



RADAR / LASER DETECTORS



Engine Oil Filter Study



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UPDATE: To help reduce some of my email traffic from this page, I have created an FAQ. Before emailing me with a question, please read the [Oil Filter Study Frequently Asked Questions](#) first. I typically don't respond to questions that are already answered here.

Upcoming Filters

Here are the filters that will be added to this page. They have already been acquired and disassembled.

- AC Delco Ultraguard Gold PF2
- Amsoil SDF15
- Bosch
- Fram HP1
- Hard Driver HD01
- K&N Gold
- Penske
- Purolator HP1/L390001

Warning!

These pages are NOT to be taken as gospel. The primary motivation behind this study was to provide information about what oil filter brands are made by which manufacturers. The secondary motivation was to uncover some of the obvious internal construction issues of these manufacturers. This "study" is not a "test". The SAE J806 and J1858 tests were designed to test the filtration capability of these filters, but unfortunately they have several shortcomings. These include issues such as anti-drainback valve functionality (valve train noise, etc.), filter element containment capability (how long before it blocks and bypasses--related to surface area), and many testimonials that appear to point in the direction of certain manufacturers. It has been my hope to shed some light in the direction of these issues. While my infamous "two eyes and common sense" approach may not be the most scientific, it is the best I could do considering there was no personal return on the investment of time and money I put into it.

The primary shortcoming of this study is the small sampling size. I only tested the Ford 5.0L filter. It has come to my attention that some brand names use different manufacturers for different applications. Another shortcoming is the lack of testing of the filter element media itself. Unfortunately I have neither the time nor resources to do this.

I invite anyone with the means to take a larger sampling size and conduct a more complete study, which may include private SAE tests. I also invite anyone to repeat a study similar to this one on other model filters.

With all of that said, please make your own judgements. Use this study only as a source of some information that may give you a better idea about which filter brands to steer clear from. It should be obvious that some manufacturers are not being honest about their product. The next time you buy a filter for your car, buy two and hack one open to see what you have. My intent was to give you some information and alert you to some little-known issues, not to tell you what to think.

Description

One weekend I set out to every auto parts store in my area and bought every brand of oil filter I could find. I chose to get the filter for the early Ford 5.0L V8 engine. The reason is that this is a popular filter, it is large so that I can unveil any fake miniature internal components, and it fits on most 2.2L and 2.5L engines. Design-wise it is fully compatible with our oil systems and is an excellent replacement for the pathetic filter that was designed for our engines. I was able to find 20 different filters spanning several brand names. They are (in alphabetical order):



- [AC Delco Duraguard PF2](#)
- [AC Delco Ultraguard Gold PF2](#)
- [AMSOIL SDF15](#)
- [Baldwin B2](#)
- [Bosch ???](#)
- [Car And Driver SF-1A](#)
- [Champ](#)
- [Deutsch D539](#)
- [Deutsch D545](#)
- [Fram Extra Guard PH8A](#)
- [Fram Tough Guard TG8A](#)
- [Fram Double Guard DG8A](#)
- [Hard Driver HD01](#)
- [Mobil 1 M1-301](#)
- [Motorcraft FL-1A](#)
- [NAPA Gold 1515](#)
- [Pennzoil PZ-1](#)
- [PowerFlo SL30001](#)
- [ProLine PPL-30001](#)
- [Purolator Premium Plus L30001](#)
- [Purolator Premium Plus L390001](#)
- [Purolator Pure One PL30001](#)
- [Quaker State Q58A](#)
- [STP S-01](#)

I hope to add more brands to this study as I can acquire them. The analysis is sorted by brand name in alphabetical order. In each brand section, I have broken the information down into the brand name models, sorted by price. Pictures coming soon!

Disassembly and Measurements

Basically, I cut open each filter on a lathe and took measurements of many of their attributes. Simply cutting them open revealed some very interesting (and disturbing) information.

