Oil Filter Comparison: Filter Fodder

Are You Killing Your Engine With A Crappy Filter?

By Harry Wagner

Oil filtration might not be as sexy a topic as locking differentials or coilover shocks, but clean oil is the lifeblood of your engine. You may think that your oil filter is not that important, but this small, inexpensive part is far from trivial. It plays a vital role in protecting your engine from premature wear by cleaning the oil as it passes through the filter element. Each moving part in the engine requires uncontaminated oil for proper lubrication and long life.

A good filter has a strong canister that can withstand high oil pressure when the engine is cold, an anti-drainback valve that keeps dirty oil from returning to the engine without creating too much backpressure, a pressure-relief valve that doesn't leak under low pressure, and a filtering element that can withstand boiling-hot oil without falling apart. The filter element also has to be able to trap small particles without restricting flow, and do it for thousands of miles. Doesn't sound so trivial now, does it?

The Players

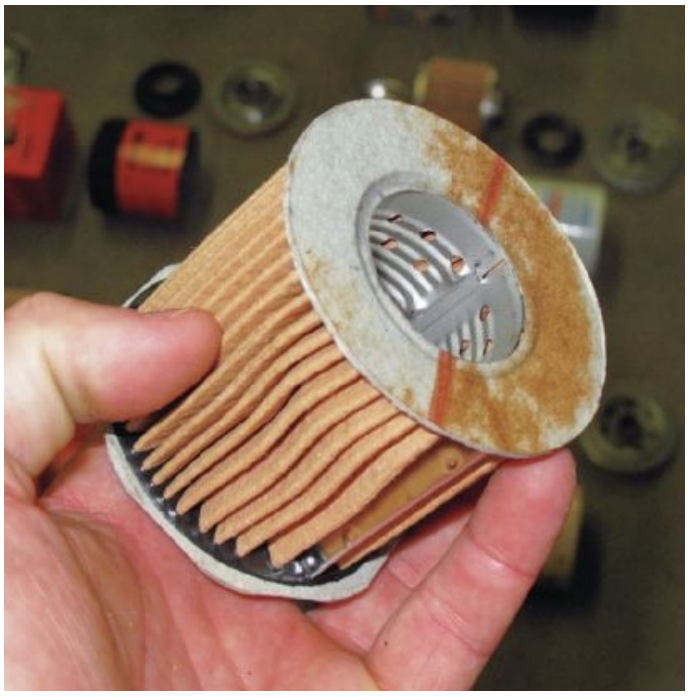
We rounded up as many filters as we could find and hacked them apart and destroyed them, all in the name of science. While these filters are all designed for the Toyota 22R engine, the same premise applies to everything from the venerable small-block Chevy to a Power Stroke diesel. The objective was to find what is hidden inside that metal housing, away from prying eyes. Do the higher-priced filters really offer better protection? Are they all the same on the inside? These were just some of the questions we hoped to answer.

We visited five different parts stores and rounded up sixteen oil filters ranging in price from $2.99 to $13.99. Brands include AC Delco, Bosch, Fram, K&N, Mobil 1, Napa, Pennzoil, Purolator, STP, Super Tech, and genuine Toyota, with some brands offering multiple filters with different prices and features. This test was by no means all inclusive; there are plenty of other brands of filters out there. Our testing suggests that most of these other filters are "house brands" that are rebadged Fram, Wix, or Purolator filters. Visually, the filters fit into two categories: large canister and small canister. The K&N, Mobil 1, STP, and Toyota filters were all physically larger than the others. All else being equal, a larger filter provides room for more filtering media, which means that your oil filter will trap more contaminants before becoming clogged. The larger physical size may be a detriment though where tight fitment is a concern around exhaust, steering, and suspension components.

The Parts
An oil filter is comprised of several parts. The outer canister, O-ring, and oil passages are all visible. Within the canister are the filter element, end caps, core, pressure relief valve, and anti-drainback valve.

Filter Element
There are a lot of qualities that make a good filter element including pore size, material composition, and amount of media. Synthetic media tends to have a more uniform porosity than cellulose (paper) media. Many filters use a combination of cellulose, fiberglass, and cotton media. If the pores are too small, they will become clogged quickly and inhibit flow. However, if they are too large they will do a poor job of filtration. Most filters trap particles down to approximately 40 microns in size, which are just under 0.002-inch. Compare this to the clearances between bearings, rings, and pistons and it is clear that you do not want particles larger than this travelling through your engine.

