Mist n' Fog in Outdoor Landscape by Bhupendra Sharma

As an evaporative cooling method; this misting cooling can be used in many ways to affect local climatic cooling. There are others possible uses of misting system such as green houses, textile, cooling for chiller plants, pre-cooling for air condition units.
Here, we intend to discuss misting system with particular to landscape architecture.

- Type of misting system
- Components of misting system
- Typical costing of misting system in landscape projects
- Typical project specification of misting system

If you search on web for misting and fogging system in landscape architecture, you will find very limited reference material related to misting system as it is a niche' category. Mostly it is covered under evaporative cooling and fire/ dust suppression and it seems to be very complicated.

(A typical representation of misting phenomena; Manali)

It refers that more energy dissipation makes more fine water droplets that give the cool feeling.

- **Type of misting system**

There are 3 types of misting system –

1. Low pressure: 40 psi - 60 psi; this is generally municipal water supply pressure. The mist drop will be larger. It is used in green house agriculture etc.
2. Mid pressure: 200 psi; the water droplets will be finer than low pressure. There will be water moisture residual. The system is designed using standard centrifugal pumping unit.
3. High pressure: 1000 psi; this type of misting system is widely used in outdoor landscape including water features & green area (fog effect), cooling in patio, open restaurants, golf drive ways etc.

Fog or mist systems can be used to eliminate odors associated with solid waste treatment facilities i.e. microbial decomposition of animal waste, and noxious volatile compounds. Some of the more common problems include carbon dioxide, ammonia, hydrogen sulfide etc.

Components of misting system

As its name indicates that it is an evaporative cooling method to dissipate the effect of scorching sun. These are the components –

1. Incoming water tank unit & feed pump
2. Primary filtration unit & anti Scale Device
3. High pressure positive displacement pump (1000 - 1400 psi)
4. Secondary filtration unit
5. Pressure controller
6. Feeding pipe line
7. Pump controller and sequence timer
8. Nozzles

Incoming water tank unit & feed pump

The feed pump is not mandatory in the designed system but the main pump is of positive displacement pump as it needs positive water head. If the tank is located underground; then a submersible pump is required, ideally.

Primary filtration unit

An ideal requirement for long lasting life of misting system; is max 50 microns. The orifice in the mist nozzle is 100 microns. This efficient filtration prevents the nozzles from clogging. Anti-scale device protects the nozzles from the salt accumulated blockages.

High pressure positive displacement pump (1000 - 1400 psi)

Such type of pumps is used to generate low flow and high pressure. The pump selection must be done correctly for longer life of the system and good performance of the system. The capacity of the pump is calculated based on the selected nozzle types and quantities. The operating pressure of the system happens around 70 – 80 Bars.

Secondary filtration unit

Secondary filtration unit is inline type high pressure filter. This filter consists of a filter head and a screw-in filter bowl. It contains a bypass valve & connection for a clogging indicator.

Pressure controller

Pressure controller is installed to control the excess developed pressure in the system. These valves are used to regulate pressure in high pressure system ranging 350 to 3700 psi. It should be made of forged brass which makes it 15 times stronger than any other mold cast part. It lowers metal scrap, has a pore-free surface, high strength for safety and long-term applications, is durable and its superior polished surface contributes to its cosmetic value-added benefits. Pressure relief valves will derive complete flow rate at a pressure between 140 and 160 bar.

Feeding pipe line

This is some kind of high pressure tubes, made either from nylon PA12 tubes that has 70 bar working pressure. This type of feed line is suitable for small to mid-exterior landscaped garden. These tubes are used for mainly for small systems for maximum 100 nozzles. The other feeding line is constructed of SS 304, Schedule 40S. These tubes have working pressure of max 120 bar and the burst pressure of 250 Bars. These Stainless-steel tubes are for bigger applications like greenhouse mist systems. And it can be used also where recessed pipe tubing required. e.g. water features, pools etc.

Now a day; mostly every manufacturer produces double ferrule squeezing fittings. These fittings are compression fitting type.

A proper designed main and lateral ensure proper water distribution.

Nozzles

Misting nozzle is heart of the designed system as this is related to overall efficiency of the system and for a long lasting project; the nozzle must be selected correctly.

Impingement type nozzles

Impeller nozzles

- ✓ **.006”/.15mm Nozzle** - It is most commonly used for humidification applications.
- ✓ **.008”/.20mm Nozzle -** It is most commonly used for humidification and cooling applications.
- ✓ **.012”/.30mm Nozzle -** It is most commonly used for outdoor cooling and odor/dust control applications.
- ✓ **.016”/.40mm Nozzle -** It is most commonly used for special effects and outdoor dust control applications.

