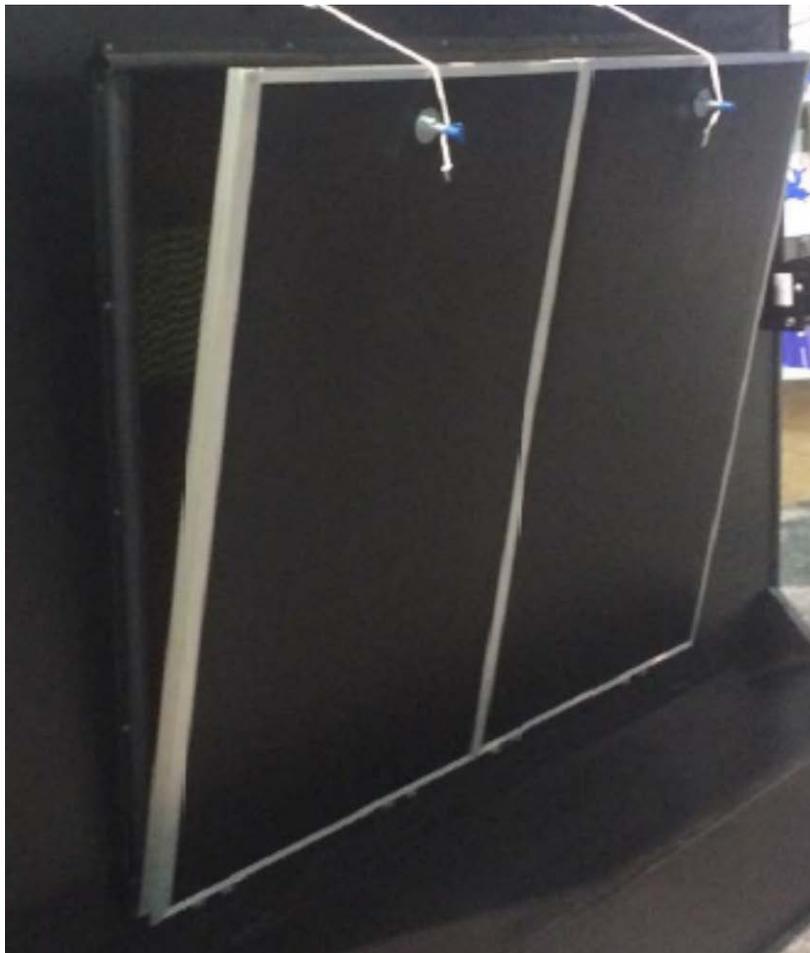




Installation Manual



Tunnel Door Framing Instructions

It is important to make sure the Tunnel Door opening is flat and plumb. A maximum variation of $\pm 1/2$ " throughout the length of the opening is acceptable. Failure to adhere to this will result in a poorly sealed Tunnel Door. The Tunnel Door should be plumb to within $1/4$ " of vertical. Any variation or "lean" should be toward the center of the building. Again, failure to adhere to this requirement will result in a poorly sealed Tunnel Door and in this case operating problems.

Rough Opening Height and Width

Rough Opening Height and Width should be 3" less than the Tunnel Door total height and width. For Example: A 4 ft (48") high by 80 ft (960") wide Tunnel Door should be framed with a 45" high by 957" wide Rough Opening (See Figure 1). This applies both to new construction and retrofit Tunnel Doors.

Perimeter Attachment Boards

Perimeter Attachment Boards should be mounted to inside wall of building as outlined below. This Tunnel Door System can be installed to either a steel framed wall or to a wooden framed wall. The lumber used should be compliant with applicable federal and local building codes. The following instructions are minimum requirements and are not meant to supersede these building codes.

