NATURAL RESOURCES CONSERVATION SERVICE

MISSOURI CONSTRUCTION SPECIFICATION
FOR

ANIONIC POLYACRYLAMIDE (PAM) EROSION CONTROL

(Ac.)

CODE 450

MATERIAL

The polyacrylamide used for reducing surface erosion shall meet the following requirements:

- Be used only if officially labeled for the intended use (e.g. labeled for irrigation erosion control or wind erosion control).
- Be of the anionic type meeting acrylamide monomer limits of ≤0.05 percent (%),
- Have a charge density of 10 to 55%, by weight
- Have a molecular weight of 6 to 24 Mg/mole.
- Be designated as “water soluble,”, “linear”, or “non-crosslinked.”
- Be mixed and/or applied in accordance with all Occupational Safety and Health Administration (OSHA) Material Safety Data Sheet requirements and the manufacturer’s recommendations for the specified use.
- Conform to all federal, state, and local laws, rules, and regulations.

POLYMER APPLICATION RATES

For furrow irrigation:

- Maximum application rate shall be at 10 ppm of pure form polyacrylamide, applied on a total product basis.
- Application shall occur only during the advance phase of surface irrigation.
- Dry or “patch” treatments of PAM shall be placed over an area of the first five (5) feet of each irrigated furrow. A starting application rate per furrow of 1 ounce per 1000 feet of furrow length is recommended. Field adjustment (increase or decrease) to this application rate is required. The rate should be adjusted until no visible erosion occurs. Do not exceed 3 pounds/acre of active PAM per single application event.

For sprinkler irrigation:

- Application rate shall be 4 pounds/acre of active PAM or less per single application event.

For Targeted Wind or Precipitation Areas:

- The maximum application rate of pure form polyacrylamide shall not exceed 200 lb./ac per year.

GENERAL RECOMMENDATIONS

Follow a recommended irrigation water management plan.

Use polyacrylamide on each irrigation that follows a soil disturbance operation, particularly the first irrigation of the season. Reapply the polymer when erosion is noted.

Based upon soils, slope, and stream size, the necessary concentration of polyacrylamide may be reduced. For the best and most economic concentration, back off on the amount of polymer used until soil movement is noted, then increase slightly.

Turbulent mixing of the polymer is critical. The following are general mixing recommendations for granular, liquid and solid PAM for irrigation applications:

- Application of PAM should be sufficiently upstream from the irrigation set that thorough mixing has occurred. In open ditches let water pass over at least one drop or ditch obstruction. In earthen ditch a drop dam is recommended. If drop of obstruction is not feasible place PAM 100 to 300 feet upstream of first set. This may be reduced to 25 to 50 feet if liquid PAM is used.
- Lack of adequate turbulence is generally indicated by jellying and deposition of polymer material downstream of the application point
- In gated pipe the swirling action of 2 to 3 pipe sections is usually enough turbulence to adequately mix PAM. If unable to obtain these lengths use inline drop structure or install baffles in the first pipe.
- For closed/pressurized systems liquid application is recommended. Ensure that adequate length (100') for the smoother delivery pipe is available for mixing. Inline elbows, valves etc. will decrease the length required.
- Solid formulation of PAM should be placed in areas where turbulence is occurring. The action of the water dissolves the PAM. Control of the concentration is difficult, as location and time are the only variables for control. A trail and error approach should be used to adjust the amount and location while visually monitoring furrow erosion.

For pressurized sprinkler and gated pipe systems, before and after injecting concentrated liquid PAM (30 to 50% active ingredient) into irrigation systems, it is a good practice to pump a surfactant (crop oil) through the injection system (pump, tubing, valves, etc.). Surfactants provide a buffer between PAM and water so non-flowing PAM does not contact water and form a gelatinous mass that can plug pumps, valves and tubing.

For pressurized sprinkler and gated pipe injection, the injection pump should be started after water is flowing in the sprinkler system and/or gated pipe system and stopped when the irrigation pump stops.

For PAM injection system a check valve should be installed between the irrigation supply line and the injection system to prevent water from entering the injection system and/or PAM supply container.

Always place PAM downstream of screens or filters.

For liquid or granular PAM application to open ditch place the discharge point at least 2 feet from flowing water. Small splash droplets can cause the PAM to clog the outlet.

If irrigation water is high in sediment, application of PAM to the head ditch or lateral may cause excessive sedimentation within the ditch/lateral and reduce flow capacity. Consideration should be given to settling out the sediment in a settling pond with increased PAM application rates or by decreasing flocculation potential by applying smaller application rates (e.g. 5 ppm) while still controlling erosion.

IRRIGATION STREAM SIZE

Irrigation infiltration can be increased with the application of polyacrylamide on undisturbed soils. Stream sizes should be increased to assure reasonable advance times and decrease potential for deep percolation. Initial stream sizes during advance can be increased (as much as double or triple) over untreated water while still preserving most of the erosion reducing effect of PAM. Visual observation should be made to ensure that erosion at these increased rates is not occurring.

If stream size are increased and re-use systems are not in place, consideration should be given to cutback irrigation techniques (e.g. cutting stream flow after completion of the advance phase) in order to maintain a high irrigation efficiency.

For the most uniform water application, advance streams containing polyacrylamide should reach the end of the field according to the following table. Cutoff ratio is defined as the average advance time (average time it takes the furrow to reach the end of the field) divided by the set time (total time of irrigation)

	Recommended Cutoff Ratio (CR)		
System Type	Sandy Soils	Loamy soils	Clayey Soils
No Re-Use	0.45	0.60	0.70
With Re-Use	0.25	0.35	0.45
Blocked Ends	0.85	0.80	0.75

With larger stream sizes and increased infiltration, irrigation water management adjustments must be made. Set times should be shortened or irrigation frequency adjusted to reduce deep percolation.

For Targeted Wind or Precipitation Areas

- Emulsion batches shall be mixed with pure form polyacrylamide not exceeding 200 pounds per batch.
- Application method shall insure uniform coverage to the target area, minimizing drift to non-target areas.

ADDITIONAL DETAILS