U.S. Department of Agriculture
Natural Resources Conservation Service

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SYSTEM DESIGN OR CHECK, PIVOT SPRINKLER

(Procedures as described in NEH, Section 15, Chapter 11)

Land user _____ Field Office _____
Job description _____
Location _____
Planner _____ Date _____ Checked by _____ Date _____

BASIC DATA (* from planning worksheet)

Sketch and dimension field and attach to worksheet.

* Crops to be grown _____

* Peak daily use rate during peak period of peak use: pu = _____ inches/day

* Minimum system requirements _____ gpm, _____ gpm/ac (from worksheet)

* Soil name _____

* Sprinkler intake group (from Irrigation Guide) _____

Design wind conditions _____ mph from the _____ (direction)

Design temperature conditions (average): Cool _____, Warm _____, Hot _____

Design humidity conditions (average): Humid _____, Moderate _____, Dry _____

Maximum slope in irrigated field _____ percent

Approximate surface storage _____ inches (Table 2.2 in Montana Irrigation Guide)

Sprinkler package type (Montana Irrigation Guide, Figure 6.31)

_____

_____

Wetted width of water pattern at outer end of pivot (w) _____ ft (obtain from manufacturer's catalog).

Design uniformity coefficient (CU). Minimum CU per standards = 85. (Use manufacturer's data for the particular system configuration if available.)

Design CU = _____

Sprinkler type at outer tower (not end gun) _____

Nozzle size: B = _____ 64ths of an inch (smallest if 2 nozzle)

Pressure at outer end of system: P = _____ psi

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SYSTEM CAPACITY

Coarseness index CI = $\frac{P^{1.3}}{B}$ = _____ = _____

Effective portion of applied water: R_e = _____ (From Irrigation Guide, Figure 6.1)

Application efficiency low 1/2: $E_h = CU \times R_e$ = _____ = _____ %

Peak daily required gross application: $d' = \frac{\text{Peak daily use (pu)} \times 100}{E_h}$ =

_____ = _____ inch

Maximum radius irrigated when corner system or end gun is in operation:

R = _____ feet

Area irrigated assuming end gun is always on: $A = \frac{3.1416 \times R^2}{43560}$ =

$\frac{\text{_____}}{43560}$ = _____ acres

Recommended system minimum capacity: $Q = \frac{d' \times R^2}{734}$ =

$\frac{\text{_____}}{734}$ = _____ gpm

Note: Soil water holding capacity is frequently used by pivot designers to store part of the water required during the peak use period. This requires special analysis. Planned deficit irrigation and management allowed deficits greater than normally recommended are also sometimes used when reduced yields are traded against lower irrigation costs. This type of operation also requires special analysis.

Selected system design capacity: Q = _____ gpm

APPLICATION RATE

Radius to point being checked: r = _____ ft

Average application rate at point: $I = \frac{192.6 \times r \times Q}{R^2 \times w}$ =

_____ = _____ iph

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Maximum application rate at point: $Ix = \frac{245 \times r \times Q}{R^2 \times w}$ =

_____ = _____ iph

APPLICATION DEPTH PER REVOLUTION

Alternative number	1	2	3	4
Gross depth of application per revolution				
Actual operating time per day: T = (hrs/day)				
Hours per pivot revolution: f_h = (hours) $f_h = \frac{d \times 10872 \times A}{Q \times T}$ = (hours)				
Net depth of application per revolution: net d = $\frac{E_h \times d}{100}$ = (inches)				

Allowable net application per revolution _____ inches (Montana Irrigation Guide Fig 2.2)

PRESSURE VARIATION (Approximation)

Check sprinkler system lateral high point pressure loss:

Elevation difference pivot/high point: Hup = _____ ft
Pressure loss = Hup x .433 = _____ = _____ psi

Sprinkler design pressure at high point lateral location: P = _____ psi

Allowable pressure drop = 0.2 x P = _____ = _____ psi (Must be greater than actual loss)

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Check sprinkler system lateral low point pressure gain:

Elevation difference pivot/low point pressure gain:
Pressure gain = Hdn x .433 = _____ = _____ psi

Sprinkler design pressure at low point lateral location:
P = _____ psi

Allowable pressure gain = 0.2 x P = _____ = _____ psi (Must be greater than actual gain)

Note: Use pressure regulators or flow regulators if pressure variation is greater than allowable.

COMMENTS