
THE GAMGRAM

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FILTER ACCESSORIES

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I went to visit a customer a few years ago who had just completed a new fuel farm. Although he had purchased his filters from a competitor of mine, I was happy to take "the guided tour". When I saw the filter vessels, I immediately realized why I had not been competitive -- my customer had bought vessels without any accessories.

I had to explain carefully to this man what each accessory was for and why it was necessary. When he was done properly "outfitting" his filters, he had spent a lot more than he had expected.

The correct accessories are critically important for proper performance and safe operation of any filter vessel. The following is a brief overview of common accessories. Also see [GamGram 37](#) on the recovery of fuel released by air eliminators, pressure relief valves, and automatic water drain valves.

1. **AUTOMATIC AIR ELIMINATOR (AAE)** - This device releases trace air from the vessel. Without an AAE, air will be trapped in most filters or filter separators, unless they have the fuel outlet connection on the top or a similar design that prevents air from accumulating, such as the small Velcon VF-61 filter vessel. Without an automatic means for releasing air, it can accumulate to such an extent that the upper portions of elements are continually exposed and never do any filtering and potentially cause a fire in the vessel ([See GamGram 15](#)). The operator has no way of knowing this.
2. **AIR ELIMINATOR CHECK VALVE** - A rubber sealed (soft-seated) check with a low "breakaway pressure" allows air to exit the AAE, but prevents air or contamination in the AAE outlet piping from going backwards into the vessel. We've seen many drain back problems (where the vessel empties to the underground storage tank, through an open or leaking line valve). We have also seen a situation where diesel fuel entered an avgas system this way. See [GamGram 43](#) for outlet piping information.
3. **MANUAL AIR RELEASE VALVE** - This is usually an ordinary ball valve, connected in parallel with the AAE. It allows easy draining of the vessel for element changing by providing a path for air to enter the vessel.

It also allows air to be released manually after changing elements, but care must be used to prevent spillage. You may want this valve to be lockable.

4. **PRESSURE RELIEF VALVE (PRV)** - A PRV is a required accessory on any filter vessel. It is solely meant to protect the vessel pressure build-up caused by the sun's heat. It is also called a thermal relief valve.

Without a PRV, thermal build-up can break the vessel housing, cause leaks. Or similarly damage other adjacent components such as meters or hoses. We have seen thermal buildup create pressures over 1200 psi in a 75 psi system.

- 5. MANUAL DRAIN VALVE** - All filter vessels must have a manual drain valve, or it is impossible to properly drain the vessel to change elements or conduct periodic sump inspections. (See [GamGram 2](#) and [5](#).)

You may want this valve to be lockable, or to be a spring loaded valve, which closes automatically when you release the handle. Another good addition is a cam lock connector with a dust cap which not only keeps the outlet clean, but serves as a secondary spill prevention device and allows a hose to be easily connected.

- 6. DIFFERENTIAL PRESSURE GAUGE** - All filter vessels should have a differential pressure gauge or indicator so that you can determine the condition of the elements and avoid the possibility of bursting dirty elements. The only possible exception is a vessel that is fed by a pump incapable of delivering over 25 psi under any circumstances and that is a "judgement call". A low pressure pump cannot burst a properly designed and built element.

The preferred indicator is a direct reading, piston-type differential pressure gauge with an inlet filter. An alternative is a pressure gauge with a proper selector valve. A differential pressure control system is recommended for all water absorbing element vessels and also unattended filters.

- 7. SAMPLING CONNECTIONS** - All jet fuel filters should have inlet and outlet stainless steel sampling connections with sampling probes to ensure that representative samples can be obtained. ([See GamGram 6](#))

By comparing the inlet and outlet results you can ascertain the performance. Avgas systems can also benefit from such connections, but they are not essential except on jet fuel.

NOTE: The following accessories apply only to filter separators.

- 8. WATER CONTROL** - This is a large subject, worthy of a GamGram of its own. In short, a filter separator without a proper water control device able to stop the system flow if water collects in the sump, is just a filter. This is because it may remove water, but once the sump of the filter separator is full of water, any additional water that enters the vessel goes downstream.

A water control device should positively stop the fuel flow. A water control device may be electric, hydraulic or pneumatic. It may be float operated or (if electric) of the conductivity probe type. Electric water controls should be intrinsically safe and/or explosion proof, except for truck mounted systems allowed to be weather-tight by local regulations, such as in the USA. The water control may stop flow by turning off the pump or by causing an outlet control valve (slug valve) to close.

- 9. SUMP/DRAIN HEATER** - In climates where air temperatures go below the freezing point, a heater is necessary to prevent water from freezing in the drain valve. A heater should be explosion proof, have a built-in adjustable thermostat, a "watt density" no higher than 22 watts/in², and stainless steel heating elements. In large vessels or vessels where the water control may become trapped in ice, a sump heater may also be needed. For full information on this subject, see [GamGram 30](#).

We recommend the above listed equipment as a minimum. Be sure to meet the requirements of your oil company and/or airline. Also make sure to use the appropriate material. We recommend against the use of cast iron.