

## Filter Separators: Efficient removal of high concentration of small particles

Grand Prix range of Filter Separators are multi stage units that utilizes four or more methods of gas conditioning in order to remove 100% solids and liquid particles 8 microns and larger. Filter Separators provides and maintains high efficiency and performance through a wide flow range.

### Principles of Operation

The common mechanical separator cannot effectively remove particles less than 8 to 10 microns. Their efficiencies based on percent weight removal are quite low for aerosols or entrainment with high concentration of small particles (less than 8 microns).

In order to achieve an efficient removal of these small particles, a process of particle conditioning must be induced to increase these particles to a size that can effectively be removed by conventional separating equipment. This can be achieved by using Grand Prix Filter Separator, a multi stage unit, which handles a wide flow range (10-110% of the capacity) by conditioning particles in the gas stream as follows:

1. High particle acceleration, providing centrifugal action, impingement and diffusion.
2. High inter particle contact by providing a coalescing media.
3. Sudden expansion of the gas, providing effective settling of liquid droplets.
4. Good flow dynamics controlling boundary layers.

The entrainment laden vapour entering the vessel will encounter a labyrinth of pipes which are an extension of the element carriers. These obstacles will impinge on the gas and their geometry will impart a certain amount of centrifugation, which will move particles 10 microns and larger to the bottom of the separator.

Smaller particles which exhibit significant Brownian movement will collide with each other coalescing to a single droplet. Inelastic collision of solids will produce aggregates which subsequently are swept by the liquid into the sump, where they are beyond the influence of the gas stream.



Particles that remain suspended will encounter the filter coalescer elements, which provide maximum surface area for solids retention. Liquid particles collide with and adhere to the fibers or other droplets and coalesce. Two mechanisms are involved in this action: deposition by impaction and by diffusion. The agglomerated liquid is then forced thru the media by the drag of the gas for subsequent removal by the second stage separator.

The second stage element or coalescing media is designed for each specific application, and may use vanes or other elements in order to achieve optimum performance.

### Performance

#### Efficiency

Grand Prix Filter Separators guarantees 100% removal of all liquid droplets 8 microns and larger and 99.9% removal of particles down to 3 microns.

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For solids it guarantees 99.5% removal of particles as small as 0.5 microns.

### Pressure drop

The Grand Prix Filter Separator is normally designed for an initial pressure drop through the unit of 2 psi with clean elements and at maximum design flow conditions. However, this is not a limitation, lower or higher pressure drop designs are used dependent on customer requirements.

### Element Life

The filter coalescer element is designed for a collapsing pressure of 35 to 50 psi to ensure that elements will not fail should the pressure differential reach this magnitude. To prolong the life of the elements, the Grand Prix Filter Separators provides a blow down connection to allow cleaning of the element while in operation.

When opened, the blow down connection will generate a pulse with enough energy to shake loose any solids built up on the surface of the elements with subsequent blow down of these solids. The pressure drop created by the loading elements will be reduced, extending the time required for element replacement.

## Features: Design & Construction Advantages

### Mechanical Features

- ASME Pressure Vessel Code, Section VIII, Div.-1, U Stamped and Div. 2 U2 Stamped.
- National Board or IBR certified
- Standard Filters are constructed of carbon steel (NACE or HIC Tested), however, Filters can be custom designed and built from stainless steel and other steel alloys.

### Applications

The Grand Prix Filter Separators are used in a variety of applications in the natural gas and chemical process industries. These include:

- Compressor station: to protect compress for liquid slugs, prevent cylinder wear from solids.
- Recip compressor: remove oil from stream.
- Metering stations and city gates: remove liquid hydrocarbons, water & sand.
- Protection of desiccant beds.
- Gas Storage: to prevent injection or withdrawal of liquids and solids.
- Fuel lines to power plants and engines.

For more information on other Grand Prix products viz. Pressure Vessels, Strainers, Cartridge Filters, Dry Gas Filters, Cyclone Scrubbers, Gas Separators, Silencers and Skid Mounted Packages contact:

**GRAND PRIX ENGINEERING PVT. LTD.**

Plot No. 82 , Sector 25, Faridabad, Haryana-121004, INDIA

Tel: +91-129-4151820/4097700 Fax: +91-129-4151821

E-mail: [mail@grandprixfilters.com](mailto:mail@grandprixfilters.com); Website: <http://www.grandprixfilters.com>