# Atomic Irrigation

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## Estimating Minimum Capacity for Irrigation Systems

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Sometimes, we are asked to estimate the flow rates required to irrigate specific areas of landscape before the design actually takes place. Quite often the results of these efforts indicate less than the maximum flow rates required by the final design. The problem with this is assuming that the system will operate at the same capacity all the time (many times it does not).

Different size areas and variability of shapes covered by irrigation systems cause the system's flow requirements to change when moving from one zone to another. (Example: from a shrub area to a turf area)

The following Equation can be used to estimate minimum theoretical system capacity required to irrigate a given acreage.

$$Q = \frac{18.86 \times A \times ETc}{t \times (Ea/100)}$$

where

| | | |
|---|---|---|
| Q | = | minimum system capacity required (gpm) |
| 18.86 | = | constant to change in. per day to gpm |
| A | = | area to be irrigated (acres) |
| ETc | = | peak ET between irrigations (in/day) |
| t | = | operating time (fraction) |
| Ea | = | application efficiency (%) |

The following example demonstrates use of this equation.

| | |
|---|---|
| Example # 1 | Given a system that can operate 23 hours/day, with an application efficiency of 75%, how many gpm, (continuous flow), are required to irrigate 40 acres of grass (ETc = 0.18 in/day)? |

Answer

$$Q = \frac{18.86 \times 40 \times 0.18}{23/24 \times .75}$$

$$= 189 \text{ gpm}$$

Modifying our equation allows us to estimate the maximum acreage that can be irrigated with a known flow rate (such as that from a well or municipal water system). The modified equation is:

$$A = \frac{Q \times t \times (Ea / 100)}{18.86 \times ETc}$$

The following example demonstrates use of this equation.

| | |
|---|---|
| Example # 2 | What is the maximum acreage of grass (ETc=0.18 in/day) that can be irrigated from a well that produces 180 gpm? The irrigation system can operate 12 hours/day, 6 days/week during peak water use. Estimated application efficiency is 75% |

Answer

$$A = \frac{180 \times (12/24 \times 6/7) \times .75}{18.86 \times 0.18}$$

$$A = 17 \text{ acres}$$

These two equations are useful in estimating the known water supply or the minimum capacity required for a given acreage.

They do not indicate exactly how many acres can be irrigated or the exact flow required. This can only be determined after the system is designed. But its a good start and can help with planning.

Need more help?

Give us a call.

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**(in a AB 1881 world)**

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