



Dust Suppression in Horse Barns, Arenas, Industrial Plants, Etc.

IRRIGATION-MART

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The essentials of a highly uniform, light precipitation, hanging sprinkler system to suppress dust in such areas as arenas, barns, and industrial plants.

Basic layout

Sprinklers that have a discharge rate of roughly 0.31 gallons per minute (GPM) at a pressure of 30 psi (at the nozzle) are installed overhead on a grid. The sprinklers should be installed about 5 feet apart along the sprinkler laterals (hose or pipe), and the laterals/lines can be anywhere from 12 to 18 feet apart. The laterals closest to the sides of the area should be 7 - 10 feet from the edge; the sprinklers at the ends of the laterals should be 7 - 10 feet from the ends of the area.

The inlet ends of all the sprinkler laterals are connected to a 'header manifold' (hose or pipe); the far ends of all the sprinkler laterals are closed, or connected to a 'flushing manifold' if the water quality is poor.

All the sprinklers may be operated at the same time if sufficient water flow and pressure is available. If there is not sufficient water and pressure to operate all the sprinklers at one time, individual sprinkler laterals or groups of laterals can be operated using manual valves, or 24 VAC valves operated by a basic irrigation controller. Each group of sprinklers that operate at the same time is called a 'zone'.

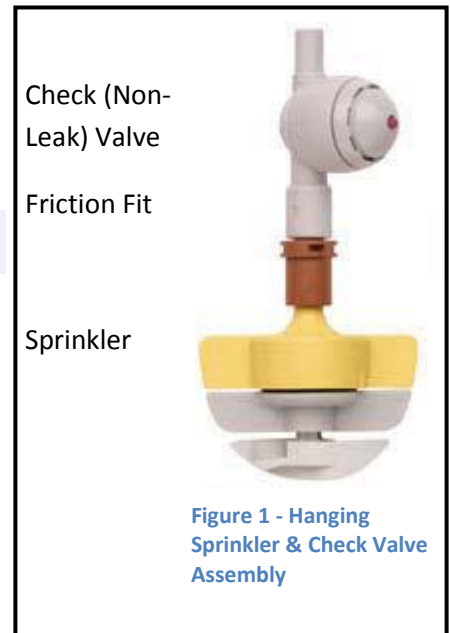


Figure 1 - Hanging Sprinkler & Check Valve Assembly

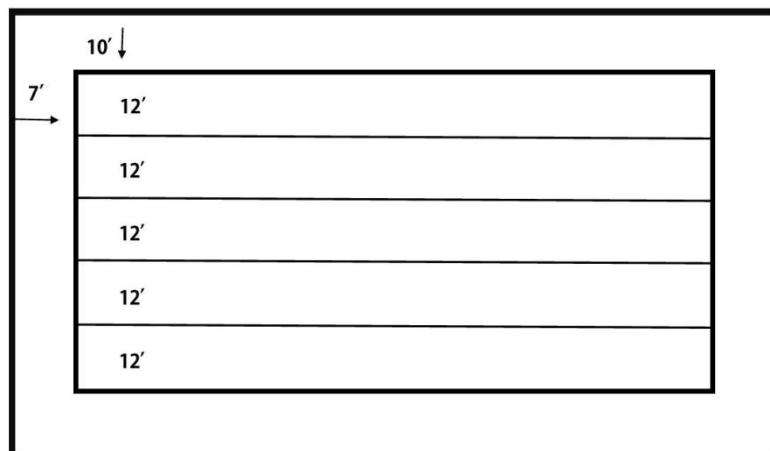


Figure 2 – A TYPICAL LAYOUT: 80' x 160' Area; 6 lines; 29 heads spaced at 5' apart per line; 8.99 gpm per line; 174 heads and 54 gpm total

Hose and pipe sizing

The diameter/size of hose/pipe should be selected according to the maximum flow rate (GPM) it carries; the greater the flow rate, the larger the diameter of hose/pipe required.

