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## Notes on Wiring Greenhouses for Tobacco Float Plants

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# Agricultural Engineering Update

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AEU - 70

## NOTES ON WIRING GREENHOUSES FOR TOBACCO FLOAT PLANTS

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Following are some guidelines for electrical wiring in greenhouses that are being constructed to grow tobacco transplants. A greenhouse is distinctly different from a residence; different wiring practices should be used. This material closely follows the National Electrical Code (NEC) but is not intended to be a complete installation guide. The purpose is to provide some basic suggestions for planning a safe electrical system. Additional details can be found in the "Farm Buildings Wiring Handbook" (MWPS-28) available from the UK Ag. Engineering Plan Service.

The NEC sets forth minimum accepted standards for safe wiring materials and installation with an emphasis on safety. At this time, Kentucky does not require most agricultural buildings to meet the code. However, insurance companies, power suppliers, or local agencies may have various installation requirements including compliance with the NEC. For example, most power suppliers require an electrical inspection before connecting power to any new electrical service. In some cases, the greenhouse may be classified as a commercial building and code compliance would likely be required. Where a greenhouse involves public access or hired labor, there are broad safety and liability concerns. Thus, for a variety of reasons, it is strongly recommended that the NEC be followed regardless of any "technical" requirement for you to do so. A competent, licensed electrician should be able to install greenhouse wiring so that it meets the code and passes inspection. Owners should retain a copy of the inspection certificate for their records.

## WIRING GUIDELINES

### A. BUILDING CLASSIFICATION – DAMP

- \* Greenhouses are classified as **DAMP** buildings for wiring purposes.
- \* **DAMP** buildings require that all wiring boxes and fixtures must be dust-tight, moisture-tight and made of corrosion resistant materials. These materials are designated as **NEMA-4X** enclosures.
- \* All splices & connections must be enclosed in sealed moisture-tight boxes.

### B. GENERAL MATERIALS

- \* Use only UL listed materials with a 20 A or higher current rating.
- \* Use gasketed, moisture tight covers and enclosures for switches, lights, outlets, boxes, and fan controls.
- \* Plastic, moisture-tight (NEMA-4X) service entrance panels are desirable but are relatively new and may not be readily available in all areas.
- \* Use only No. 12 or larger copper wire for all circuits.
- \* Do not use cords, conduit, or cable to support outlets, controls or lights. Provide mechanical support such as a chain or post.

### C. WIRING METHODS ( 2 options )

1. Surface mounted cable
  - \* Use type UF-B, sunlight (UV) resistant cable.
  - \* Do not use type NM-B cable commonly used for wiring houses.  
(Reason: It is not moisture resistant.)
  - \* Use watertight cable connectors at all boxes and fixtures.
2. Wiring enclosed in conduit
  - \* Use schedule 40 PVC (plastic) electrical conduit. Do not use steel conduit or PVC plumbing pipe.
  - \* Wire in conduit should be a type that includes a "W" (for wet) in the type code printed on the insulation (example: Type THWN).
  - \* Support conduit (1" or smaller) at 3-foot intervals.
  - \* Provide expansion joints in conduit runs longer than 50 feet. Leave bends unrestrained. (Reason: Conduit is subject to large temperature swings and must move as it expands and contracts.)
  - \* Use flexible plastic conduit for connections to motors.
  - \* Conduit should enter from the bottom or sides of boxes.  
(Reason: Any moisture in the conduit will not drip back on exposed connections in the box.)

## D. ELECTRICAL SUPPLY & CIRCUITS

- \* Provide adequate electrical service to meet all expected loads. It should be at least a 60 A (240 VAC) service.
- \* When obtaining power from an adjacent building, be careful not to overload the existing service in that building.
- \* One circuit should be exclusively dedicated to the exhaust fan and motorized shutter. If 2 or more exhaust fans are used, provide at least 2 separate circuits. No more than 2 fans should be wired on 1 circuit.
- \* Circuits with long runs to large fan motors may require larger than normal wire size to prevent excess voltage drop.
- \* Install outlets along the center aisle for waterbed heaters.
- \* Outlet circuits should be GFCI (Ground Fault Circuit Interrupter) protected. The NEC would not normally require GFCI's for general purpose outlets but they are recommended in wet areas.
- \* No more than 10 duplex outlets should be included on a 20 A circuit.
- \* Do not load circuits to more than 80% of their rated capacity.

## E. EQUIPMENT GROUNDING

- \* The frame of all electrical equipment must be grounded. A separate equipment grounding conductor must be connected from the equipment back to the service panel. The metal bows of the greenhouse do not constitute proper electrical grounding!
- \* Do not use the grounding conductor as a current carrying conductor. All 120 V circuits need 3 wires: hot, neutral, and ground. Using the equipment ground as a neutral conductor is extremely dangerous!
- \* Grounding electrodes, usually a driven copper rod (minimum 8 foot), are required at all service entrances. Underground metallic water pipes should be connected to the grounding electrode.

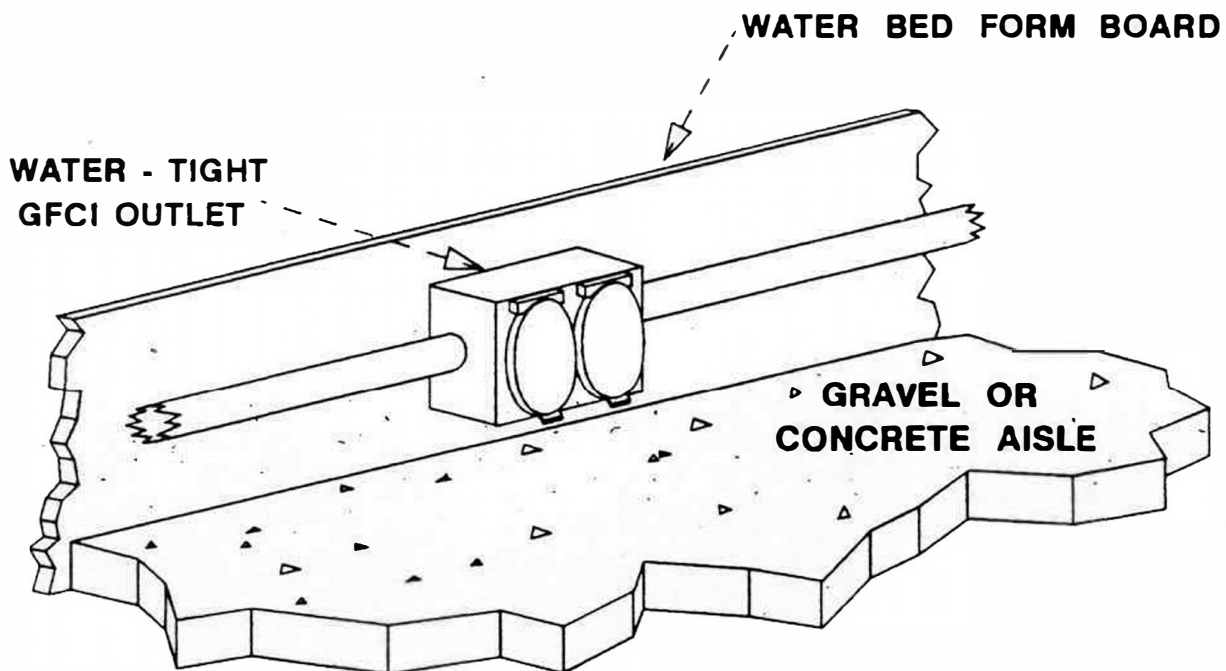


Figure 1. Duplex outlet installation on waterbed form along center walkway.