

**Mid-level Classroom Greenhouse: Intended for high school classrooms providing the basics of horticulture. Most instructors will conceptually understand a greenhouse but lack the experience to operate a fully automated greenhouse. Average size: 16' x 48'.**

### **1. Side Wall Vents**

Description: Aluminum framed, awning hinged windows with fiberglass screens and safety covers.

Size: Typically 3' wide x 2' tall.

Operation: Motorized drive shaft with scissor arm operators; 115V; activated by the control system (below).

Manufacturer: Vents-Sunshine Rooms, Inc.; drive system-Lock; controls-Wadsworth.

Purpose: Allows fresh air intake at bottom of greenhouse.

Suggested qty.: Lean-to styles, continuous on longest wall; traditional style, continuous on two sides.

Notes: Must be used in conjunction with ridge vents. Traditional rack and pinion operators are not recommended due to their appearance, space consumption, and safety concerns. Each vent motor will require a control box separate from the control system.



### **2. Ridge Vents**

Description: Aluminum framed, ridge vent windows.

Size: Typically 3' wide x 2' tall.

Operation: Motorized drive shaft with scissor arm operators; 115V; activated by the control system (below).

Manufacturer: Vents-Sunshine Rooms, Inc.; drive system-Lock; controls-Wadsworth.

Purpose: Extract hot air from greenhouse, pulling fresh air in from wall vents.

Suggested qty.: Continuous along ridge.

Notes: Must be used in conjunction with side wall vents. Traditional rack and pinion operators are not recommended due to their appearance, space consumption, and safety concerns. Each vent motor will require a control box separate from the control system.



### **3. Operable Door(s)**

Description: Aluminum framed, narrow stile, commercial door.

Size: Typically 3' wide x 7' tall.

Operation: Push/pull hardware.

Manufacturer: Manko.

Purpose: Provides access in and out of the greenhouse (may be a fire exit).

Suggested qty.: As needed per project.

Notes: Panic hardware, 42" wide and 6' wide double doors are available.



#### 4. Horizontal Air Flow (HAF) Fans

Description: Fan with wire basket suspended from rafters.

Size: 12” diameter.

Operation: 115V; Activated by the control system (below).

Manufacturer: Schaefer model VT12PA.

Purpose: Use in pairs to create gentle, horizontal air circulation.

Suggested qty.: Two per 750 sq. ft. of floor area.

Notes:



#### 5. Heater

Description: Ceiling suspended unit heater (natural or LP gas available).

Size: Determined per geographic region, glazing and usage.

Operation: 115V; activated by the control system (below).

Manufacturer: Modine models Hot Dawg or Effinity.

Purpose: Keep plants alive and people comfortable during winter months.

Suggested qty.: Determined per region, glazing and usage. Call for support.

Notes: Heat may be supplied by the building’s primary heat system if controlled separately. Gas heaters will require gas piping and venting duct work.



#### 6. Shade System

Description: Shades for the roof area using built-in shade tracks.

Size: Width to match bay for the length of the roof.

Operation: Manual pull cords.

Manufacturer: Thermal Designs model Comfort Glide.

Purpose: Reduce glare and heat in warmer months; provide insulation during winter nights.

Suggested qty.: Every bay for roof area and possibly west facing walls.

Notes: Fabric and color selection by architect.



#### 7. Exhaust Fans

Description: Aluminum exhaust fan(s) made especially for greenhouses with aluminum slant-wall housing, louvers, and safety grill.

Size: Typically, 1/3hp, 30” fans are adequate though many sizes are available.

Operation: 115V; activated by the control system (below).

Manufacturer: American CoolAir.

Purpose: Extract hot air, pulling fresh air in from intake shutters.

Suggested qty.: Typically, one is adequate (two in southern climates).

Notes: Used in conjunction with intake shutters on opposing walls.



#### 8. Air Intake Shutters

Description: Aluminum air intake shutters.

Size: Typically 21” x 21”.

Operation: Motorized; 115V; activated by the control system (below).

Manufacturer: American CoolAir.

Purpose: Shutters open when the exhaust fan comes on providing fresh air.

Suggested qty.: Typically two 21” shutters per exhaust fan.

Notes:



### **9. Environmental Control System**

Description: A greenhouse specific, “entry-level,” four-stage control system with corrosion resistant cabinet, blueprints and temperature sensor.

Size: 16” x 14” x 6” cabinet.

Operation: 115V; One stage of heating; 3 stages of cooling.

Manufacturer: Wadsworth model MiniSTEP control.

Purpose: Central controller for most cooling and heating equipment including wall and ridge vents, exhaust fans, intake shutters, HAF fans, and heater.

Suggested qty.: One per greenhouse (or per zone).

Notes: Minimal training will be required.



## **Optional Equipment**

### **10. Growing Benches**

Description: Aluminum frame benches with stationary legs and plastic tops.

Size: 3’ tall x 3’ wide x 3’, 4’, and 6’ lengths.

Operation: n/a.

Manufacturer: Frames-Sunshine Rooms, Inc.; Tops-Dura-Bench.

Purpose: Provides a growing area for plants.

Suggested qty.: Typically around the perimeter and center of the greenhouse.

Notes:



### **11. Potting or Work Tables**

Description: Stainless steel top work tables

Size: 36” tall x 30” wide x 48” or 60” long.

Operation: n/a.

Manufacturer: Eagle or equal.

Purpose: Provides an area to work with plants and study area.

Suggested qty.: Two or three per average sized greenhouse.

Notes: Optional sink and lower shelf are available.



### **12. Portable Evaporative Cooler**

Description: Plastic housed, aluminum framed, evaporative cooler on wheels with oscillating head.

Size: 1hp; 33” x 33” widths x 52” tall; 24 gal.reservoir.

Operation: 115V; 10.4A high-5.8A low; Manually activated.

Manufacturer: Schaefer model WC-1HPMFOSC.

Purpose: Simple but effective means to supply cool, humid air to plants without the extra ductwork, setting pads, and plumbing required for exterior units.

Suggested qty.: One per greenhouse.

Notes: May not be required in northern climates if classroom will not be used in summer months.



## Other Equipment to Consider by Other Trades

### **13. Water Supply**

Multiple water spigots with watering and misting hoses.

### **14. Floor Drains**

At least one per greenhouse will ease cleaning considerably.

### **15. Grow Lights**

Since these would be installed by a licensed electrician they should also supply them. We recommend high pressure sodium fixtures by P.L. Light Systems, 1-800-263-0213.



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