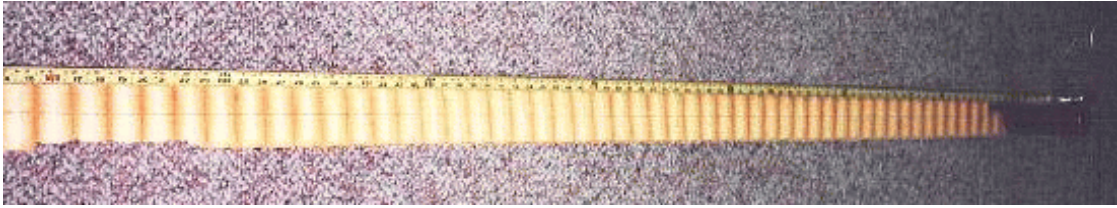


The sections below detail each of the filters I tested. A summary of the measurements I took can be found in a table for each. I noticed that other filter part numbers for the same brand were designed a bit differently. This is probably because of the shape of the can and the requirements for that engine. Here is a description of each table entry:

Average Retail Price	The average of all the retail prices I found for this filter (to the nearest \$0.50)
Cartridge Length	The length of the filter cartridge, including end caps
Cartridge Outside Diameter	The outside diameter of the filter cartridge element pleats
Cartridge Inside Diameter	The inside diameter of the filter cartridge inside support tube
Cartridge Pleats	The number of pleats (or folds) in the element while in the cartridge
Cartridge End Cap Type	The type of material used to construct the end caps
Anti-Drainback Valve Type	The valve design and construction material
Bypass Valve Type	The valve design and construction material
Element Type	The type of material used to construct the filter element and the seam seal
Element Length	The overall length of the element when removed from the cartridge and stretched out
Element Width	The width of the stretched-out element
Element Surface Area	The calculated surface area of the cartridge using the above two values
Shell Thickness	The thickness of the metal used to construct the filter's shell
Backplate Thickness	The thickness of the metal used to construct the filter's backplate
Gasket Type	The type of material used to construct the backplate sealing gasket (O-ring)
Hydrostatic Burst Pressure	Since I cannot test this myself, I have removed this data.
SAE J806 Filtration Efficiency	Since I cannot test this myself, I have removed this data.
SAE J1858 Filtration Efficiency	Since I cannot test this myself, I have removed this data.

The construction of the anti-drainback and bypass valves is an important feature. Many are made of nitrile rubber. As long as they have good sealing surfaces, they generally work fine. However, nitrile rubber diaphragms gets stiff in extreme cold and may fail to seal in those conditions. Silicone rubber seals or steel valves are not prone to this. Many bypass valves are spring-loaded steel and work well. Some are spring-loaded plastic and are often not molded well enough to make a decent seal, allowing oil to leak passed them.

Probably the most important value here is the element surface area. This helps determine the amount of filter media that is available to trap particles. Cellulose media (basically paper) can trap fewer particles and can flow less oil per square inch because there are fewer passages through it. Synthetic media has more passages and can trap more particles and flow more oil than cellulose per square inch. For the same type of media, the smaller the area, the sooner the filter will become plugged and will end up bypassing much of the oil instead of filtering it. Some filters use a cellulose/synthetic blend, so a direct comparison is not possible. More pleats in the element does not necessarily mean more surface area (as you will soon see). In fact, too many pleats can end up restricting the flow too much because there is not enough space between them to allow oil to flow. Most of the cheaper filters use a mix that is mostly cellulose. Some of the better filters use synthetics or synthetic blends. I'll try to come up with some way of identifying these.



The shell and backplate thickness are only relevant if your engine's oil system operates at unusually high pressures. Occasionally a seemingly strong filter can still leak due to a failure at the crimp between the can and backplate. If this happens to you, I would send it back to the manufacturer so that they can solve the problem. Even the cheapest filters have to be strong enough for stock oiling systems, or they will fail SAE tests.

I have removed SAE filtration efficiency and all other data that came from the manufacturers, since these are often inaccurate numbers.

Other measurements and values are debatable and I will allow you to draw your own conclusions from them.

SAE Tests

All filters have to undergo SAE (Society of Automotive Engineers) tests to verify that they meet the vehicle manufacturer's specifications. There are two tests available for automobile engine oil filters. All filters must be tested with the J806 test, but the new J1858 is much more meaningful. Currently the J1858 test is optional. Really, it's a way for high-end filter manufacturers to show off their great filters.

