

KLEENOIL

KLEENOIL

Kleenoil Onboard Oil Recycling Systems

Go GREEN! - Keep it KLEEN

KLEENOIL 

Kleenoil Bypass Filtration System



Resource Responsibility



We are committed to helping you reduce your OTR truck oil usage up to 80%



Economic Profitability

Fewer oil changes
and reducing wear in
engines yields
revenue in areas
often overlooked



Social Accountability

Less consumable oil
used equals a
smaller carbon
footprint and a
cleaner environment



Select Kleenoil USA Inc. Customers



Kleenoil Bypass Filtration History / Concept

Is the Kleenoil Bypass Filter an established and tested technology?

- Kleenoil Filtration has been in business for over 30 years
- In almost every country in the world.
- Bypass filtration has been around 70 years.
- US Armed Forces used bypass filtration in WWII to save oil.
- Today's improved technology has greatly improved bypass filtration.

How do Kleenoil Bypass Filters differ from the standard main flow, OEM Filters?

- Full flow filters are designed not to work!
- Full flow oil filters cannot be restrictive, only filter 25 to 40 microns.
- Engine tolerances are between 3 and 20 microns.
- Oil particles between 20 and 3 microns create engine wear.
- This is the reason why you currently change your oil.
- Fluid Power Institute, at Milwaukee School of Engineering, says the particles from 3 - 20 microns responsible for up to 60% of engine wear.
- Filtering oil to 1 micron or below, oil would stay clean.
- Exactly what the Kleenoil Bypass Filter does.
- Process not possible full flow; Kleenoil does in bypass loop
- Uses a cellulose filter medium; filters to 1 micron, also filters 99.95% water
- Eliminates possibility of corrosion and hydro cracking.
- Water contamination can cut bearing life by as much as 80%.

Features and Benefits

✓ Eliminates Water and Particles

Water will always be present because of the heating and cooling of components in an engine. Diesel fuel used as the source of combustion contains sulfur. Small amounts of fuel will pass by the piston rings and end up in the oil. The sulfur will mix with the water resulting in sulfuric acids. Using the Kleenoil Filtration System will remove all water down to less than 0.05%, reducing the formation of sulfuric acid that will cause accelerated wear to engine components.

✓ Removes Dirt and Contaminants

Dirt and wear metals will always be present in Hydraulic and Engine oil. The reasons that most fluid changes are done is to get rid of the dirt and contaminants. Conventional fluid filtration components will filter the fluid down to approximately 25 - 40 micron in size. Accelerated wear and damage occurs somewhere around 3 - 6 micron. Using the Kleenoil Filtration System you will filter the fluid down to 1-micron (3 absolute) in size reducing the chance of wear and ultimately reducing the number of engine failures and rebuilds that would have needed to be performed during the life of the unit.

Features and Benefits

✓ Doesn't Remove Desirable Elements

Certain components are purposely placed in lubrication oil to make it effective. Some of the additives include dispersants, detergents, oxidation and rust inhibitors, pour-point depressants, metal deactivators, and anti-foaming and gelling agents. While the Kleenoil Filtration System is removing dirt, contaminants, wear metal particles and water; it is not removing the oil additives needed for continued use.

✓ Extends Drain Intervals

Because of the reasons mentioned above, oil can be run longer as it is kept clean, free of water and still maintain its additive package. Proper oil analysis will indicate the life of the oil but on average the drain is extended up to 10 times what it would be without the Kleenoil Filtration System.

Features and Benefits

✓ Reduces Time Needed for Service

Changing the Kleenoil Filtration Cartridge requires much less time than what is required to perform a conventional full fluid change. Simply remove the lid from the container, remove the old cartridge and install the new cartridge and seal. All this can be performed in less than 10 minutes and without the worry of spilling oil and disposing of contaminated fluids.

✓ Continuous Protection Provided

The Kleenoil Filtration System is installed to filter the fluid whenever there is oil pressure. Once the engine or the hydraulic pump is activated and there is fluid pressure, the fluid is continuously passing through the densely wound filter cartridge. The cartridge is wound with pure coniferous long fiber wood pulp paper. This design allows the water to be extracted from the fluid and still allows the larger oil molecules to pass through unchanged. The dirt and wear particles are trapped in the filter giving you a continuous self-contained recycling system.

