The type, size, etc. of the endwalls and doors on high tunnels are important to their users. Both influence ease and safety of access, high tunnel structural integrity, and the ability to maintain the targeted set of conditions (especially temperature and relative humidity) in the structure. For example, endwall design and components influence ventilation and its success. Endwalls and doors also vary in cost.

The Vegetable Production Systems Laboratory (VPSL) at The OSU-OARDC in Wooster, OH operates nine high tunnels. Three measure 30 ft x 80 ft while the remaining six measure 21 ft x 48 ft. The large structures were installed by CVS Supply of Dundee, OH in October 2008 and contain 2-panel sliding doors with all metal and poly frame and track that are on the inside of the tunnel. Four of the small structures were supplied by Ledgewood Farms of Ledgewood, NH and installed by the VPSL in March 2003. They contain two-panel, wood and poly swinging doors. The remaining two small tunnels were also installed by CVS Supply in October 2008; they contain metal-poly two-panel sliding doors with the track on the outside of the tunnel. All VPSL high tunnels contain hard poly endwalls which are more expensive than soft poly endwalls but also offer advantages, mainly strength and ease of maintenance. Only the large tunnels contain endwall vents.

Growers, including participants in the hightunnels.org list-serve, often express an interest in seeing pictures of high tunnel doors and endwalls, partly to help identify which types may be best for their high tunnels. We hope the following images are useful to you. Please contact us if you would like additional information about these images or about other high tunnel-related issues.

The Vegetable Production Systems Laboratory

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• 2, 4 ft x 8 ft sliding panels
• 2, 4 ft x 8 ft sliding panels
Endwall of 30 ft x 80 ft high tunnel featuring two, 4 ft x 8 ft sliding panels as doors (now open) and a louvered vent above door frame. Vent could be larger.
• Temperature-sensitive piston on bracket in background and on inside of high tunnel
• The upright temperature-sensitive piston (containing an oil that expands and contracts with temperature) is bracketed to the vent frame and connected to louvers of the vent with a bent arm.
• Side view of the unit controlling the position of the louvers.
• Opposite-side view of the unit controlling the position of the louvers.
• weather-stripping on doors and frame can help seal the tunnel when doors are closed.
• left-hand sliding panel as it slides past frame on left and to outside
• right-hand sliding panel as it slides past frame on right and to outside
Below, a link to an example of a shutter (louvered vent) controlling unit that operates continuously ... without electricity or other power.

http://www.growerssupply.com/farm/supplies/prod1;gs_shutters_vents_louvers_1;pg105109.html
Please note:
1. The opener must not be heated to more than 50°C.
2. The window must always be able to open; it must not be obstructed.

Components:
See fig. 1–2.
1. Cylinder
2. Cylinder housing
3. Piston rod
4. Piston rod holder
5. Frame
6. Arm
7. Clutch rod
8. Screw + washer
9. Stepped link arm
10. Self-cutting screws
11. Rivet
12. Lock washer
13. Nylon washer
See fig. 2–3.
14. Handle
15. Louvre frame
16. Louvre bar
17. Screw
18. Screw
See fig. 3.
19. Straight link arm
20. Rivet
21. Rivet

Fitting instructions
1. Place the cylinder (1) in a cool place for at least 30 min., max. 10°C, in cold water or in a refrigerator.

a. Louvres with a stepped link arm (9). See Fig. 2
2. Dismantle the handle (14) by removing the screws (17) and (18).
3. Ensure that the louvre moves smoothly. Adjust if necessary and lubricate all moving parts with light oil.
4. Loosely fit the opener to the place of the handle by using the screws (18), see fig. 4.
5. Secure the link arm (9) to the clutch rod (7) by means of the screw and washer (8), see fig. 5.
6. Push the opener upwards until the louvre is fully closed. Tighten it there. Ensure that the opener is at a right angle with the louvre frame (15). Pack out, if necessary; see fig. 6.
7. Press the piston rod (3) into the cooled cylinder (1), see fig. 7. Screw the cylinder into the cylinder housing (2) and make sure that the piston rod (3) gets into the piston rod holder (4), see fig. 1. Screw in the cylinder until the thread is same length on both sides of the cylinder housing.
B. Louvres with a straight link arm (19). See fig. 3

8. The handle (14) and the straight link arm (19) are dismantled by removing the rivet (20) and (21) in said order. This is done by either drilling or filing.

The fitting as described in steps 8-13 is carried out in the best and easiest way when the louvre is removed from the greenhouse and the glass removed from the louvre.

9. Fit the stepped link arm (9) to the louvre bar (10) using the rivet (11), the lock washer (12) and the nylon washer (13), see fig. 8.

10. As described in step A. 3.

11. As described in step A. 5.

12. Lay the opener against the louvre frame (15).

Push the opener upwards until the window is fully closed. Make sure that the opener is at right-angle with the louvre frame (15) and parallel with the louvre bar (18), see fig. 5.

Mark the position of the holes.

13. Drill two holes, 3 mm (1/8") diameter where marked and tighten the opener loosely by means of the self-cutting screws (10).


15. As described in step A 7.

Maintenance:
Lubricate all movable parts with light oil after filing as well as each Spring and once or twice during the Summer. Use grease or petroleum jelly for lubrication of cylinder thread.

Winter storage:
Disassemble the entire opener, or just the cylinder if this is easier. Store it in a dry place throughout the winter.

Do not forget to lubricate especially the piston rod and the cylinder thread before mounting next spring.

See that the piston rod slides easily backwards and forwards.

Guarantee:
A correctly fitted and used LOUVERE OPENER is guaranteed for 1 year.

Adjustment:
It is recommended that the LOUVERE OPENER be adjusted when the temperature in the greenhouse is constant, as it takes some time before it has responded completely to changes of temperature.

If you want the opener to start opening the window at another temperature, adjustment may be made by turning the cylinder:
Clockwise: To achieve an earlier/higher opening.
Counter-clockwise: For a later/lower opening.

One turn corresponds to approximately 0.5°C (1°F). You should not overlook the fact that the temperature might vary quite a bit in the same greenhouse, and at the separate windows.
• 2, 4 ft x 8 ft sliding panels; easy to control opening size as a way to meter ventilation
• each 4 ft x 8 ft sliding panel is suspended from the track at two points
• each 4 ft x 8 ft sliding panel is suspended from the track at two points; still “square” and sliding easily after 6 years
• doors can be removed easily
• access is easier when snow is in front of a sliding door; weather stripping around door frame provides additional protection
• simple latch installed after hanging
• 2, 4 ft x 8 ft sliding panels removed from outside track
• 2, 4 ft x 8 ft swinging doors still good after heavy use but more tricky to manage and repair or replace
• fewer, less stable ventilation options than sliding panels
• the center brace is on the winter “stabilize” position, fixing the right side door in place
• less costly, reliable swinging doors with wintertime bracing on far end
• the horizontal braces are in the winter “stabilize” position facing prevailing winds
• stuff happens when winds are high, wood is old and doors are open