Introduction

History shows us that as technology evolves and develops, so do commonly held beliefs and methods of performing all kinds of tasks. Once it was a commonly held belief that the Earth was flat and that if you kept sailing to the end you would simply fall off into oblivion. More recently, it was believed that our water supplies in Australia (amongst the driest in the World) were stable and were treated as an almost unending supply. Both of these we now know to be incorrect. The same situation applies to the argument between washable and disposable air filters used in HVAC systems.

But before we look at the comparisons between disposable and washable filters, we need to consider the reasons for having filters in the first place. It might sound overly simplistic, but it is important to remember that the air filters are designed to remove particles (dust etc.) from the air stream that is passed through them. These particles are removed to protect either other equipment or occupants that breathe the air or both. But whatever the situation is, the filters are there to do a job.

This job, as with almost everything else, costs money to perform. The cost of the filters and the labour to install them however is often only a small percentage of the owning and operating costs of the job. By far the most expensive part of owning the filter (when it is doing its job) is the energy costs of passing the air through it. It can typically cost between $150.00 and $500.00 per annum in energy costs just in getting the air through the filter. So when considering a filter, don't just look at the purchase price. Of course when the filter is not doing the job that it is put there in the first place to do, then the obvious result is equipment failure and occupants health being put at risk. Both of these outcomes being far more expensive than the costs of the filters.

Washable filters and correct operating procedures

Now before we go straight into the arguments between washable and disposable filters for use in HVAC systems, I will first describe the correct procedures for using and maintaining washable filters. This is necessary to understanding the comparisons between the two systems.

Washable filters have limitations in both their performance and their service requirements. Washable filters are generally available in the G1-G3 performance range, with a select few that fall into the G4 range. So what does this mean? Simply put, a filter's efficiency in stopping dust of various sizes can be reflected in its performance rating. G rated filters are considered roughing filters or "rock stoppers". F rated filters are considered fine filters (for stopping smaller dust particles). The number proceeding either the G or the F (1-9) rating gives a further indication as to the filter's performance – the higher the number, the more efficient the filter is at stopping smaller particles (for more information please refer to Peregrine Industries Filter Training Manual – Air Filters in HVAC Applications).

Washable filters also require regular maintenance to keep them clean. The best way to clean these filters is obviously to wash them. This process can be easily achieved by washing them gently with mild detergents and water. The water used to do this must, under EPA and water authority requirements, be treated as wastewater and is not allowed to be discharged into the stormwater system (heavy fines may be imposed by the relevant authorities for failure to comply). After they have been washed, the filters must be left to dry completely before being placed back into the HVAC system. If they are not completely dry, then the risks of bacteria and fungal growths on the filter are increased significantly due to the dark, damp conditions that will then be present on the filter media.

With this in mind, it is strongly recommended that two sets of filters be used, one set of filters are used in the system and the second set be used as a changeover set. When the service is required, the correct procedures states that the dirty filters be removed from the system and be replaced by the spare set. The dirty filters are then serviced (washed and dried) at an approved facility and kept in storage ready for the next service. This process should only be carried out a maximum of 6-10 times per filter before the filters will need to be replaced.
Washable filters versus disposable filters

The most important function of the filter is its ability to remove the dust that it was put there in the first place to remove. So how does the washable filter do this? Not very well is the answer! Each time a filter is serviced, the filter media will become worn and it steadily loses its ability to carry out its function. Typically, a new washable filter may be 80-90% efficient at removing average atmospheric dust form the air (G3 rated filter) but after just a couple of services it could be as low as 50-60%. The disposable filter on the other hand typically performs at it worst when it is new and gradually gets better over time (but in doing so it also increase it’s energy consumption) until it requires replacement. So that’s one point for the disposable filters.

How about the reliability of performance? Well the washable filter, for reasons already mentioned, are more likely to be unreliable than the disposable filter. And to further compound this, if the filters are not serviced properly and put into use when wet, then they are more likely to have bacteria and/or fungus grow on the filter media. So that is another point for the disposable filters.

What about time intervals between services – surely this would be an advantage of the washable filter? Wrong, if a washable filter is left in too long when new it will not be able to be cleaned properly. And after each service it can clog up quicker or let more dust through or both. The disposable on the other hand can stay until the energy costs get too high before you throw it away – after all it doesn’t matter if the filter is no good at the end of it’s service life. That’s another point for the disposable filters.

What about the all import issue of costs? Well with a washable filter in a typical HVAC situation you need to first buy two sets of filters, then you have to service them every month or two (it is generally recommended that the filters are serviced monthly to minimise the energy consumed thus keeping the costs down, if this time is extended then the energy consumption is increased exponentially). You also have the increased risk of equipment failure and health risks to occupants. Now the washable filters with just the service and supply costs will in most cases exceed the costs of the equivalent disposable filters without even considering the increased costs associated with the poor filtration caused by the washable filters. Yet another point for disposable filters.

Now for those of you that still are unconvinced, there are the environmental issues associated with filters. Washable filters are washed using water (usually drinking water), which everyone knows is in short supply in Australia. This water must then be treated as wastewater and cannot be discharged to stormwater. On top of this, the washable filter can have an increased resistance to airflow after every service, this in turn will increase the energy consumed in passing the air though the filter. So for the environment, the green points go to the disposable filters.

So where would you use a washable filter over a disposable filter? Generally speaking you would not, but in very high dust situations you can often employ a washable metal fabric filter as a prefilter to a disposable filter to make the disposable filter last longer. Or if a non-standard sized filter is required for a particular situation then a washable filter can be used, but in this situation it is often the case that a disposable filter media can be used in its place thus saving money, performing a better job at removing the dust and be more environmentally friendly.

For further information on any of the above or to gain a free comparison of filter energy consumption using our unique filter energy calculator which can also calculate the optimum pressure drop at which to change your filters; or for any other enquiries on air filtration please contact your nearest Peregrine Industries representative.

Your Authorised Distributor:

Peregrine Industries Pty. Ltd.
2/14 Dennis Street
(PO Box 78 Somerton … 3062)
Campbellfield, Victoria … 3061
Phone: +61 3 9303 9888  Fax: +61 3 9303 9688
www.peregrineindustries.com.au

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