Features and Benefits

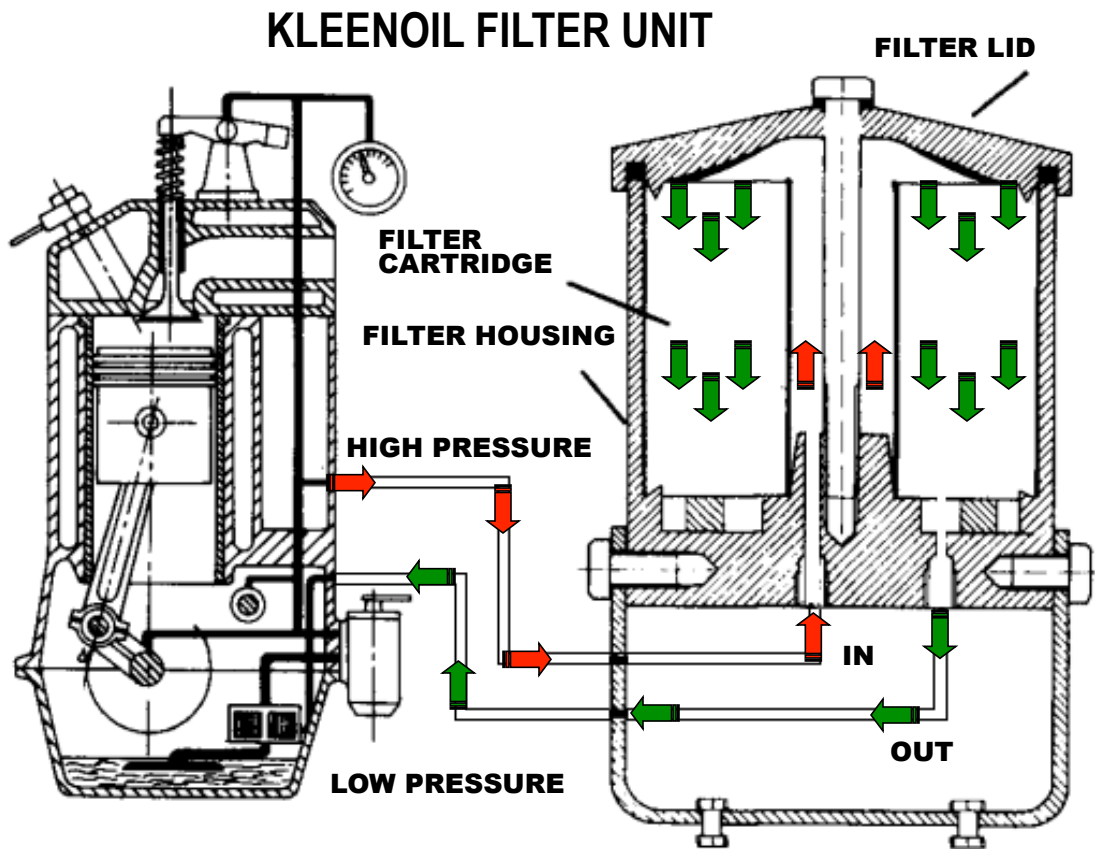
✓ Good for the Environment

Because the fluid is being recycled inside of its own application, longer drain intervals can be realized. Oil is a finite resource that one-day will run out. Keeping the fluid running longer reduces the amount of oil you will have to purchase throughout the now extended life of the unit.

Disposing of the used contaminated oil also creates a risk to the environment. Proper disposal methods are needed to safeguard the environment for our children. Reducing the amount of fluid that has to be disposed of is one way of reducing the impact on the already taxed environment.

Whenever a full fluid change is required to be done there is always a risk of spills and ground contamination. Reducing the number of full drains reduce this risk dramatically.

How Bypass Filtration Works



- The Kleenoil bypass filter diverts a small percentage of the normal oil flow then directs it through a bypass loop.
- As it passes through the bypass filter, and before it returns to the normal flow, abrasive particles such as carbon, soot, wear metals and silicon (dirt) down to one micron size are removed, along with all water.
- The cleaned oil is then returned to the normal flow effectively in its original new condition.
- By removing these impurities as they occur, the Kleenoil bypass filter prevents the buildup of acid and particulates and maintains the oil within its operating specification.

