Flame Arrestors.

Stop the flames reaching

- Regulator or the cylinder in an lpg gas cylinder.
- Tanks or vessels containing flammable material
- Furnaces using pre-mixed gases or hydrogen atmosphere.

Use of flame arrestor to

- Extinguish flames in pipelines, ducts and vents carrying flammable gases or vapors and prevent them from spreading to other parts of the system.
- Prevent the propagation or spread of flames by absorbing and dissipating heat from the flames on one side of the arrestor. So preventing the temperature of the gas or vapour on the opposite side rising to ignition point.
- Dandekar industries presents a safety device that will arrest the flame, absorb the heat and reduce the flame temperature to below ignition point of gas or vapour.
- Dandekar industries has carried out continuous research to develop a unique dry-type flame arrestor using perforated disc, ceramic cartridge or sintered metal seals.

Customised solutions suited for your needs and requirements

dandekar industries provides the flexibility of selecting between ss316, copper or aluminum material for construction or either welded or bottled by tie rods.

Size variations of the flame arrestors

from applications varying from small sized domestic lpg cylinders to large sized room ventilators. Flame arrestor can be designed to suit every application. Dandekar industries offers flame arrestor solutions varying in sizes and shapes that meet the domestic and industrial requirements.

Importance of flame arrestors

- Flame arrestor is designed to protect the tank by preventing the flame propagation & explosion in the tank.
- The flame arrestor element dissipates the heat of flame below the ignition point of the vapours.
- When the storage tank contains liquids having flash point lower than the possible tank temperature, flame arrestors are recommended.
- Flame arrestors, when properly applied are effective, passive device against the propagation of flame front.
- The function of flame arrestor is to restrict the transmission of flame front from the unprotected side to the protected side of device.

Application of flame arrestors

- Storage tank vents
- Oil / petrochemical refineries
- Offshore drilling platform vents
- Flare stakes
- Pulp & paper nag processing
- Vapour inclination systems

- Chemical processing plants
- Marine loading systems
- Vapour recovery systems
- Landfill gas inclinators
- Sewage treatment vapour processing
- Pharmaceuticals

How to flame arrestors works

flame arrestors are passive device with no moving parts. They prevent the propagation of flame from the exposed side of the unit to the protected side by the use of wound crimped metal ribbon type flame cell element called as honeycomb. This construction produces a matrix of uniform openings that are carefully constructed to quench the flame by absorbing the head of the flame. This provides an extinguishing barrier to the ignited vapour mixture.

Under normal operating conditions the flame arrestor permits a relatively free flow of gas or vapour through the piping system .if the mixture is ignited and flame begins to travel back through the piping. The arrestor will prohibit the flame from moving back to the gas source. The type of gas in the system determines its gas grouping and therefore predetermines the type of arrestor required. The element must be designed to accommodate the specific gas group that could possibly ignite and propagate in the system. The more explosive gases require the flame cell channel to absorb the heat more quickly and efficiently.

Flame propagation

the difference between the vapours types of flame arrestors are mainly based on the nature of the flame which is expected (especially how fast it moves) and on the expected intensity of pressure pulse created by the flame. A flame is a volume of gas in, which a self-sustaining exothermic (heat producing) chemical reaction is occurring. The reaction is presumed to be oxidation, also known as combustion. To have a flame three things must be present, oxygen (supply of air) very high temperature (initially supplied by ignition source), and a flammable gas. Flammable gas mixed with air in suitable proportions called a combustion mixture. So long as these requirements remain available, a flame can burn indefinitely. Flame arrestors operate by removing one of these elements, high temperature.

In a stationary flammable mixture, a flame seems to move toward the unburned gas leaving combustion products behind that apparent motion is called flame propagation. The flame exists only with in a relatively narrow volume at boundary between the unburned gases and the combustion products.the speed at, which the flame propagates is measured at the front edge of flame. This speed depends on several variables including the speed of the chemical reaction air-

to-gas mixture ratio, and whether the flame confined or unconfined.

A critical concern in flame arrestor installation is possibility of a flame stabilizing on the face of the flame cell element. A flame that continuously burns against the flame cell element for a period of time can heat the element above the gas auto ignition temperature resulting in the flame propagation through the element. The time period varies with the type of element, mixture & flow velocities to achieve the highest achievable temperature at the element.