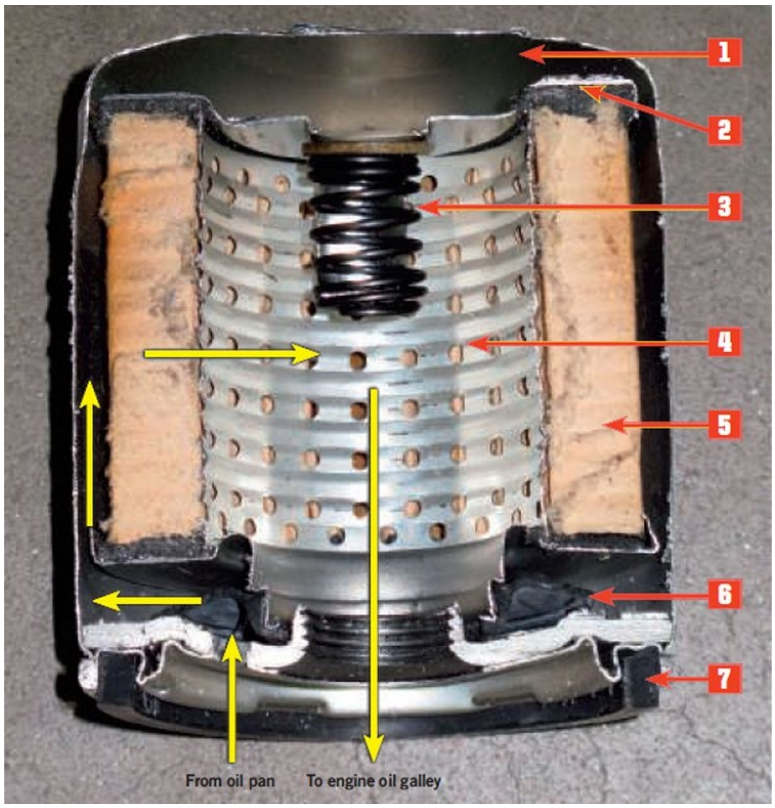
Unfortunately, since our microscope was down for repairs the only parameter we could really quantify was the amount of media. The size of the filter element was obviously a factor, but so were the number of pleats and depth of the pleats. Just as axleshafts with more splines are stronger than those with less splines (even with the same diameter), filters with more pleats provide more surface area than filters with less pleats.



End Caps and Core
The filter media is wrapped around the core and housed within the end caps. Both the core and end caps are typically constructed from stamped steel. Some manufacturers reduce costs by using plastic cores and paper or cloth end caps. These companies claim that the laminated coating provides integrity to the end caps, but there are reports of the cardboard or cloth becoming saturated with oil and disintegrating, travelling through the lubrication system of your engine. The more/larger holes in the core, the more oil can freely flow through the filter to the engine. The downside is if there is too little material in the core, the filter media can delaminate and in extreme instances the core can even collapse under high pressure.

Pressure Relief Valve
The pressure relief valve is also sometimes referred to as the bypass valve. This generally consists of a metal or plastic valve at one end of the filter element with a spring that can be overcome by pressure. As the name implies, it causes the oil to bypass the filter element if the filter becomes plugged or the oil is so thick (such as start-ups in cold temperatures) that there is significant backpressure from the filter. Dirty or thick oil is not great for your engine's internal components, but it is still far better than no oil at all.

Anti-Drainback Valve
The anti-drainback valve is a nitrile or silicone diaphragm that sits at the base of the filter. Silicone lasts longer and is less susceptible to changes in temperature, but it also costs more money to produce. Pressure from the oil pump allows oil to overcome this valve, but when the engine is shut off it plays the critical role in ensuring that all debris stays in the oil filter and does not drain back into your oil pan.



Pressurized oil travels up from the pan and passes through the filter media before travel

The Results

Sorry, Four Wheeler isn't going to tell you which filter to go out and buy. Instead we would rather present you with all of the information that we have collected and let you draw your own conclusions, so the next time you head to the parts store to buy an oil filter for your pride and joy, you can make an informed decision about this small but critical component.