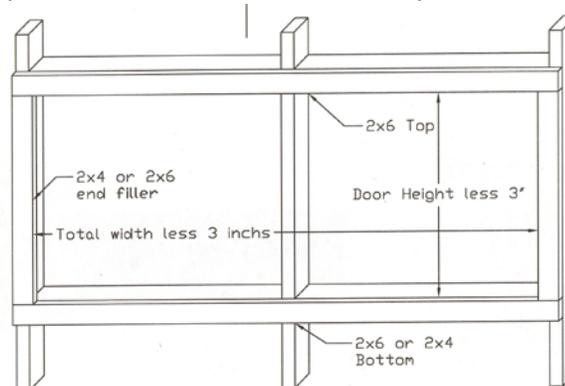


Figure 1

It is recommended that ACQ Treated Lumber or equivalent be used for framing. The top and bottom stringer should be 2"x 6" and the side stringers should be 2"x 4". As an option, the side stringers can be 2"x 6" also. The top and bottom stringers should over lap the vertical side stringers (See Figure 1).

The stringers should be attached with at least 3 1/2" long Deck Grade Wood Screws spaced approximately 6-8 inches apart in a Zig Zag pattern (See Figure 2). The top and bottom stringers should also be Lag Screwed to studs at least every 32" apart (every other stud). The Lag Screw heads should be flush with stringer surface. It is important to Lag Screw the top and bottom stringers as they support the weight of the door (Bottom Stringer) and actuation pulleys, etc (Top Stringer). All joints between horizontal and vertical Stringers should be flush for best sealing of Tunnel Door.

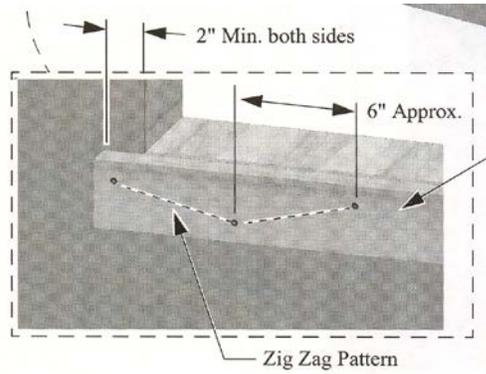


Figure 2

Please Note: It is important to make sure the horizontal stringers are straight and level to within $\pm 1/2$ " and the door is plumb to within $1/4$ " as mentioned above.

Sealing the Rough Opening

Silicone Caulk or equivalent should be used to seal between the Perimeter Stringer Boards and wall as well as the joints between the Stringer Boards **(See Figure 3)**

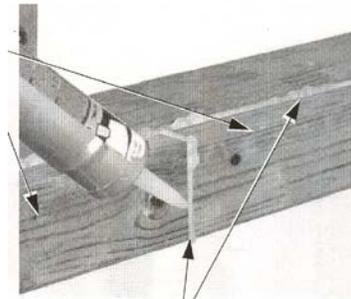


Figure 3

P-Seal Installation

The P-Seal should be attached to Perimeter framing in four (4) sections; top, bottom and (2) sides. The top and bottom pieces should extend past the side pieces much as the Perimeter Stringer themselves. The P-Seal should be positioned on the Perimeter boards with the Bulb of the seal flush with the inside edge of the door opening, and the flat tail pointing away from opening (**See Figure 4**).



Figure 4

If it becomes necessary to splice the P-Seal at any point, it should be cut and butted together at a 45 degree angle (**See Figure 5**). Start at one end of door and work around door perimeter. The P-Seal should be attached to frame with 1" Galvanized Roofing Nails spaced 6" apart positioned on the flat surface of the P-Seal. Equivalent galvanized 1" or greater staples are also acceptable.

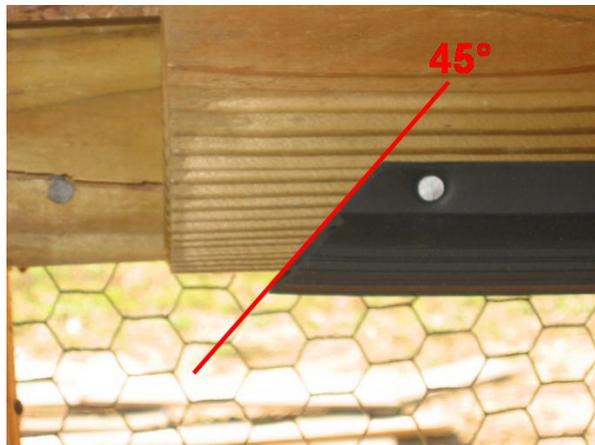


Figure 5

Seal should be straight and flat against the Perimeter boards; however, P-Seal should not be stretched or pulled during assembly. This will adversely affect its sealing ability.

