Knitted Wire Mesh Pad (Mist Eliminator)

AZAR ENERGY
TABRIZ

CHEM GROUP

AZAR ENERGY Co.

Application

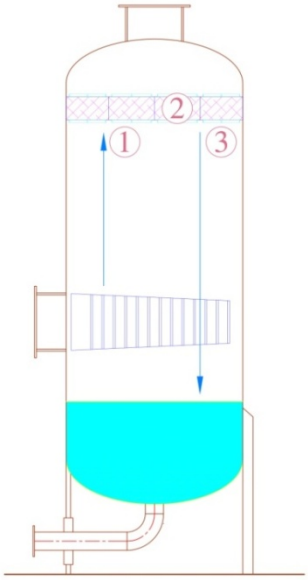
Azar Energy's AZ-MIST mesh pad type mist eliminators remove droplets by impingement on the wire surface. The liquid collected on the filaments is then able to drain from the pad under gravity. They have a limited range of useful operation in which they provide almost complete removal of droplets down to about 3-5 microns. At excessively high vapor velocities, the liquid droplets that impinge on the wire surface are sheared off by the vapor and reentrained before they are able to drain. At very low vapor velocities, all but the larger droplets are able to follow the vapor path through the mesh and thus avoid impingement. Wire mesh mist eliminators are well suited to remove mechanically formed entrainment from packed and trayed process towers, spray columns, venture scrubbers and other gas scrubbing devices. They are also a widely used deentrainment device in knock out drums and separators.

General Configuration

AZ-MIST mesh demisters consist of a pad of knitted metal wire mesh usually sandwiched between grids for mechanical support. Except for units less than about 600mm diameter, they are normally split into sections of between 300 to 400mm wide to facilitate installation through a normal vessel manway. The pads are cut slightly oversize to ensure a snug fit and thus eliminate any possible vapor by-pass either between sections or between pad and vessel wall. Each mesh pad is formed from crimped layers of fabric knitted from monofilament with the direction of the crimp rotated 90 degrees in each adjacent layer to provide a uniform voidage together with a high ratio of filament surface per unit volume of pad. Standard support grids consist of a framework of 25mm x 3mm thick flat bar fixed to a grid consisting of 6mm rods usually spaced on 150mm centre to retain the mesh with minimum obstruction of the face of the pad. The top and bottom grids are connected by spacer rods passing through the mesh that are welded to each grid to ensure the dimensional stability of the pad. Mesh pads can also be furnished with special heavy duty support grids where these are required to provide a working platform inside the vessel. AZ-MIST mesh pads can be installed either horizontally for vertical vapor flow or vertically for horizontal vapor flow. For vertical vapor flow, mesh pads are normally either 100mm or 150mm thick and for horizontal flow are normally greater at 150 to 200mm+ thick. Where mesh pad thickness exceeds 300mm, the unit is usually divided into 2 separate layers so that the sections will pass through normal vessel manways and in such cases wire screens are fitted between layers to maintain pad integrity during installation.

Mechanism of wire mesh pad

1. A vapor stream carrying entrained liquid droplets passes through a wire mesh pad. The vapor moves freely through the AZ-MIST knitted mesh.
2. The inertia of the droplets causes them to contact the wire surfaces and coalesce.
3. The large, coalesced droplets formed in the mesh ultimately drain and drop to the vessel bottom.



Salient Features

- Easy to install in all process equipment
- No moving parts
- Very high levels of separation efficiencies
- Low pressure drop
- Light weight
- Fits in all process equipment
- No maintenance
- Easy to clean with air/water/steam

Typical Materials of Construction

Material	**Liquid Product Separated**
SS 304	Water solution, nitric acid, reduced crude
SS 304L	Petroleum fractions
SS 316	Fatty acids, reduced crude
SS 316L	Naphthenic acid, and other corrosives
Monel	For caustic soda, alkalis, dilute acids
Incoloy 825	Acid, neutral and alkaline solutions like sulfuric