Maximum flow rate	Number of sprinklers	Dia. of hose/pipe
2 GPM	6 sprinklers	0.5"
4 GPM	12 sprinklers	0.75"
8 GPM	25 sprinklers	1"
20 GPM	65 sprinklers	1.5"

Since each sprinkler has a discharge rate of roughly 0.31 GPM at 30 psi, the flow rate of any sprinkler lateral is the number of sprinklers on that lateral multiplied by 0.31 GPM. The flow rate of any zone is the total number of sprinklers multiplied by 0.31 GPM. To limit the size of sprinkler laterals required when runs are long, they can be supplied from a header manifold located near the center of the sprinkler line.

Zone sizing

It is important to know dependable flow rate the of water source (in GPM) and at a pressure of at least 45 psi (nozzle pressure, plus elevation loss, plus friction loss; this is discussed in more detail below under Operation and Control). This flow rate is the determining factor for how many sprinklers can be operated at one time. Sometimes it is more economical to design/operate a system using several zones even if the water source is sufficient to allow fewer zones.

Sprinkler assembly

The basic element of the system is the sprinkler. Each sprinkler should be equipped with a **check valve**, to prevent the system from draining and forming wet spots. The sprinkler may fit into an adapter as a friction fit. To assemble, twist the sprinkler in a screwing fashion while pressing it into the adapter. This friction fit is able to withstand at least 60 psi of pressure, although the actual operating pressure will be much lower. The sprinkler can be attached to the sprinkler lateral in several ways, chiefly determined by whether the lateral is Polyethylene (PE) hose or Polyvinyl Chloride (PVC) pipe.

Polyethylene hose systems

Little experience is required to install a system using polyethylene hose for the laterals. Only use **Linear Low Density (LLDPE)** hose, which is soft and resists UV radiation. The hose should be opaque (so algae will not grow in it). Black LLDPE hose is commonly used. Some LLDPE hose has an outer layer that is a different color (e.g., white); the color is for aesthetic reasons.

The LLDPE hose itself should be hung/suspended in such a way that it is relatively straight, not sagging excessively. It can be attached to a rigid structural member in the roof, or attached to a high tensile wire. Hanging sprinkler assemblies attach to the hose using barbed fittings. A hole is punched into the hose and the barbed fitting is inserted into the hole.



LLDPE HOSE

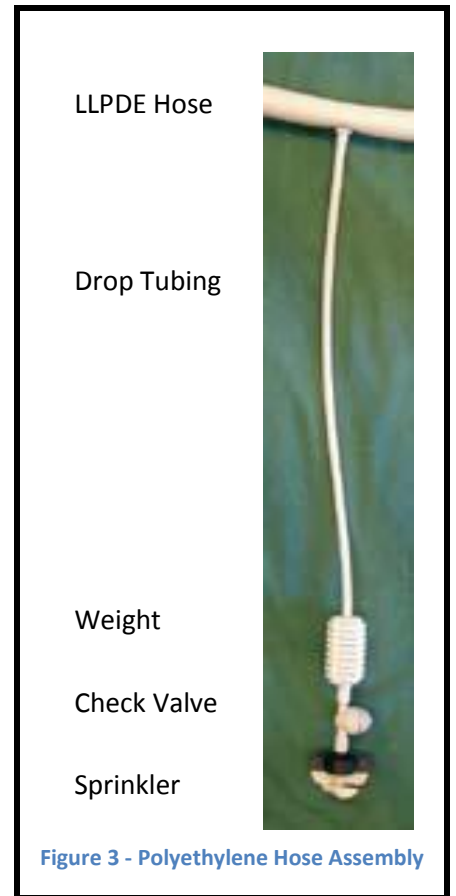


Figure 3 - Polyethylene Hose Assembly

PVC pipe systems

For systems using PVC pipe as the laterals, each sprinkler is adapted to a threaded tee (slip x slip x FPT) installed on the pipe. All threaded fittings should be sealed with Teflon tape. The PVC pipe itself must be hung in such a way that it is straight, not sagging excessively, and ***so that the sprinklers are vertical***. The pipe can be attached to a rigid structural member in the roof, or to a high tensile wire.