Note: Seal material can become twisted during shipment and packaging. Please unroll and straighten prior to attaching to Perimeter boards.

Door Preparation – Split Bolt

Tunnel Doors should be unpacked and placed along wall opening with the hinges toward the ground. If a narrow (30" wide door section) is required for proper length fit, it should be positioned as close to the center of the entire door length as possible.

It is not recommended that the smaller panel be positioned on either end of door length as this will make sealing the corners more difficult due to position of handle bracket.

All split bolts should be assembled toward the inside of house and 4" from top of door. For doors that are less than 48" wide, locate split bolt in center of door width. Doors 48" wide but less than 92" wide locate split bolts 12" from each side. Doors 92" and wider locate split bolts 16" from each side. Drill ½" diameter hole for split bolts in specified location depending on door width. Insert bolt and flat washer through door and secure with second flat washer and nylon lock nut. **Caution: Do not over tighten these bolts as the Tunnel Door can be deformed or damaged.** Place blue plastic nut on end of split bolt. (See Figure 6) This should be completed for all door panels.



Split bolt location for doors less than 48" wide



Split bolt locations for doors 48" and wider

Figure 6

On the second door panel from each end of house, drill a 5/16" hole 2" below split bolt closest to that end. Insert a 5/16 - 4" eyebolt and secure with 2 washers and 2 nuts (one on each side of door). Eye should be oriented horizontal and to the outside of door. This is to provide for safety cable connection. This procedure should also be completed for two other door sections, evenly spaced along the door length. This would make a total of four safety cable connections point along the door length.

Door Assembly to Wall

Note: Door-to-Wall Assembly will take at least two people.

First, orient bottom hinges (if necessary) for proper assembly to wall. Starting at one end of framed opening; position first door panel so that top and side of door are located flush with outside edge of P-Seal. Door should be level. Drive at least one #9-1 ½" Galvanized Self Tapping Screw (Provided) in each of the left and right hinges to bottom Perimeter Board to hold door in place. This door should be temporarily secured to wall using a temporary rope tied to temporary nail in top Perimeter board and door split bolt. Second door panel, should be assembled to first door panel by aligning and snapping together the "C" channel. The height of second door panel should be aligned to first door panel, second panel should be leveled and then hinges fastened to bottom Perimeter board as done with first panel.

Note: Height alignment and proper seating of "C" channel should be done with a Rubber Mallet. Door should only be struck at corners. The use of anything else could result in door damage.

This process should be repeated until all door panels are in place. It will be necessary to secure the door system to wall with additional temporary attachment points along the door length.

Once completed; using a couple of people, check door for binding. Then make sure that all of the hinge attachment points have been screwed to bottom Perimeter Stringer.

In some cases, especially retrofit of door to older houses, it may not be possible for the Tunnel Door System to exactly fit the available opening. In this instance, the Tunnel Door System will be larger in height and width than the opening. If this happens the Tunnel Door System overhang should be centered top-to-bottom and/or left-to-right.

Actuation Rod and Pulleys

Special Note: Consideration should be given to other hardware located on wall when positioning the actuator rod and pulleys for proper operation to avoid interference with Tunnel Door operation. This is especially important in retrofit of tunnel Door Systems in existing houses. These items could include winches, wall inlets, etc.

A 3/4" Nylon Pulley (supplied) should be located on the centerline of each door split bolt using a 1/4 x 3 1/2 cup hook (supplied) positioned approximately 3" above door in top Perimeter Board (See Figure 7). Hook should be closed after pulley is assembled.



Figure 7

The 3/16" Control Rod should be cut approximately 2 feet longer than total door width. (For Example; Rod for 80 Foot Door should be 82 Feet long). Control Rod should be positioned on ledge above door created by top Perimeter Board skewed toward pull direction (control machine end) of system with other end flush with door edge.

Caution: Great care should be taken when uncoiling Control Rod as it is under tension and will want to spring straight.