Thus your engine oil lasts between 4 - 5 times longer than it used to under certain conditions and hydraulic up to ten times longer: you only need to change it one fifth as often as you did before. By removing the two items which directly and indirectly cause damage, the engine life is dramatically extended.

Extended Drain Intervals

Will extending oil drain intervals void engine manufacturers' warranties? **No.** While it is a common concern, it is not true. An engine warranty covers defects in material or workmanship only. This cannot be voided. Manufacturers often provide suggested drain intervals for their engines, but since there are so many variables, these suggested drain intervals are only guidelines. Are the engine manufacturers interested in how much oil you use a year, or running your engine on clean oil? The bottom line is, if through *oil analysis*, you can show that your oil is within specification, you cannot legally be held responsible for an equipment failure simply based on the number of miles or hours on the oil.

How long can oil drain intervals be extended? Kleenoil's conservative recommendation for extending the oil change interval in a diesel engine, is 4 - 5 times your normal base interval. However, the best answer is to let the *oil analysis* tell you when to drain.

Does oil wear out? The US Government states in the Bureau Standards Bulletin number 86, that **NO**, "Oil does not wear out, it simply gets dirty or contaminated".

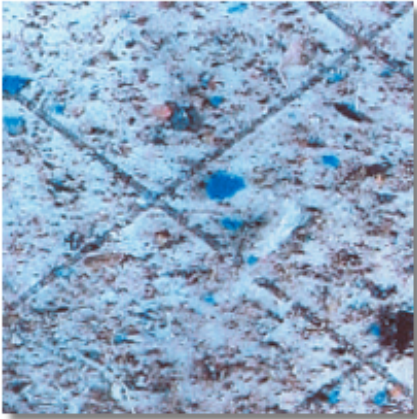
What does the term "Oil breakdown" mean? The technical term for it is degradation. Oil degradation can be recognized by an increase in viscosity and a decrease in TBN. It is caused by contamination with water, combustion by-products and acids. Viscosity can also be increased by the introduction of soot and dirt. The Kleenoil USA filtration system removes soot and dirt down to 1 micron in particle size and 100% of normal water contamination. This eliminates the formation of acids. Thus the viscosity and TBN levels are maintained within specification therefore degradation or "oil breakdown" is virtually eliminated.

Will heat cause degradation or "oil breakdown"? Not in a normal operating engine. The CF-4 oils were formulated for increased thermal stability. Normal engine temperatures rarely exceed 260 degrees F. This is many degrees lower than would be necessary to cause degradation.

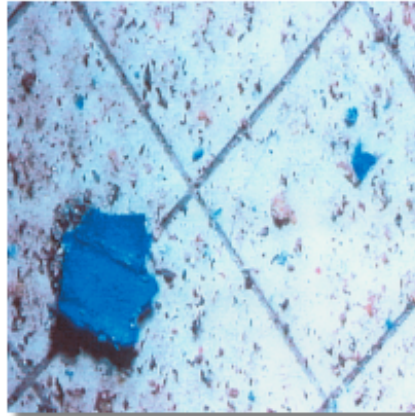
Kleenoil Reduces Engine Wear

The Kleenoil BY-PASS Filtration System will remove dirt particles down to 1 micron and totally remove water. The particles normally present in oil, which will not be removed by the standard, full-flow filter, can be as much as 40 microns. The film of oil between two moving parts under load is normally 3 microns, so a wide range of particles will bridge this film, causing metal to metal contact, resulting in friction, heat, and wear.

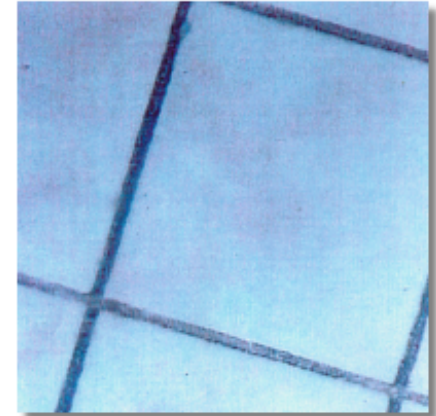
The Kleenoil Cartridge will Ensure No Particles Above 1 Micron Nominal (3 Absolute)!



Sample #1 The first photo shown here is a sample of oil taken from a power steering unit of a large commercial scraper at time of refurbishment.



Sample #2 The second photo shown here is a sample of oil taken from a test unit with 10 micron filtration.