Control Panel

Complete panel designed to fully automatically operate the pump units. Both the electro-motor and the control and operation panel have the corresponding seal of compliance with electrical safety and electro-magnetic compatibility.

- The control and operation panel include the following services:
- Protection by fuses or magnetic circuit breakers (not thermal ones)
- Main switch of suitable power
- Contacts for star/triangle start-up of three-phase 380V motors
- Detector of phase failure for each pump
- Transformer
- Indicators of the status of the system
- The enclosure should be IP 65

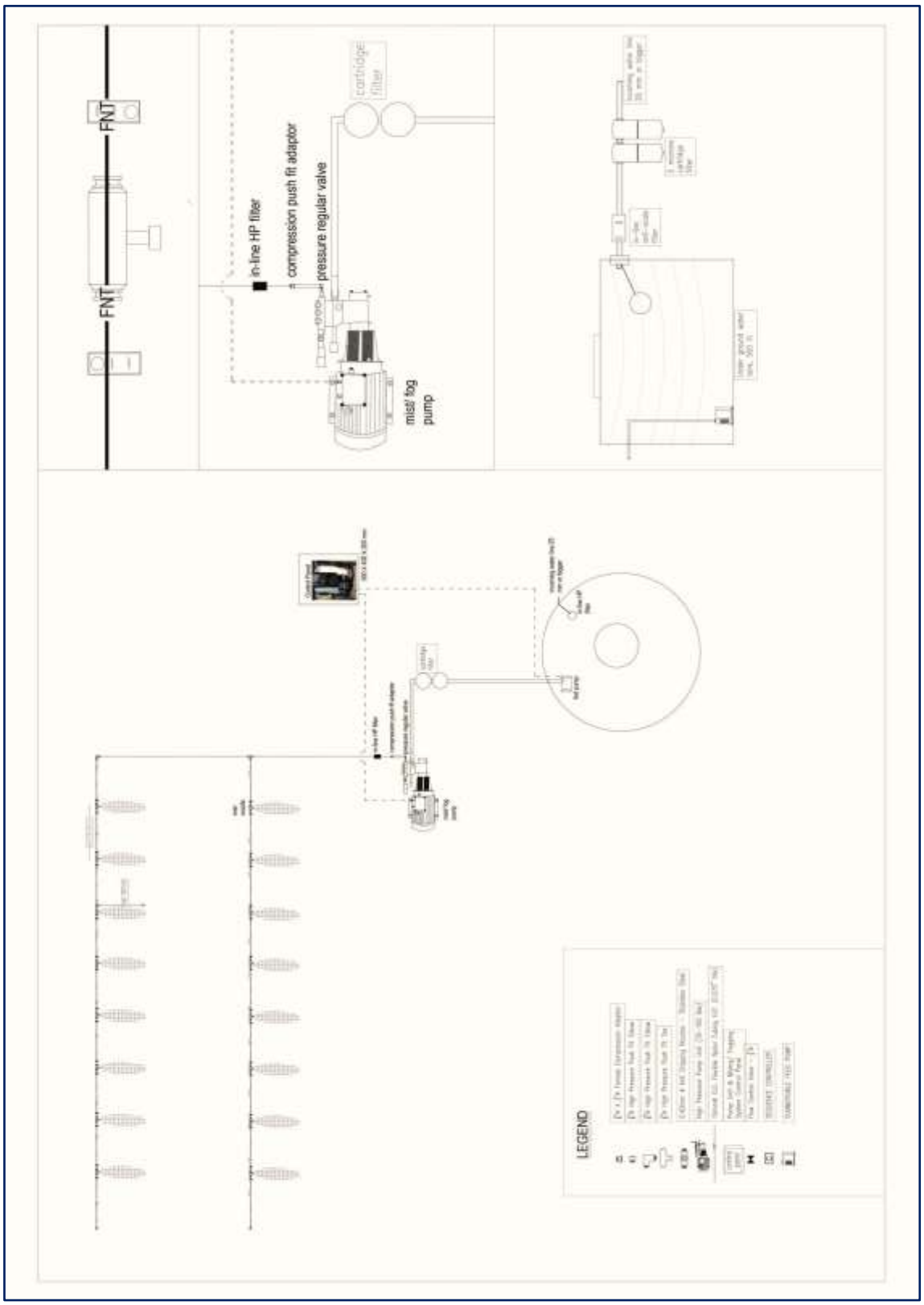
Alarms for:

- Tank water level: indicates minimum water level.
- Start-up failure.
- Electric/non-automatic failure: When the system is started up manually or when there is an electrical
- fault (inverted phases, no voltage)
- Start-up command: When the system receives an external start-up command
- Overpressure: Indicates that the outlet valve is closed
- Pump start-up and stoppage buttons
- Programmable logic control unit: Programmable automation and panel operator terminal.
- Interaction between the user and the system by means of:
- There should be an electronic timer for small size landscape or pool misting system. There system should work in intermittent manner as 2 min working and 5 min ideal.
- Both main pump and feed pump should work together to avoid any damage to main pump.