It would be impossible to show every way to cable the Tunnel Doors. Generally, the Control Machine, Double-Back Pulleys and Hand Winch would be mounted to the end wall. A 25 pound weight should be attached to end of Control Rod opposite the Control Machine and Winch using necessary 3/16" Galvanized Cable, clamps and necessary pulleys to ensure that weight is located away from other equipment and does not interfere with day-to-day operation for facility. The other end of Control Rod should be attached to Manual Winch and control machine in the same manner mentioned before. See (Figure 8) for method of attaching Cable to control Rod using (3) clamps. **Note: Cable Clamps are alternated 180°.** Control Rod should be attached to top edge of Perimeter Board using 1/4 x 3 1/2" Cup Hooks. Care should be taken in positioning cup hooks as not to interfere with the

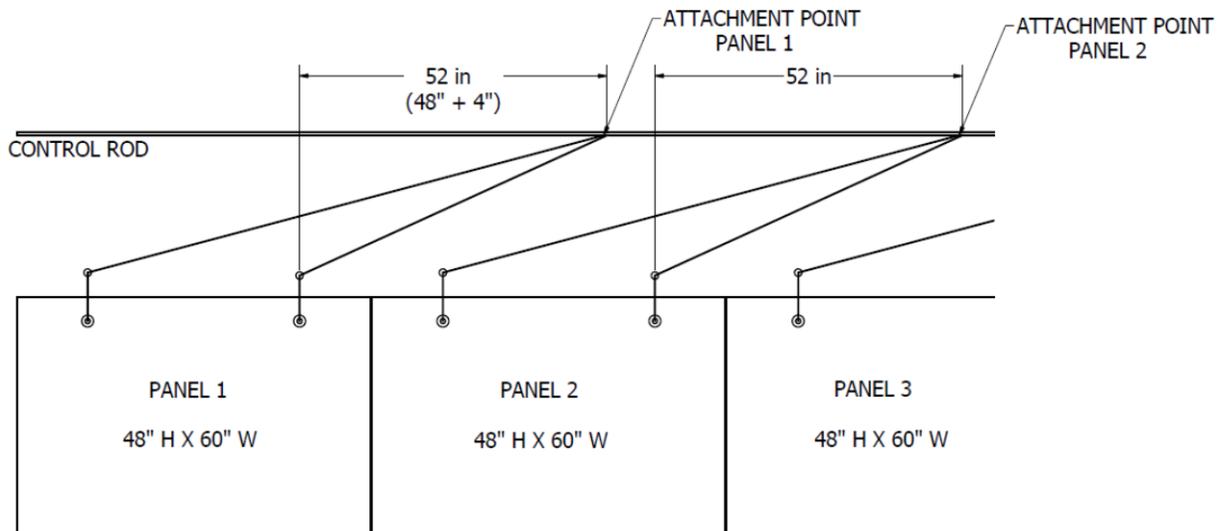
attachment points of individual door control cords and for this reason should be installed at the end of cabling the doors. For this reason, Control Rod eyehooks should be positioned after Nylon Rope attachment points have been established. The best position for these eyehooks is 2-3" from the Nylon Rope attachment point toward Control Machine.



Figure 8

Attachment of Individual Nylon Ropes to Control Rod

Each door panel has either one or two split bolts. Nylon cords coming from the split bolts of the same panel should attach to the Control Rod at the same point. This attachment point is defined as 4" plus the height of door from the closet split bolt toward control machine (**See Figure 9**). For Example: on a 4' (48") tall door, the attachment point would be 52" from the closet split bolt.



4 FOOT (48") HIGH DOOR SYSTEMS

Figure 9

In the case of 60" (5 foot) tall doors where each panel is 48" (4 feet) wide; two panels are to be treated as one for cord attachment to Control Rod. This means there will be a total of four (4) cords attached at a single point on the control rod. Position of this attachment point is the same as for the 48" high door which is 4" plus the height of the door from the closet split bolt toward the control machine (i.e. 64"). **(See Figure 10)**