Sample #3 The third photo shown here is a sample taken from the same source as Sample #1 after passing through the Kleenoil BY-PASS Filtration System.

Kleenoil Reduces Engine Wear



IDENTICAL BEARINGS FROM A CAT 3406C THAT WAS HAULING A TANDEM MILK TRUCK TRAILER. IN THE PAST, THE BEARING ON THE LEFT HAD TO BE REGULARLY CHANGED DUE TO THE STRAIN ON THE MOTOR FROM THE LIQUID LOAD SHIFTING BACK AND FORTH DURING MOVEMENT. THE BEARING ON THE RIGHT CAME FROM THE SAME TRUCK THAT NOW HAS OVER 1,000,000 MILES ON IT AFTER HAVING THE KLENOIL SYSTEM INSTALLED.

There is no scratching due to abrasive particles, or pitting and corrosion due to acid. At such a rate, the bearings will be functional for double or triple the normal lifetime. Bearing with same amount of miles in an engine without the Kleenoil BY-PASS Filtration System installed.

Life Extension of Equipment Components

ISO 4406 Particle Counts

	ISO Code	Particles per 1 ml > 6 Micron in Size	Particles per 1 ml > 14 Micron in Size
Used Oil	21/18	10,000 - 20,000	1280 - 2560
	21/17	10,000 - 20,000	640 - 1280
	21/16	10,000 - 20,000	320 - 640
	21/15	10,000 - 20,000	160 - 320
	20/17	5000 - 10,000	640 - 1280
	20/16	5000 - 10,000	320 - 640
	20/15	5000 - 10,000	160 - 320
	20/14	5000 - 10,000	80 - 160
	19/16	2500 - 5000	320 - 640
	19/15	2500 - 5000	160 - 320
New Oil	19/14	2500 - 5000	80 - 160
	19/13	2500 - 5000	40 - 80
	18/15	1300 - 2500	160 - 320
	18/14	1300 - 2500	80 - 160
	18/13	1300 - 2500	40 - 80
	18/12	1300 - 2500	20 - 40
	17/14	640 - 1300	80 - 160
	17/13	640 - 1300	40 - 80
	17/12	640 - 1300	20 - 40
	17/11	640 - 1300	10 - 20
Kleenoil Range	16/13	320 - 640	40 - 80
	16/12	320 - 640	20 - 40
	16/11	320 - 640	10 - 20
	16/10	320 - 640	5 - 10
	15/12	160 - 320	20 - 40
	15/11	160 - 320	10 - 20
	15/10	160 - 320	5 - 10
	14/11	80 - 160	10 - 20
14/10	80 - 160	5 - 10	

Component Life Extension AFTER Kleenoil - New Cleanliness Level (ISO CODE)

Component Life BEFORE Kleenoil - Old Cleanliness Level (ISO CODE)