Brand	Model	Model #	Height (inches)	Canister Outside Diameter (inches)	Filter Media (Type)	Height	Filter Media (square inches)	Center Core	End Caps	Anti-Drainback Valve	Pressure Relief Valve	Retail Price	Observations
AC Delco	Duraguard	PF53	3.06	2.95	Cellulose	2.15	133.3	Plastic	Paper	Nitrile	None	$4.49	Appears to be the same as the Super Tech filter
Bosch	Premium	3330	3.35	3	Cellulose	2.375	133	Perforated Metal	Metal	Silicone	Metal	$6.59	Appears to be rebadged Purolator filter
Fram	ExtraGuard	PH3614	3.35	3	Cellulose	2.375	106.875	Perforated Metal	Paper	Nitrile	Plastic	$4.49	
Fram	HighMileage	HM3614	3.35	3	Cellulose	2.375	106.875	Perforated Metal	Paper	Nitrile	Plastic	$7.99	Appears to be the same as ExtraGuard, except with Teflon gel
Fram	ToughGuard	TG3614	3.35	3	Synthetic Glass & Cellulose	2.375	123.5	Perforated Metal	Paper	Silicone	Plastic	$6.99	Screen over bypass valve
K&N	Performance Gold	HP-2004	3.8*	3.65	Resin-impregnated Cellulose	2.5*	225	Perforated Metal	Metal	Silicone	Metal	$11.99	Appears to be same as Mobil1 *Height does not include 1" Nut welded to top
Mobil1	Extended Performance	M1-204	3.8	3.65	Sythetic & Natural Fiber Blend	2.5	225	Perforated Metal	Metal	Silicone	Metal	$10.99	Appears to be the same as K&N
Napa	ProSelect	21348	3.4	2.95	T-83 Composite Cellulose	2.188	109.375	Perforated Metal	Metal	Nitrile	Metal	$2.99	
Napa	Spin-Flow	91348	3.4	2.95	T-52 Synthetic Cellulose	2.188	109.375	Perforated Metal	Metal	Nitrile	Metal	$3.99	Appears to be the same as ProSelect, except Spin Flow attachment
Napa	Gold	1348	3.4	2.95	T-03 Glass Enhanced Cellulose	2.188	131.25	Perforated Metal	Metal	Silicone	Metal	$6.49	
Pennzoil		PZ-21	3.35	3	Cellulose	2.375	133	Perforated Metal	Metal	Silicone	Metal	$3.49	Appears to be rebadged Purolator filter
Purolator	PremiumPLUS	L10241	3.35	3	Cellulose	2.375	133	Perforated Metal	Metal	Silicone	Metal	$8.59	
Purolator	PureONE	PL10241	3.35	3	Multi-Fiber Cellulose	2.375	133	Perforated Metal	Metal	Silicone	Metal	$13.99	
STP		S16	3.15	3.6	Micronic Cellulose	2.188	181.563	Plastic	Paper	Nitrile	None	$3.49	
Super Tech		ST3614	3.06	2.95	Cellulose	2.15	133.3	Plastic	Paper	Nitrile	None	$2.99	Appears to be the same as the AC Delco filter
Toyota		15600-25010	3.9	3.7	Cellulose	2.75	206.25	Perforated Metal	Metal	Nitrile	Metal	$4.99	Sealed surface from the manufacturer, metal spring behind anti-drain back valve

SOURCES

Toyota
19001 S. Western Ave
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ACDelco
6200 Grand Pointe Drive
PO Box 6020
Grand Blanc MI 48439
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http://www.acdelco.com/

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www.fram.com

Kluhsman Racing Components
800-814-5745
www.krcracing.com

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Pennzoil
800-237-8645
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800-526-4250
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1455 Citrus Street
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www.knfilters.com

STP
www.stp.com

Mobil 1
www.mobiloil.com

Super Tech
www.walmart.com

Read more: http://www.fourwheeler.com/techarticles/engine/129_1202_oil_filter_comparison_fodder/index.html#ixzz1ulCVD7Lx