

Water for Profit

BASIC DESIGN REQUIREMENTS FOR IRRIGATION SYSTEMS



Irrigation performance is a function of both the design and management of the irrigation system.

Introduction

Below is a summary of the minimum criteria which should be addressed in designing and installing a horticultural irrigation system.

For high value crops and/or growers with low risk profiles, the system performance should significantly exceed the minimums stated below.

Note also that this list is not exhaustive and that the design of any irrigation system should be undertaken in consultation with a professional certified irrigation designer.

- The system capacity should be sufficient to deliver the crop's peak water requirements in at least nine out of every 10 years.
- The pump characteristic should be matched to the distribution and application system pressure and flow rate characteristic to achieve optimal efficiency. The pump design flow rate may be up to 10 per cent higher than required to account for wear over the life of the system.
- The mainline should be a class above the design pressure with thrust blocks placed at the mainline/submain elbows and pipe ends. Air release, pressure release and vacuum valves should be included to minimise damage and flow restrictions associated with water hammer and field topography.
- Field topography should be considered to minimise pressure variations within the system. Pressure variations along a lateral should not be greater than 10 per cent of the desired operating pressure.

- Pipes should be sized to ensure that the water velocities are between 0.6 metres per second (m/s) and 2.0 m/s.
- The irrigation application rate should be less than the soil's steady state infiltration rates (to prevent runoff). The system operation and scheduling should also be matched to the soil's moisture holding capacity.
- The infield uniformity should exceed 85 per cent for fixed sprinkler and travelling gun systems, 90 per cent for centre pivots, lateral moves and booms, and 95 per cent for micro-sprinkler and drip systems.
- Water quality tests should be conducted. Where necessary, filtration capacity and type should be matched to the water quality and irrigation application rates required. Final filter mesh/screen size should be smaller than one-quarter of the nozzle diameter for micro-sprinkler systems and one-seventh of the emitter diameter for drip systems.
- Flushing lines or valves must be included in the design to enable the removal of sediment and foreign matter.
- For micro-irrigation systems, a maintenance schedule (including acid and chlorine injection) should be provided.
- In completing the design, consideration should be given to future expansion requirements.

For more details contact Growcom on 07 3620 3844.

Disclaimer: This information is provided as a reference tool only. Seek professional advice for irrigation specifics.

A Growcom project conducted in collaboration with the Queensland Department of Agriculture, Fisheries and Forestry and the National Centre for Engineering in Agriculture with funding provided by the Queensland Government's Rural Water Use Efficiency Initiative.