	20/17	19/16	18/15	17/14	16/13	15/12	14/11	13/10	12/9	11/8	10/7
26/23	5 3	7 3.5	9 4	>10 5	>10 6	>10 7.5	>10 9	>10 >10	>10 >10	>10 >10	>10 >10
25/22	4 2.5	5 3	7 3.5	9 4	>10 5	>10 6	>10 7	>10 9	>10 >10	>10 >10	>10 >10
24/21	3 2	3.5 2.5	4.5 3	5 3.5	6.5 4	8 5	9 6	10 7.5	>10 9	>10 >10	>10 >10
23/20	2 1.5	3 2	4 2.5	5 3	6.5 4	7.5 5	8.5 6	9.5 7	>10 8	>10 10	>10 >10
22/19	1.7 1.3	2.3 1.5	3 2	3.7 2.5	5 3	6 3.5	7 4	8 5	10 6.5	>10 8.5	>10 10
21/18	1.6 1.3	2 1.6	3 2	4 2.5	5 3	7 3.5	8 4	>10 5	>10 6	>10 7	>10 >10
20/17	1.4 1.1	1.8 1.3	2.3 1.7	3 2	3.5 2.5	4.5 3	5.5 3.5	7 4	8 5	10 5.5	>10 8.5
19/16	1.3 1.2	1.5 1.5	2 1.7	3 2	4 2.5	5 3	7 3.5	9 4	>10 5	>10 7	>10 >10
18/15	1.2 1.1	1.5 1.3	1.8 1.4	2.2 1.6	3 2	3.5 2.5	4.5 3	5 3.5	7 4	9 5.5	10 8
17/14		1.3 1.2	1.6 1.5	2 1.7	3 2	4 2.5	5 3	7 4	9 5	>10 7	>10 9
16/13		1.2 1.05	1.5 1.3	1.8 1.4	2.3 1.7	3 2	3.5 2.5	5 3	6 4	8 5.5	10 7
15/12			1.3 1.2	1.6 1.5	2 1.7	3 2	4 2.5	5 3	7 4	9 6	>10 8
14/11			1.2 1.1	1.5 1.3	1.8 1.5	2.2 1.7	3 2	3.5 2.5	5 3.5	7 4.5	9 6
13/10				1.3 1.2	1.6 1.5	2 1.7	3 2	4 2.5	5 3	7 4.5	>10 6
				1.2 1.1	1.5 1.3	1.8 1.5	2.3 1.7	3 2	3.5 2.5	5.5 3.7	8 5
					1.3 1.2	1.6 1.5	2 1.7	3 2	4 2.5	6 3	8 5
					1.2 1.1	1.5 1.3	1.8 1.5	2.3 1.7	3 2	4 2.5	6 3.5
						1.3 1.2	1.6 1.5	2 1.7	3 2	4 3.5	6 4
						1.2 1.1	1.5 1.3	1.8 1.5	2.3 1.8	3.7 3	4.5 3.5
							1.3 1.2	1.6 1.5	2 1.7	3 2	4 2.5
							1.2 1.1	1.5 1.4	1.8 1.5	2.3 1.8	3 2.2
								1.3 1.3	1.6 1.6	2 1.8	3 2
								1.3 1.2	1.6 1.4	1.9 1.5	2.3 1.8
									1.4 1.2	1.8 1.5	2.5 1.8
									1.2 1.1	1.6 1.3	2 1.6

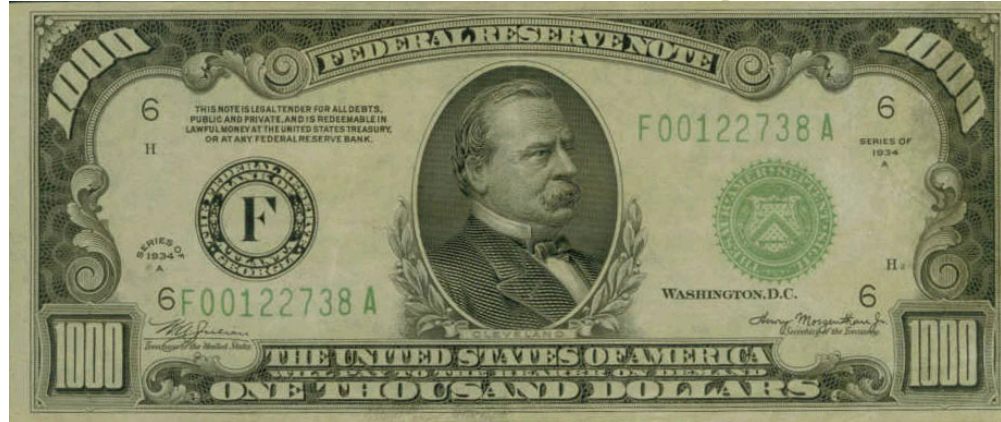
Hydraulics and Diesel Engines

Rolling Element Bearings

Journal Bearings and Turbo Machinery

Gear Boxes and Other

Kleenoil Provides Immediate Cost Savings



For trucks with pan capacities of up to 11 gallons the cost of a Kleenoil bypass filter is \$695.

With immediate savings of around \$1,000 per year the cost of the unit is written off in about six or seven months. Bypass filter cartridge replacements, changed at the old oil change frequency, will cost around \$33 each. Other units are available for heavy equipment and also for small trucks.

Environmental Concerns



The Kleenoil bypass filtration system is a major friend of the environment. It naturally encourages the conservation of our earth's resources. With the current and impending laws on the use and disposal of oil, Kleenoil offers a way to protect not only the environment, but also the user. This is particularly true for unnecessary consumption and disposal costs.

Is the decision to extend oil drain intervals a maintenance issue only?

No. Extended oil drain intervals are not strictly a maintenance concern. Environmental issues and costs are also pertinent.

What is the cost of disposing of used oil?