Technical Data

AZ-MIST Type	Density [kg/m^3]	Surface Area [m^2/m^3]	Voidage [%]	Wire Diameter [mm]	York	ACS	UOP	Application / Characteristic
AZ-MIST193	193	375	97.5	0.28	421	4BA	C	Very High Efficiency, Very clean Service
AZ-MIST144	144	280	98.2	0.28	431		A	High Efficiency for Fine Entrainment
AZ-MIST80	80	157	99	0.26	931	7CA	B	Highly Corrosive Condition
AZ-MIST128	128	460	98.4	0.14	326	3BF		Heavy Duty
AZ-MIST160	160	535	94.0	0.14	371	-	-	For general purpose
AZ-MIST432	432	2000	94.6	0.14	333	X100	-	Super dense

Features

1) BASIC SIZING

The usual practice in selecting a particular mesh for a given service is to determine the maximum allowable velocity and from this select a vessel diameter. In the case of existing vessels where mesh is to be installed, the reverse procedure is used, i.e., determine the velocity conditions which will prevail and select a mesh to fit as close to the conditions as possible. The procedure is outlined below:

Allowable vapor velocity (mesh in horizontal position)

$$V_a = K\sqrt{\frac{\rho_l - \rho_v}{\rho_v}}$$

Where:

V = maximum allowable superficial vapor velocity across inlet face of mesh

K = K-Factor

ρl = Liquid density

ρv = Vapour density

The K-Factor is equal to 0.107 m/s at a gauge pressure of 0 bar for vertical drums with horizontal mesh pads. For all other condition, we can provide the necessary consultation.

2) PRESSURE DROP

The pressure drop relationship is also reasonably well documented, although designers must rely on some simplifications as it is unlikely they will know the liquid loading with any degree of accuracy:

$$\Delta P = C(\rho_l - \rho_v)K^2 t$$

Where:

t = Pad thickness, m

ΔP = Pressure drop, kPa

For values of C refer to the table below:

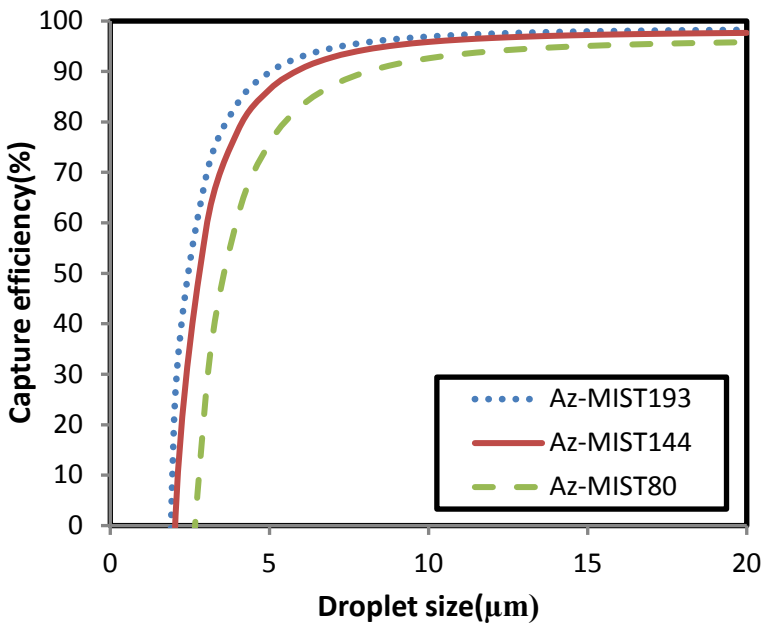
Mesh Pad Style	Dry	Wet
High Efficiency Pad	0.13	0.25
General Purpose Pad	0.10	0.20
Dirty Service Pad	0.07	0.15

The total pressure drop across wire mesh is the sum of the pressure drop across the dry mesh plus the additional pressure loss contributed by the liquid load within the mesh. This may be expressed as:

$$\Delta P_{Total} = \Delta P_{Dry} + \Delta P_{Wet}$$

3) DROPLET REMOVAL EFFICIENCY

The wire mesh pad is extremely versatile, providing virtually 99.9% removal efficiency in most mist control applications for particles greater than 5μm size. Furnished in a great variety of mesh styles, the mesh demister offers capture efficiencies and a pressure drop that can be suited exactly to specific process requirements. Curves in Figure below Shows the typical performance in an air-water system. Actual droplet size separation efficiency in other systems will be affected by the gas velocity, liquid and gas densities and physical characteristics of the mesh demister.



Capture efficiency vs droplet size for four types of wire mesh pad