



February, 2011

## Applying Filters to Fan Powered Terminal Units

The increased focus on improved indoor air quality and work place health has led to higher filtration levels being specified for recirculated room air. Because of this, Fan Powered Terminal Units (FPTU) are often equipped with a filter on the return air inlet.

When selecting FPTUs with a filter, the pressure drop of the filter needs to be taken account or several issues may arise in the field such as:

- Reduced fan flow
- Increased noise levels
- Increase energy consumption
- If equipped with electric heat, decreased fan flow could cause heater safeties to trip.

To make selecting FPTUs with filters easier, Price has several simple tools to show the adjusted capacity of our FPTUs when equipped with a filter:

### MERV 3 filter (Standard throwaway filter)

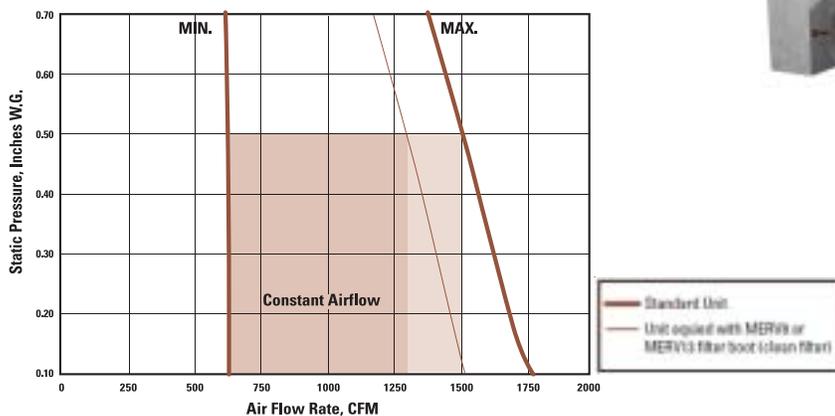
- 1" Thick (Mesh Media)
- Efficiency less than 20%
- Installed in a vertical position in front of the return air inlet
- Filter reduces max fan capacity by approximately 10%



### MERV 8 and MERV 13 filters in Price Filter Boot

- 2" Thick filters (pleated media)
  - MERV 8 – Efficiency up to 40%
  - MERV 13 – Efficiency up to 85%
  - Installed on an angle to increase filter area.
- Note, vertical installation of pleated filter is not recommended for Price FPTUs due to excessive air velocities and pressure drop through the vertical filter.
- See Price Catalogue or website for fan curves of units equipped with Filter boot.
  - Note that MERV 8 and MERV 13 filters are only available on FDC, FDV, FDCG, and FDCGQ units equipped with ECM.

Unit Size 40 - No Coil

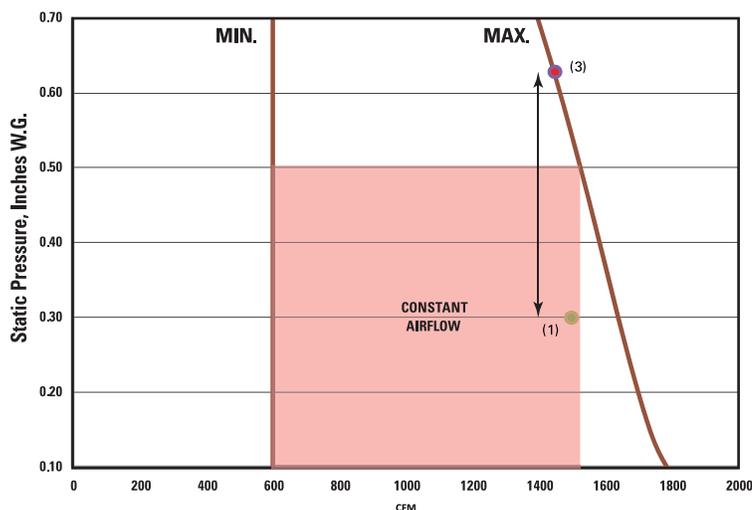




## Other Pleated Filters

- If filters are to be supplied in the field by others, then the pressure drop of the filter needs to be added to the external static pressure of the downstream components (e.g. ductwork, diffusers) when initially selecting the units.
- The pressure drop of the filter will depend on the area of the filter and the airflow through it. Once these are known, the filter manufacturer's specifications should be consulted to determine the pressure drop. Filters should be tested per ASHRAE Standard 52.2.
- Filter velocities should be kept below 500 feet per minute at maximum flow
- When selecting pleated filters, selecting a thicker filter will result in a lower pressure drop because of the increased pleat area which increases the effective filter area (Ex: A 2" deep filter will have a lower pressure drop than a 1" deep filter for a given filter size and air flow). Price recommends 2" pleated filters as they offer the best balance between cost and performance.
- If the filter pressure drop is not taken into account, then the fan may not be capable of achieving the desired flow as shown in the example below.
- Example:
  - FDV40, Fan Flow = 1500 CFM, External Static Pressure = 0.3" W.G. (1)
  - 2" MERV 8 or 13 Filter pressure drop @ design flow = 0.35" W.G. (2)
  - Fan is not capable of delivering 1500 CFM @ 0.65" W.G. of external static pressure. Fan will end up delivering 1450 CFM in the above scenario (3)

**FDV 40 Fan Curve (No Filter)**

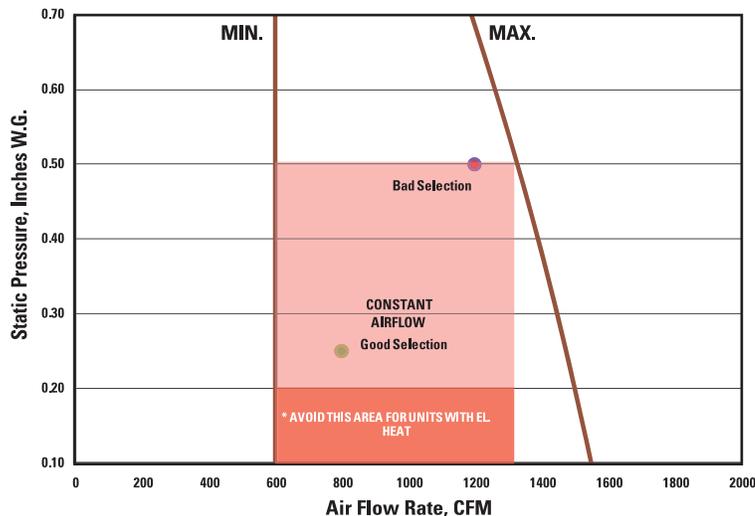




### Filter Loading

- All units are tested with clean filters and the pressure drop will increase steadily as the filter becomes loaded with dirt.
- Filters must be changed regularly to avoid reduced fan flow due to loaded filters.
- For optimal performance, FPTUs with pleated filters should be selected to operate in the low flow, low pressure area of the constant airflow range so that as the filter pressure increases, the EC motor can compensate and fan flows will not be diminished.

FDV 40 Fan Curve w/ MERV 8 Filter Boot



- If the dirty filter is left too long, the filter loading will cause the fan to operate outside the constant airflow range and the flow will begin to decrease.
- As the flow decreases, the downstream static pressure will also begin to drop. If the unit is equipped with electric heat, this could cause the heater to trip if the downstream static pressure falls below the minimum of 0.2" W.G. (\*) or the air flow decreases below the req'd 70 CFM/kW.

Best Regards,

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