

Inner Safety Elements

Various equipment and truck manufacturers incorporate a two element type of air induction system. These systems include an outer air filter and an inner safety element. Some of these systems also incorporate fins either permanently affixed in the housing or attached to the primary element. Figure 1 shows an example of this style of air filtration/housing system.

A great misconception about the safety element is that it is part of a two stage filtration system. Another misconception is that the safety element is a final line of defence to stop dirt that gets past the primary filter. The inner element does neither of these.

In fact, the safety element is composed of a comparatively open media with lower filtration efficiency than the primary filter. Inner elements commonly use either a pleated paper media or a fiber matt type media. The safety element is installed solely to prevent dirt from entering the engine when the primary filter is removed during normal service (Figure 2). Since the safety element is on the clean side of the primary filter, it typically will stay cleaner longer and is not replaced each time the primary is replaced.

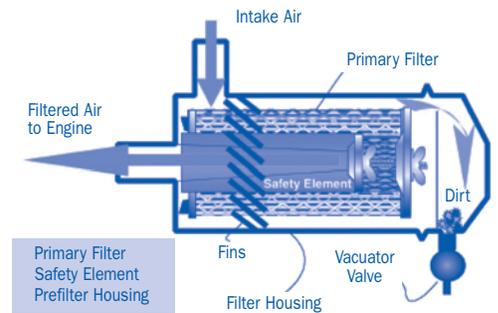


Figure 1

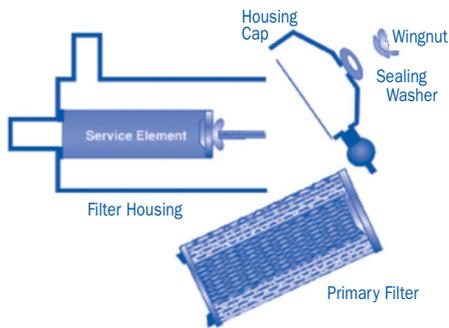


Figure 2

Recommendations for safety element replacement intervals vary, but they are not usually replaced each time the primary filter is replaced. In environments with high concentrations of soot or other fine contaminants, service elements may have a replacement cycle equal to that of the primary filter.

To establish a baseline to help identify a restricted safety element, check the air filter restriction gauge readings immediately after installing a new primary filter and a new safety element. The initial reading provides a baseline for air flow restriction and can be referenced to determine if the one or both of the elements require service. For example, if there is an abnormally high restriction gauge reading after installing a new primary filter, this would be evidence that the safety element is in need of replacement also.

Should a safety element be kept in service too long, element damage can occur. This damage can be as subtle as breaks in the element's media to the complete destruction of the element. Shown below are examples of inner elements that have been subjected to excessive differential pressure. All of these safety elements had become plugged by engine exhaust soot and kept in service until the differential pressure destroyed the elements. Had air filter restriction gauges been used, and these products properly serviced, there would not have been any damage to the elements.

Additional information about inner elements is available in the Filter Manufacturers Council Technical Service Bulletin #99-2. The bulletin is available on the Council's web site; www.filtercouncil.org



Figure 3:

Element plugged with soot that has begun to collapse. The media has been torn. The differential pressure has distorted the element enough to have caused the top end cap to become detached.

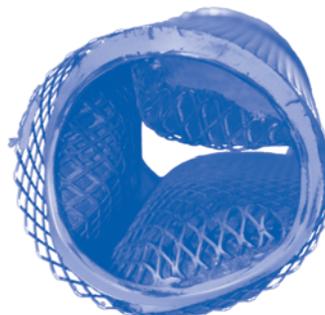


Figure 4:

Element plugged with soot that has collapsed and the media has been torn. The differential pressure has distorted the element enough to have caused both end caps to become detached.



Figure 5:

Element plugged with soot that has collapsed, the inner body destroyed by continual flexing, and the media has been torn. The differential pressure has distorted the element enough to have caused the top end cap to become detached.