Fuel Contamination Control

Contamination Control Enhances Performance

Contamination control is increasingly important for maximizing performance and service life in fuel systems. Some Cat® fuel systems exceed pressures of 30,000 psi in order to deliver more horsepower, better fuel economy and fewer emissions. This necessitates tolerances smaller than five microns between parts. These tolerances and injection pressures make fuel systems more vulnerable to wear and abrasion.

- **Injector Nozzles—** Contaminants move quickly in high-pressure systems, causing damage, eroding orifices and resulting in incomplete atomization of fuel and overfueling. This harms performance and fuel economy. It also results in hard starts and increased emissions. Larger contaminants can actually clog orifices.
- **Injector Plungers and Barrels—**Abrasive particles cause wear between an injector's plunger and barrel. Contaminants scuff metal surfaces, causing metal-to-metal contact and eventual injector seizure.
- **Control Valves—**Contaminants damage valves that control fuel pressures, eroding mating parts of the valves. This excessive wear causes leaks and eventual loss of engine power.

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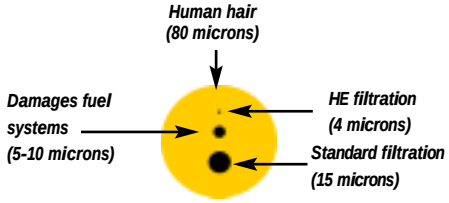


Size of Contamination

A particle five microns across can damage fuel systems. A micron is one-millionth of a meter. To give you an idea of how small that is, an average human hair is 80 microns in diameter. Tolerances in Cat fuel injectors are 1/1,000th the diameter of a human hair. It's easy to understand how even small contaminants can damage today's fuel systems.

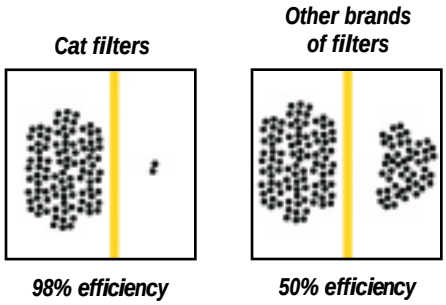
Sources of Contamination

- **In the Fuel—**Contaminants can enter during storage or transportation of fuel. A reliable supplier, filtered dispensing and periodic sampling and testing assures consistent quality.
- **During Operation—**Airborne particles can be drawn into your fuel tank through the vent tube. A fuel tank vent can ingest dust when it is not properly sealed.
- **External—**Contamination can enter during maintenance and service, even when changing filters.

Filtering Contamination

The precision components in today's fuel systems require specially designed fuel filters. Cat Advanced Efficiency Fuel Filters use exclusively designed filtration media to remove more than 98% of particles, four microns in size and larger. Cat Advanced Efficiency Fuel Filters feature:

- spiral roving and acrylic beads to maintain pleat stability and spacing to better trap and hold contaminants
- non-metallic center tube for strength and to prevent metal contamination



Standard 15 Micron Absolute Part Number	Typical Engine Application	Advanced Efficiency 4 Micron Absolute Part Number
1R-1712	3126B, 3176 3176B, 3176C 3196, 3304 3304B, 3306 3306B, 3406 3406B, 3406C 3406E, 3408E 3412D, 3412E 3456, C-9, C-10 C11,C-12, C-13 C-15	1R-0749
1R-1725 (Cartridge)*	3508, 3508B 3508C, 3512 3512B, 3516 3516B, 3524B	1R-0755 (Spin On) 1R-0756 (Cartridge)*
1R-1740	3114, 3116 3208, 3304 3304B, 3306 3306B, 3306C	1R-0750
None	3114, 3116 3126, 3126E C-7, C9	1R-0751
None	3116, 3126	1R-0753
None	3126B, 3456B 3456E, C-9 C-10, C-12	1R-0762
None	3606, 3608 3612, 3616 3618	1R-0766 (Cartridge)*

*Gen Sets/Industrial
Refer to your Operation and Maintenance Manual to find the correct part number for your application. Most applications require that an Advanced Efficiency filter be used.

Measuring Contamination

Contamination is measured by counting particles and reported by comparing those results to an International Standards Organization (ISO) code. ISO codes contain two numbers. The first refers to the number of five-micron and larger particles in a one-milliliter sample. The second number indicates the quantity of 15-micron and larger particles in the same sample.

An ISO 21/17 rating means a one-milliliter sample contains 221, or about two-million particles five microns and larger, and 217, or 130,000 particles 15 microns and larger. A 55-gallon barrel of fuel with a 21/17 rating would have a half-teaspoon of fine dust. That is not clean enough for today's machine systems and components.

Cleaner fuel maximizes performance and service life of Cat fuel systems.

For more information, see us today or visit our Web site at www.cat.com

CATERPILLAR®

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