The cost of used oil disposal with less than 5% water may be 5 -10 cents per gallon. If it contains more than 5% water, then the cost can rise to 10 - 25 cents per gallon. This is 25% of its original value when new. Projected estimates suggest that the disposal cost of non contaminated used oil, could equate to the value of new oil within the next 2 to 5 years.

Volvo Letter

VOLVO

Gentlemen,

The filtration method I would recommend for machine L180E, serial # 9009, is more commonly called by-pass filtration. This system is fitted into a lower flow portion of the hydraulic circuit i.e. servo or cooler return, and filters the oil over a longer time frame but to a finer level.

During this filtration period the machine can be operated as normal and, in fact, the more functions that are operated the cleaner the system hydraulic oil becomes. This method has no effect on machine operation and requires no external power or pumps.

Here are some links to sites that sell/service bypass systems.

<http://www.kleenoilusa.com/>

As we discussed, anyone who owns, rents or uses Volvo equipment can use the contact information below. I would prefer any other equipment owners/users to use:
jhemmings11@comcast.net

Best regards,

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Asheville, North Carolina 28803

E mail james.hemmings@volvo.com

Tel 828-650-2083

Mob 828-230-4838

Fax 425-675-5968

Kleenoil Lifetime Warranty

Original equipment warranties are unaffected by the installation of a Kleenoil Onboard Oil Recycling System.

Kleenoil USA Inc. Onboard Oil Recycling Systems - bypass filtration systems (excluding hoses and fittings) **carry a lifetime warranty.**

Kleenoil USA Inc. warrants the Kleenoil filter housing and brackets to the original purchaser for life.

Adaptors, hose ends, and hosing will all carry the normal warranty of the original supplier of those parts.

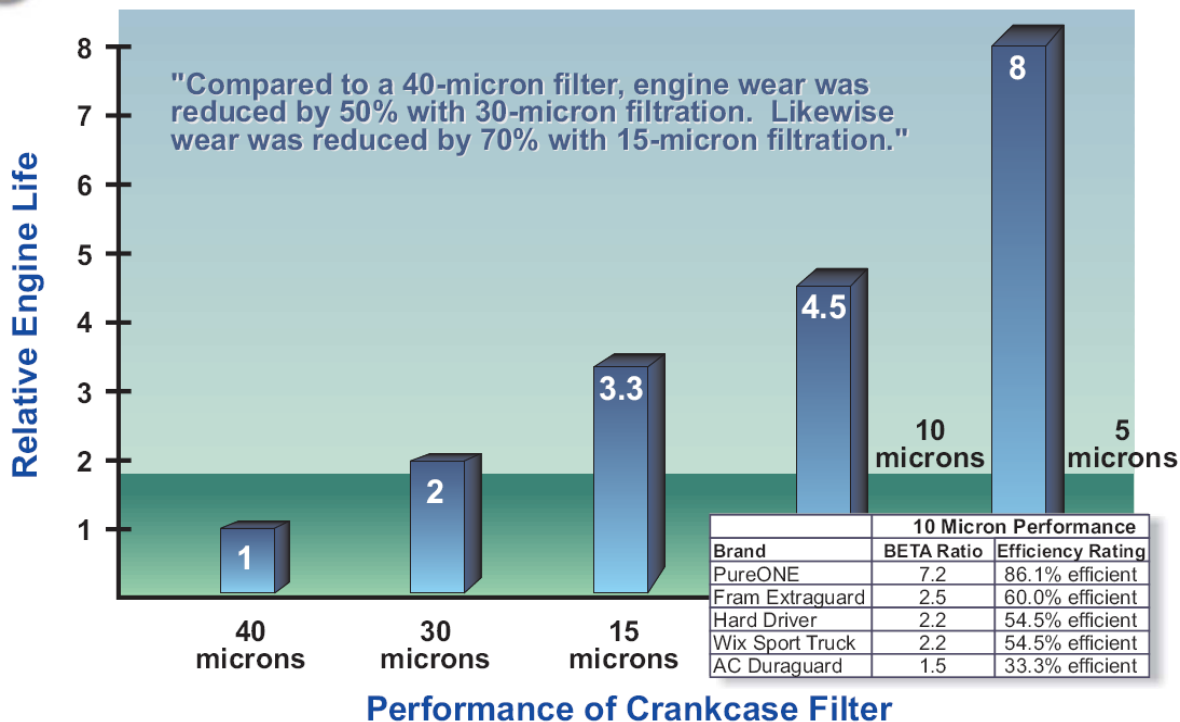
The Kleenoil Lifetime Warranty does not cover any damages caused by you or due to external causes, including any act of God, natural disaster, accident, flood, war, sabotage, terrorism, military actions, or problems with the engine, e.g., failure to maintain the engine in accordance with its documentation (other than manufactures recommended oil changes).



