

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

EVAPORATIVE COOLING PADS

Interim Standard
(acre)
CODE 781



DEFINITION

Cooling and regulating humidity in greenhouse and livestock production structures.

PURPOSE

- To conserve moisture.
- To provide climate control (cooling and humidity).

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to greenhouse nursery and livestock production industries.

CRITERIA

All planned work shall comply with Federal, state, and local laws, rules, and regulations.

Evaporative cooling pad systems shall be designed according to manufacturer recommendations. Evaporative cooling pad systems consist of pads, water supply, pump,

distribution pipe, gutter, sump, and bleed-off line.

All evaporative cooling pad systems shall provide for recirculation and reuse of cooling water.

A continuous water bleed-off rate of 0.05 gpm for every 1,000 cfm of airflow is recommended to prevent salt and mineral concentration buildup.

Cooling pad and exhaust fans shall not be separated by more than 200 feet. A distance of 150 feet or less is preferred. Exhaust fans shall not be spaced more than 30 feet apart. Exhaust fans shall have a minimum capacity to provide at least one air change per minute.

A safety disconnect switch shall be installed near each fan and pump.

CONSIDERATIONS

Consideration should be given to use of climatic sensors that can automate the use of this system. Automation will allow the system to be shut off when not needed and thus conserve water and energy. Thermostats and other control sensors should be near the center of the room and away from unrepresentative climate modifiers.

Consideration should be given to screening return flow before it enters the sump and covering of the sump to keep out debris.

Consideration should be given to shading the evaporative pads and sump to aid in algae control. Regular drying of the evaporative pads will also help control algae.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

Consideration should be given to treating recirculating water where disease and plant pest are concerns.

Consideration should be given to use of high pressure fog systems which can be designed and operated to maintain more uniform temperatures and humidities in greenhouses than are possible with fan and pad systems.

Consideration should be given to locating pads on the prevailing summer wind side and locate the fans on the downwind side of the greenhouse. If an adjacent greenhouse is within 25 feet of the evaporative cooling pads, the benefit of wind effect is negligible. Facing fans into prevailing winds will decrease capacity by 10% to 15%. Exhaust fans should not discharge toward the evaporative cooling pad of another house unless separated by 50 feet or greater.

PLANS AND SPECIFICATIONS

Plans and specifications for evaporative cooling pads shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

The Operation and Maintenance (O&M) plan shall specify that the evaporative cooling pads system be inspected to identify repair and maintenance needs.

Pads need to be inspected for salt and mineral buildup, algae buildup, and deterioration. Pads should be checked for compaction of pad material and for bare spots or thin areas. Check for any openings in the house that would allow short circuiting of airflow around the evaporative cooling pads. Rate of water supply to the cooling pads should be calibrated annually prior to the cooling season to ensure that the rate is within manufacturers recommendations.

Thermostats should be checked using an accurate thermometer each spring and fall to insure proper operation. Humidistats should be checked at least weekly using a psychrometer.

Exhaust fans should be cleaned as often as necessary to prevent accumulation of dust. Operating efficiency of exhaust fans can be reduced 30% to 50% by the buildup of dust on fan blades or by shutters that do not operate freely. Obstructions to flow of air into a fan within a distance of one blade diameter.

Sump screen should be checked regularly to ensure that it is reasonably free of debris.

REFERENCES

- Ohio State University Fact Sheet AEX-127-99, Evaporative Cooling Pads: Use in Lowering Indoor Air Temperature
- Bucklin, Henley, and McConnell. 1993. Circular 1135: Fan and Pad Greenhouse Evaporative Cooling Systems. University of Florida.
- Buffington, Bucklin, Henley, and McConnell. 1992. Maintenance Guide for Greenhouse Ventilation, Evaporative Cooling, and Heating Systems. University of Florida.