The SAE J806 test uses a single-pass test, checking for contaminant holding capacity, size of contaminant particles trapped, and ability to maintain clean oil. As an amendment of the J806 test, the multi-pass test also looks for filter life in hours, contaminant capacity in grams, and efficiency based on weight. The efficiency of the filter is determined only by weight through gravimetric measurement of the filtered test liquid. Typical numbers for paper filter elements are 85% (single pass) and 80% (multi-pass).

The SAE J1858 test provides both particle counting and gravimetric measurement to measure filter capacity and efficiency. Actual counts of contaminant particles by size are obtained every 10 minutes, both upstream (before the filter) and downstream (after the filter), for evaluation. From this data filtration ratio and efficiency for each contaminant particle size can be determined as well as dust capacity and pressure loss as a function of time. Typical numbers for paper element filters are 40% at 10 microns, 60% at 20 microns, 93% at 30 microns, and 97% at 40 microns.

NOTICE: Since all of the SAE data I have is from the manufacturers, it cannot be trusted to be truthful. Therefore all SAE data has been removed from the filter sections below.

AC Delco

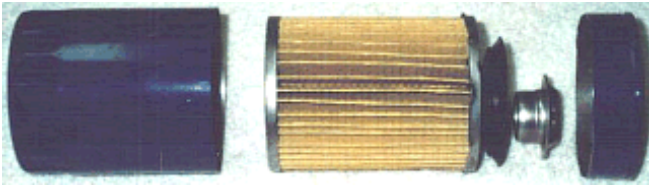
Duraguard PF2

The filter cartridge has a large outside diameter with deep pleats. At first glance, it appears to have little filter element media, but the surface area measure was surprising: 315 sqin. The unit had a solid top end cap because the bypass valve is at the bottom, which is a well constructed spring-loaded steel with a nitrile seal design. The nitrile rubber diaphragm-type anti-drainback valve doubles as the seal between the bypass valve and the cartridge. The only drawback to this design is that the bypass valve seats metal-to-metal against the backplate. This could allow oil from the clean side of the filter to seep back into the oil pan, but it wouldn't allow the dirty oil in the filter to seep back. Oil that is in the main gallery usually leaks out through the main bearings anyway while the engine sits. One disadvantage to the AC Delco is that the anti-drainback valve seals against a rough backplate. I noticed that if I blow air through the oil outlet, air slowly leaks past the valve. Even so, I have been getting testimonials that the AC Delco stops the valve train noise problems associated with the Fram filter, so it may seal fine once it has been exposed to oil. The Wix and Purolator filters seal perfectly.

The telltale signs for an AC Delco filter are: Five large holes for the oil inlet and 6 spot welds on the rim surrounding them. There are no crimps holding the gasket in place. When you look through the inlet holes, you can see the metal bypass valve with its 12 small holes and the black anti-drainback valve diaphragm around it. Through the center outlet hole, you can see the spring for the bypass valve.

Exploded view:





Average Retail Price	\$3
Cartridge Length	4.625 inches
Cartridge Outside Diameter	3.375 inches
Cartridge Inside Diameter	1.375 inches
Cartridge Pleats	36
Cartridge End Cap Type	Stamped steel
Anti-Drainback Valve Type	Nitrile rubber diaphragm
Bypass Valve Type	Spring-loaded steel
Element Type	Paper media, glued seam
Element Length	70.0 inches
Element Width	4.500 inches
Element Surface Area	315 square inches
Shell Thickness	0.015 inches
Backplate Thickness	0.100 inches
Gasket Type	Nitrile rubber

AMSOIL

SDF15

This filter has been acquired, disassembled, and is awaiting measurements.

Baldwin

B2

This filter has not been acquired.

Bosch

?

This filter has been acquired, disassembled, and is awaiting measurements.

Car And Driver

SF-1A

This filter is a Champion filter.

Average Retail Price	\$3
Cartridge Length	4.000 inches
Cartridge Outside Diameter	3.250 inches
Cartridge Inside Diameter	1.625 inches
Cartridge Pleats	54
Cartridge End Cap Type	Stamped-steel, with bypass valve
Anti-Drainback Valve Type	Nitrile rubber diaphragm
Bypass Valve Type	Spring-loaded steel, nitrile seal
Element Type	Paper media, glued seam
Element Length	87 inches
Element Width	3.875 inches
Element Surface Area	337 square inches
Shell Thickness	0.012 inches
Backplate Thickness	0.102 inches
Gasket Type	Nitrile rubber

Champ

?