General Motors Case Study - Noria



Case Study: General Motors



Kleenoil Advantages Over Competition

- ✓ **Single Canister Design** - The Kleenoil Onboard Oil Recycling System only requires a single canister to function. All water removal is done inside the cartridge so it does not require a separate canister to evaporate water from the oil.
- ✓ **Multi-Bolt Lid Design** - This design assures a complete seal around the top of the canister, eliminates leaks that can form around the edge. The KU85, KU65, and KU50 all have either 3 or 4 bolt lids.
- ✓ **Large Surface Area Filter** - A larger surface area on the filter cartridge allows for dirt and wear particles to be trapped in the filter, creating a continuous, self-contained recycling system.
- ✓ **2-Stage Filtration (KU85)** - The filter cartridge has an additional disc at the bottom to capture 1-micron particles that may pass through the first stage of the filter.
- ✓ **No Electrical Hookup** - The Kleenoil Filter Cartridge removes 99.95% of all moisture through absorption into the cellulose media. This is done without tying into the electrical system thereby avoiding the potential for costly repairs.
- ✓ **Simple Installation** - The Kleenoil Filter System can be installed in less than 1 hour.
- ✓ **No Internal Moving Parts** - The Kleenoil Filter System utilizes the oil pressure of the engine. There are not any mechanical moving parts to wear down, break or malfunction.
- ✓ **Lifetime Warranty** - Kleenoil USA warranties the Kleenoil filter housing and brackets to the original purchaser for life.
- ✓ **30 Year Proven Track Record** - Kleenoil's design has been proven in the global marketplace spanning over 30 years and hundreds of thousands of applications.

Municipal Installations in the United States and Canada

- City of Houston, Texas
- City of Albuquerque, New Mexico
- City of Honolulu, Hawaii
- City of Artesia, New Mexico
- City of Carlsbad, New Mexico
- City of Las Cruces, New Mexico
- City of Ruidoso, New Mexico
- Ottawa International Airport
- Mississauga Transit, Canada
- City of Hamilton, Ontario, Canada

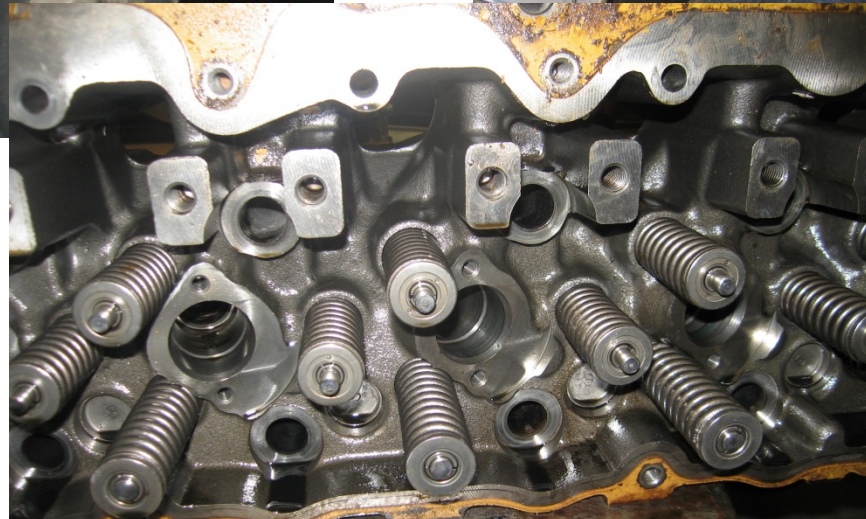
City of Houston, Texas



City of Artesia, New Mexico



City of Carlsbad, New Mexico



City of Las Cruces, New Mexico



City of Ruidoso, New Mexico



Ottawa International Airport



Mississauga Transit, Canada



City of Hamilton, Ontario, Canada



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*“Make **Green** the new color of your bottom line!”*

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