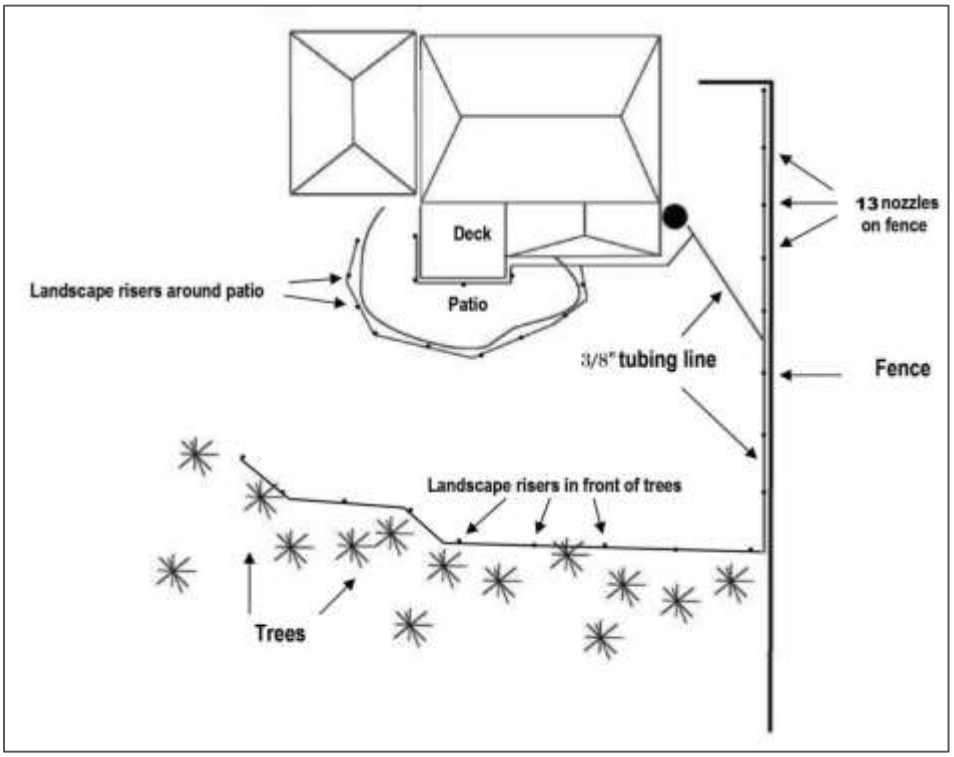
Mist Cooling in the MENA region

In simple words, drier the air results more cooling. The evaporative cooling is dependent on the specific location as much as 30°F / 16.5°C or more in areas with humidity below 40% in MENA region.

Schematic Drawing



Project layout



Typical costing of misting system in landscape projects

Typical project costing for mist/ fog system - Small project

S No	Description	Unit	Qty	Rate - AED	Amount - AED
1	BRASS ANTI-DRIP HEX NOZZLES 10/24	Nos	50	15.00	750.00
2	3/8" OD Nylon Tubing Black	mtr	70	16.67	1,166.67
3	Fittings -SS Cushioned Clamp	Nos	100	1.23	123.00
4	Beam Clamp	Nos	8	13.00	104.00
5	Plastic Tubing Clip	Nos	10	14.00	140.00
6	Liquid Filled Gauges 0-2000 psi; 2.5"; 1/4	Nos	2	14.00	28.00
7	1000 PSI DIRECT DRIVE PUMPS	Nos	1	3,250.00	3,250.00
8	Dual Inlet Filters with Scale Cartiage filter10"; 5 micron	Nos	2	290.00	580.00
9	10mm OD stainless steel 304 fabrication works	Nos	1	1,500.00	1,500.00
10	HDPE water tank for transfer c/w submersible pump & float valve	Nos	1	2,300.00	2,300.00
11	High pressure inline filter 3/8"	Nos	1	250.00	250.00
12	Outdoor type control panel c/w provisions for PLC & VFD for soft start, open contacts for BMS system - stand alone type	Nos	1	3,000.00	3,000.00
13	Provision for installation works at site	Nos	1	10,000.00	10,000.00
				AED	**23,191.67**

Note – the above cost is indicatively only.