

Simple Life Cycle Cost/Total Cost of Ownership for Air Filters

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Determining the total Life Cycle Cost of air filters in your building take into account 6 costs:

- 1) Filter cost
- 2) Energy Consumption
- 3) Disposal
- 4) Shipping
- 5) Storage
- 6) Labor

Most of these are easy to figure out, for filter cost and shipping you can look at the invoice from your supplier. Labor is determined by the amount of time multiplied by the hourly wage of your staff or yourself. Disposal and storage are generally only an issue if you have enough filters per change to warrant extra dumpsters or if you need to keep an extra set on hand because of supplier lead time issues.

That leaves the largest contributor to an air filters life cycle cost, *Energy Consumption*. The equation to determine this is as follows:

$$E = \left(\frac{Q \times \Delta P \times T}{\eta \times Co} \right) \times Pc$$

E	Energy
Q	Airflow CFM
ΔP	Average Pressure Drop (in inches w.c.)
T	Operation Time
η	Fan Efficiency
Co	Conversion Factor
Pc	Power Cost (\$/kwh)

EXAMPLE CALCULATIONS

For these examples we will assume we have an airhandler with 2 rows of (5) 24x24 filters, or 2 rows 120" long. The Average CFM will be 16,000 cfm which equates to a face velocity of 400fpm, with a fan efficiency of 68%. Operation time will be 10 hours a day for 5 days a week. Each Kilowatt hour will be figured at \$0.10

EXAMPLE 1 – The filters have an initial pressure drop of .30" w.c. and after 3 months in service the pressure drop doubles. Using those numbers we get:

$$[(16,000 \times .30 \times 600)/(.68 \times 8515)] \times .1 = \$49.74 \text{ in energy}$$

EXAMPLE 2 – Let's use the same filters, but they don't look completely packed full, so we allow the filter to stay in twice as long, but the pressure drop then goes up to 1" w.c. when we decide to replace it. Using those numbers we get:

$$[(16,000 \times .70 \times 1200)/(.68 \times 8515)] \times .1 = \$232.12 \text{ in energy}$$

These examples show that going by how a filter looks, versus using a piece of inexpensive equipment like a manometer or magnehelic pressure gauge, which may already be installed on your air handlers, can cost your school hundreds or thousands of dollars in energy every year.

Life Cycle Costing has become an important step in our push to use less energy and help become aware of the decisions we've made in the past in efforts to "save" money and will only become more important as our budgets continue to get tighter and tighter.



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