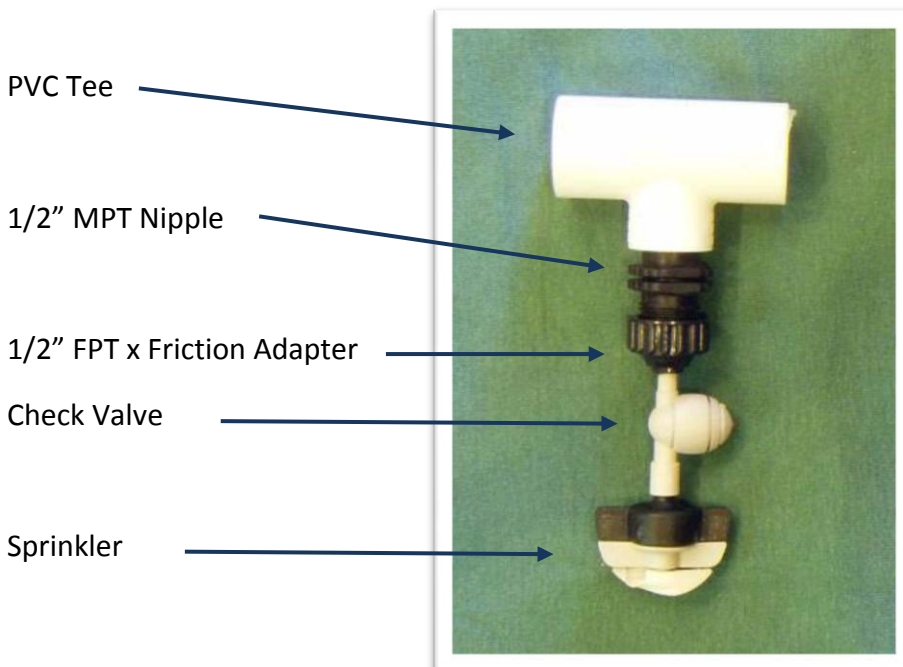


Figure 5 - PVC Pipe Assembly



Figure 4 - PVC Pipe

Operation and control

Pressure Regulation

The sprinkler system is designed to operate at about 30 psi at the nozzle. A pressure regulator will reduce the downstream pressure to a given pressure value. While it might seem reasonable to use a 30 psi pressure regulator, in fact, most control system components (like the pressure regulator) are commonly installed below eye level for easy access. Since the sprinklers are typically mounted much higher than this, more than 30 psi pressure will be required to both elevate the water to the installed height of the sprinklers, to account for friction losses, and to supply the sprinkler nozzle with 30 psi. To perform an exact calculation for required pressure, the important conversion factor is 2.31 ft. per psi. Most often a **40 - 50 psi pressure regulator** is suitable.

Filtration

Most water sources can be used to supply the sprinklers, but using dirty water sources such as lakes, streams, and ponds, can be demanding. A 120 mesh or finer screen filter is recommended for all water sources, even for community/municipal supplies.

Valves

Dust control sprinkler systems can be operated by manual valves, or by 24 VAC automatic valves and an irrigation controller. If the water source is dirty, care must be taken in selecting automatic valves to assure that they can operate in dirty water conditions.

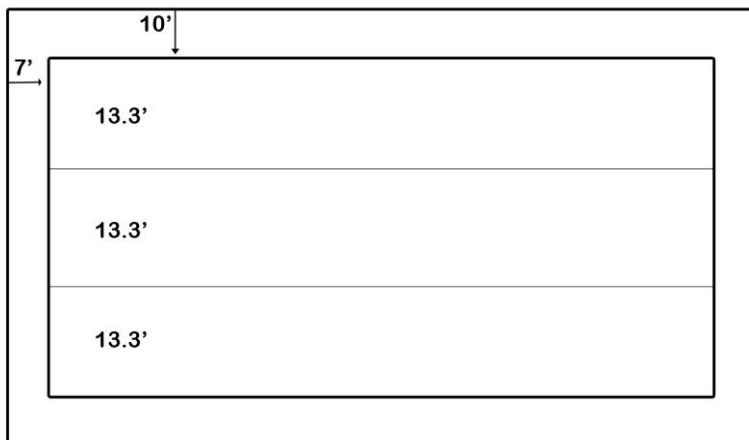


Figure 7 - ANOTHER TYPICAL LAYOUT: 60' X 120' area; 4 lines of 21 heads and 6.51 gpm each; 84 heads and 26 gpm total



Figure 6 - Valve, filter, & pressure regulator assy.

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