

Air Cleaner Selection

With the multitude of sizes and styles of air cleaners available from Donaldson, how do you choose the proper model that will reliably protect your engine and deliver maximum filter service life? Selection is based on two primary factors - airflow requirements of your engine and the environment the air cleaner will be operating in. Use our five-step selection method on the next few pages to make the right choice for your application:

1 Determine the combustion air requirements of the engine

For the most accurate engine airflow specifications, Donaldson recommends using the intake airflow rate specified by the engine manufacturer. If this information is not readily available, you can calculate your own numbers by using the preferred or alternative methods shown below. If the air cleaner may see excessive engine vibration, include a pulsation factor into your calculations.

Ideal Method Obtain from Engine Manufacturer

For the most accurate engine airflow specifications, Donaldson recommends using the intake airflow rate specified by the engine manufacturer. This information may be obtained from the manufacturer.

Preferred Method Engine Displacement Formula

4-Stroke (Cycle) Engine Formula

English Units

$$\text{Airflow (CFM)} = (\text{Engine Size (CID)} \times \text{RPM}) \times \text{VE} / 3456$$

Metric Units

$$\text{Airflow (m}^3\text{/min)} = (\text{Engine Size (Liters)} \times \text{RPM}) \times \text{VE} / 2000$$

VE = Volumetric Efficiency - 4-Stroke*

0.90 for naturally aspirated gas engine
0.90 for naturally aspirated diesel engine
1.60 for turbo charged diesel engine
1.85 for turbo charged after cooled diesel engine

2-Stroke (Cycle) Engine Formula

English Units

$$\text{Airflow (CFM)} = (\text{Engine Size (CID)} \times \text{RPM}) \times \text{VE} / 1728$$

Metric Units

$$\text{Airflow (m}^3\text{/min)} = (\text{Engine Size (Liters)} \times \text{RPM}) \times \text{VE} / 1000$$

VE = Volumetric Efficiency - 2-Stroke*

0.90 for naturally aspirated diesel engine
1.40 for scavenge blower diesel engine
1.90 for turbo charged diesel engine

Alternative Method Engine Horsepower Formula

English Units

$$\text{Airflow (CFM)} = \text{HP (SAE)} \times \text{SA}$$

SA = (Specific Airflow) per Horsepower

4-stroke naturally aspirated diesel engine - 2.0
4-stroke turbo charged diesel engine - 2.3
4-stroke turbo charged after cooled diesel engine - 2.3

2-stroke naturally aspirated diesel engine - 2.0
2-stroke scavenge blower diesel engine - 3.3
2-stroke turbo charged diesel engine - 3.6

Metric Units

$$\text{Airflow (m}^3\text{/min)} = \text{HP (SAE)} \times \text{SA}$$

SA = (Specific Airflow) per Horsepower

4-stroke naturally aspirated diesel engine - 0.057
4-stroke turbo charged diesel engine - 0.065
4-stroke turbo charged after cooled diesel engine - 0.065

2-stroke naturally aspirated diesel engine - 0.057
2-stroke scavenge blower diesel engine - 0.093
2-stroke turbo charged diesel engine - 0.102

The Pulsation Factor (PF)

On naturally aspirated** engines, intake airflow to the air cleaner can negatively affect the cubic displacement of the air into the engine. To compensate for the loss, we recommend you multiply the engine airflow by one of the following factors:

English Units

2.1 for 1 cyl.
1.5 for 2 cyl.
1.2 for 3 cyl.
1.0 for 4 or more cyl.

Metric Units

1,2 m3/min.

2 Determine the dust condition for the engine/machine and typical operating environment

For example, a standby hospital generator set would probably see light dust; whereas, a rock crusher would almost always be surrounded by an extremely heavy dust concentration of large dirt particles. Our air cleaner selection chart, on the next page, is a visual guide to select your vehicle type and operating environment.

* The VE values are guidelines. It is always best to use manufacturer ratings when they are available. Electronic controls on modern engines can raise VE ratings to 2.0 or greater.

** No airflow adjustment is required for turbo-charged engines on Donaldson air cleaners with high pulsation filter media (i.e., Donaldson DuraLite™ ECB, ECC, ECD air cleaners).