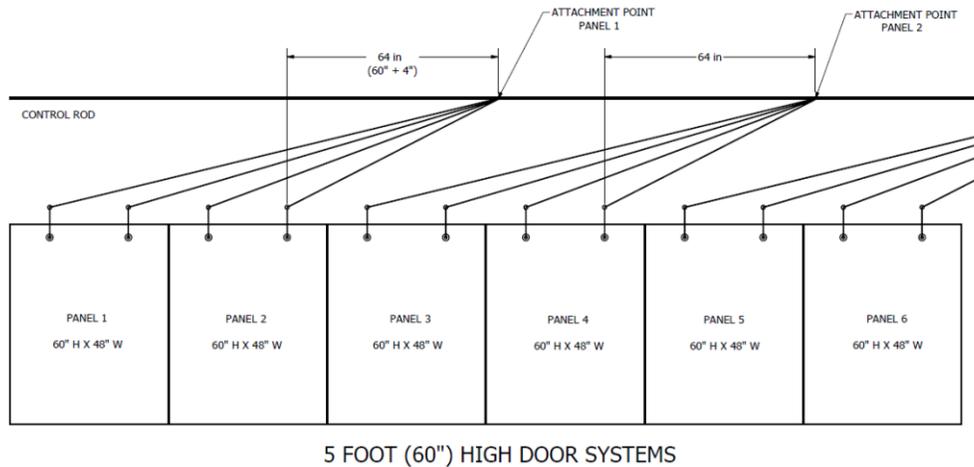


Figure 10

The attachment of the Nylon cords to the Control Rod is made with a 3/16" Cable Clamp. Nylon cords are slipped through the clamp, knotted and clamp is tightened on Control Rod. Nylon Cord can also be tied directly to Control Rod **behind the cable clamp (toward Actuation Machine)** if desired. Orient cable clamp such that the Control Rod is towards Nut side of clamp **(See Figure 11)**. It is important to get clamps tight as they supporting the weight of the Tunnel Door. Cord is run through 3/4" pulley and attached to split bolt and **tighten with the 3/16" plastic nut.** Tie a loop in excess cord to help with cord tension adjustment. **(See Figure 12)** Make sure that Nylon rope creates a straight line and is not looped over or around the Control Rod. Attach the rest of the Nylon cords throughout the entire Tunnel Door System in the same manner. Again, it is important for the Control Rod guide cup hooks to be positioned just past the connection point of the Individual Nylon Ropes as not to interfere with door actuation. Once satisfied that positioning is correct, hook loops should be closed.



Figure 11



Figure 12

Special Note for Doors that are positioned close to house end Walls (Less than desired travel distance)

In some cases, the Tunnel Doors may be positioned too close to house end wall prohibiting the minimum distance required for end door(s) attachment point to Control Rod. This would be less than 52" for four (4) foot tall doors and 64" for five (5) foot tall doors. This will require a pull "double-back" to be used to gain sufficient travel of control cords. The number of "double-backs" required will be contingent on door height (width) and proximity to end wall. This is not an uncommon situation and used frequently in curtain applications. See **(Figure 13)** for a sample of "double-back" pulley.



Figure 13

Tunnel Door Adjustment

With the control machine and winch both set to the "Closed" position and the control machine limits adjusted; starting in the middle of the Tunnel Door, adjust each individual Nylon Rope so the maximum P-Seal compression is about $\frac{1}{4}$ ". Each individual Nylon Rope should be adjusted in a similar manner moving away from center of door doing one side and then the other. Any more compression than $\frac{1}{4}$ " will not improve seal and only put additional stress on Tunnel Door components.

Manually open door with the control machine until opening from wall to top edge of door is 45" for 5' doors and 35" for 4' doors **(See Figure 14)**. The control machine's "Open" set point should be adjusted to this point.



Figure 14

Safety Cable Attachment

Manually open Tunnel Door System about 12" to 18". Attach a Cup Hook at four points under the top of the door opening as not to interfere with the door closing opposite the Eye Bolts assembled in door brackets (**See Figure 15**). Assemble 1/8" Galvanized Cable looped with cable clamp to each Eye Bolt. Note: cable should be 60" long.



Figure 15

Using control machine, open door to max opening previously set. Attach other end of 1/8" Safety Cable to Eye Bolts with cable clamp allowing about 1" slack.

Final Adjustment

Manually open and close Tunnel Door System several times and check for proper function and any binding. This also allows the Nylon ropes to stretch and system to seat together. Close the Tunnel Door System and recheck the P-Seal compression. Make any adjustments necessary to get proper compression of P-Seal. Pay special attention to the top corners of the door system as these are areas prone to leakage.

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