Types of flame arrestors

- End of line (un confined deflagration) flame arrestors.
- End of line long burning proof flame arrestors.
- In line (confined deflagration) flame arrestor

End of line

end of line deflagration flame arrestors are designed for unconfined flame propagation. An unconfined deflagration is defined as the propagation of flame at a speed less than the speed of sound in an area where the expanding combustion by products are not restricted by any enclosure. A vapour cloud ignited in the open atmosphere is usually the flame front burns through the vapour at relatively low but constant velocity of approximately 15- 20 ft / sec, end of line flame arrestor must be mounted on an outlet pipe venting or gas they are simply bolted or screwed on to the vessel or tank vent. These design incorporate well- established but simple technology. By use of single element of crimed wound metal ribbon that provides the heat transfer needed to quench the flame before it gets through the arrestor element.

The main point of concern when selecting an arrestor for end of line application are as follows :

- Hazardous group designation or mesh value of the gas.
- Flame stabilization performance characteristics of the arrestor compared to the system potential for flame stabilization for sustained period of time.
- Process gas temperature.
- Pressure drop across the arrestor during venting flow conditions, relative to the system’s maximum allowable pressure and vacuum.

- Material of construction that meet the ambient, extremely cold
- Size & type end connection
- Instrumentation requirements.

Long burning proof end of line flame arrestors

long burning proof end of line flame arrestors are designed for atmospheric explosion or unconfined deflagration. They simply boltedor screwed on to the vessel or tank vent. These design incorporate advance technology. Most use multy element or crimped wound metal ribbon with a radiation gap between each element which provides the heat transfer by two different ways. Heat transfer by conduction & by radiation.

In line (confined deflagration) flame arrestors

a confined detonation is result of an explosion in a pipe line where the flame moves increasingly compressed by the increased volume os unburnt gases. The flame velocity increases rapidly and combustion process changes after a certain distance from an explosion to a detonation due to the residual unburnt gases being compressed to the point of self ignition. Starting from on initial pressure of 1 bar, flame front velocities more than 2000 meters / sec, with air gas mixtures are possible and pressure peaks with a static load more than 80 bars may occur in the direction of detonation wave. The point of change from explosion to detonation is in part dependent up on the relation ship between the pipe length & it's diameter. If a flame arrestor is installed in a pipe line at a distance from the possible point of ignition is not more than 20 times nominal pipe diameter, an explosion will occur and not a detonation .but if, a flame arrestor is installed in a pipe line at a distance from possible point of ignition is more than 20 times nominal pipe diameter or minimum length of 2 meters detonation will occur, and a detonation proof flame arrestor must be installed.

The flame arrestor that are intended to be mounted on a pipe line caused a more confined space as a pipeline, the propagation of flame front is defined as a deflagration. A confined deflagration is a flame front travelling at a speed less than the speed of sound in the area where the flame front is constrained by external boundary. In this case the pipe accelerate rapidly, this acceleration is the result of the turbulence of unburnt vapours directly in front of the flame. This happen fast and can

turn catastrophic. This stated dynamic condition resulted to provide a flame arrestor product which stop the propagation of flame front and with stand the enourmous pressure caused by explosions within the confined piping.

The very wide range of possible behavior for confined flame causes two particular problems or the flame arrestor products. First , the high pressure deflagration & stable detonation states have very stable kinetics of burning and the flame is moving very fast. Therefore the arrestor must be able to absorb the flame's heat much faster than required by standard low - to – medium pressure deflagration conditions. Second, the instantaneous impulse pressure caused by the shock waves of overdriven detonation subject the arrestor to force of up to 40 bar. Thus the arrestor must be structurally superiors standard low pressure deflagration arrestors.

Honeycomb or bank of dandekar flame arrestors

elements consists of alternate layers of crimped and uncrimped metal built into a circular frame in either case this results in structure with many approximately triangular shaped apparatus. This types of arrestors can be made to very close tolerance & dimensions can be varied over a range . The pressure drop across the arrestor is low and they can be constructed to with stand to mot severe explosion.

* maximum experimental safe gap (mesg)

Group	Groups defined by nfpa	Mesg
Ii - c	Group a & b	< 0.8 mm.
Ii - b	Group - c	0.8 to 1.0 mm.
Ii - a	Group - d	>1.0 mm

Group a & b	Group - c	Group - d

Acetylene	Acetaldhyde	Acetone, octanes
Butadyne	Ethylene	Ammonia, tolune
Ethyline oxide	Cyclopropane	Benzene, haxen
Hydrogen	Hydrogen sulphide	Butylene, pentanes
Propylene oxide	Die ethyle ether	Butan, xylene
Propyle nitrete	Die methyle hydrazine	Ethane, isopropane
		Gasoline, nephtha
		Methane, propane
		N propyle acetate
		Styrene, ethanol
		Cyclohaxen
		N- butyle acetate
		Heptanes
		Methyle amine
		Ethyle acetate