

NEW OR OLD, YOUR ENGINE NEEDS TO BREATHE

As all operators are aware, proper maintenance of equipment leads to longer useful life. They also recognize that this maintenance includes the entire piece of equipment, including subsystems such as the air and fuel system on the diesel engine.

Proper maintenance of the air system is essential to longer engine life. If not maintained at regular intervals, dust can enter an engine and cause extensive damage and even failure. Diesel engine manufacturers produced literature as early as the 1950's to help explain how dust ingestion impacts the life of an engine. As diesel technology has changed, the impact of dust on an engine remains the same. Engines could not tolerate dust 50 years ago, and they still cannot tolerate it today as upwards of 150 gallons of air/second passes through heavy duty diesel engines.

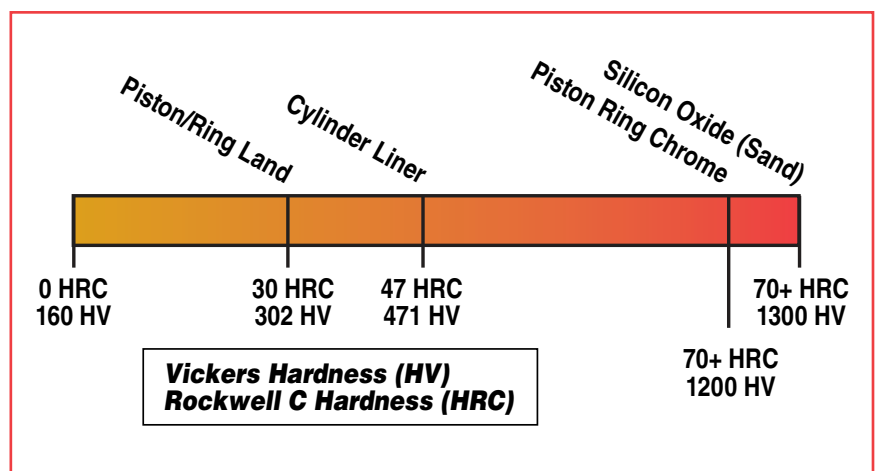
When it comes to providing an insight into the reasons and benefits for maintaining air and fuel system cleanliness, few companies are better qualified to talk on this subject than Cummins Inc. Unlike other engine manufacturers, Cummins is also a world leader in the design and manufacture of filtration products. Here, Cummins explains the causes of dusting and provides tips on how to avoid it.

WHAT IS A DUST OUT?

A dust out is the ingestion of hard particles into the engine that lead to rapid wear of the power cylinder components. The particles that enter the engine and accelerate ring and liner wear come in multiple forms, including: Silicon Oxide — sand or dirt particles or Aluminum Oxide — aluminum particles. Both of these particles are much harder than the power cylinder components (pistons, rings and liner). The dust particles can range in size from 2 microns to grains of sand, all the way up to small rocks; and as little as 2 oz of dust can severely impact expected engine life. This dirt or dust that is ingested into the engine does not leave out the exhaust, it is embedded into the softer components such as liners and piston ring lands.

The softer material, pistons and liners, allow the dust particles to become embedded and act as a carrier for the abrasive materials. When the abrasive material becomes embedded in the piston ring land, it begins to wear the bottom side of the piston ring creating ring wear, ring flutter and consequential breakage. This dust damage is magnified as an engine is operating at 1400 RPM's, the ring passes over the dust particle embedded in the liner 2800 times per minute.

The Chart below shows the hardness of sand or dirt particles as well as aluminum particles compared to the power cylinder components of an engine.



AIR SYSTEM COMPONENTS

Components that are affected by dust include the following:

- Air Filter Housing
- Air Filter
- Intake Piping (Suction and Pressure Side)
- Charge Air Cooler
- Turbocharger
- Engine Intake Manifold
- Cylinder Head
- Power Cylinder Components (Piston, Rings and Liners)
- Air Compressor

ROOT CAUSES OF “DUSTING”

Three things cause the “dusting”. First are incorrect maintenance procedures to clean your filters. The outer filter elements should only be cleaned/maintained per the machine OMM recommendation. The inner filter element can never be cleaned and can only be disturbed if it is being replaced. Furthermore, the air system should never be left open in unsatisfactory conditions. The second cause is assembly quality such as incorrect clamp torque, clamp placements, and pipe alignments. The last cause is incorrect equipment repairs including replaced parts due to maintenance.

MAINTENANCE

To avoid repeat dust-out failures clean the air filter housing with a damp cloth once the filter has been removed. Do not attempt to clean filters by hitting them against the tire. Complete the important daily intake system checks by looking for loose or missing clamps and checking the contact points between the intake system and other equipment components. Also look out for issues such as cracked pipes and filter minders when doing this check.

For more questions reference your Equipment manufacturer’s maintenance manual under air filter maintenance guidelines and understand your air filter change instructions as well as your intake system maintenance guidelines. Here you

will find helpful information such as your recommended cleaning frequency, clamp re-torque frequency, and maintenance item replacement frequency.

CLEANLINESS FOR FUEL SYSTEMS

Equally important to maintaining air filter cleanliness is the need to take maintenance precautions with the engine fuel system to ensure you attain the peak performance, reliability, and long life cycle you demand.

This also aides in meeting the stringent emissions regulations for which the engine is designed. New technologies, including fuel systems are more sensitive to debris than yesterday’s diesels due to these emission regulations and today’s horsepower and torque demands. Therefore it is imperative that an operator keep the fuel system, like the air system, clean.

Some fuel systems and their parts cannot be cleaned once contaminated. Therefore it is imperative to keep them clean by avoiding sources of contamination that may be introduced through the cleaning process, the repair environment, or on your own person.

Whenever you open up part of a fuel system for a repair or cleaning you are also opening

up the potential for contamination. Diesel fuel is a dust/dirt magnet, so keeping tools clean before each use is also important. If you are cleaning parts for your fuel system use lint free shop towels since cloth towels and paper towels can leave lint. Often the best cleaning job is done using chemicals only.

Another point that is often overlooked is the actual parts washer. While a parts washer is good for general parts, it is not recommended for use on fuel system parts due to poor filtration and poor drainage of the parts washer itself.

Prefilling your fuel filters, once considered a good maintenance practice, is also not required for today’s diesel engines and is another common way to contaminate your fuel system and cause damage to your engine. This contamination is often due to the quality of the fuel you are pouring from one container into the inside of the filter.

Information on maintaining air and fuel system cleanliness can be found in the equipment operation and maintenance manual. For additional information or advice, consult your equipment dealer.