This filter is manufactured by Champion Laboratories, Inc. (NOT the same guys who make the spark plugs), and is sold under several other brand names. Champion admits some of these outright, and they are: Lee, Lee Maxi, and STP.

The Champion design has metal end caps on the filter cartridge, with the bypass valve stamped right into the bottom end cap like the Purolator. I refer to this as a one-piece filter cartridge. Though definitely not the same design as the Purolator, it does use the same type of leaf-spring-type spacer at the top of the cartridge and the nitrile anti-drainback valve, which doubles as the cartridge-to-backplate seal, at the bottom. One issue is that I sometimes noticed was some rust on the backplate of these filters. Since the rust is usually around by the inlet holes, any loose rust would be caught by the filter.

The telltale signs for a Champion filter are: 6 large holes for the oil inlet, one of which is larger than the others. Only the black anti-drainback valve can be seen through the inlet holes. There are 6 large crimps holding the gasket in place. Through the center outlet hole, you can see the bypass valve spring. Usually, the backplate metal is dull, or even rusty.

Deutsch

D539

This filter is a Champion filter.

Average Retail Price	\$3
Cartridge Length	4.000 inches
Cartridge Outside Diameter	3.250 inches
Cartridge Inside Diameter	1.625 inches
Cartridge Pleats	55
Cartridge End Cap Type	Stamped-steel, with bypass valve
Anti-Drainback Valve Type	Nitrile rubber diaphragm
Bypass Valve Type	Spring-loaded steel, nitrile seal
Element Type	Paper media, glued seam
Element Length	88.5 inches
Element Width	3.875 inches
Element Surface Area	343 square inches
Shell Thickness	0.012 inches
Backplate Thickness	0.102 inches
Gasket Type	Nitrile rubber

D545

This filter has not yet been acquired, but is apparently a heavy-duty version of the D539 (Champion).

Fram

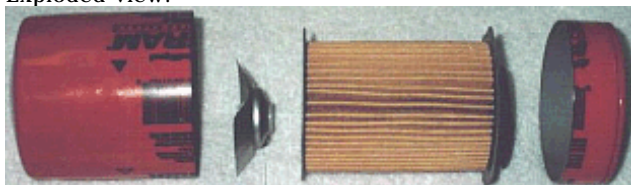
These filters are manufactured by Allied Signal, Inc. See this email from [an Allied Signal production engineer](#).

Fram Extra Guard PH8A

This filter cartridge has a small outside diameter with a rather low filter element surface area (193 sqin), and features cardboard end caps that are glued in place. The rubber anti-drainback valve seals the rough metal backplate to the cardboard end cap and easily leaks, causing dirty oil to drain back into the pan. If you have a noisy valve train at startup, this filter is likely the cause. The bypass valves are plastic and are sometimes not molded correctly, which allows them to leak. The backplate has smaller and fewer oil inlet holes, which may restrict flow.

The telltale signs for a Fram Extra Guard are: It has 8 small holes for the oil inlet and a thin, cheap looking backplate, and is currently stamped with a "2Y". There are 5 very small crimps holding the gasket in place. If you look into the center hole all the way to the top of the filter, you will see a kind of "button" in the end cap of the cartridge (which looks like it's made of metal from there). This is the plastic bypass valve.

Exploded view:



Average Retail Price	\$3
Cartridge Length	4.125 inches
Cartridge Outside Diameter	3.000 inches
Cartridge Inside Diameter	1.375 inches
Cartridge Pleats	34
Cartridge End Cap Type	Cardboard
Anti-Drainback Valve Type	Nitrile rubber diaphragm
Bypass Valve Type	Spring-loaded plastic
Element Type	Paper media, stamped metal seam
Element Length	47.5 inches
Element Width	4.063 inches
Element Surface Area	193 square inches
Shell Thickness	0.015 inches
Backplate Thickness	0.089 inches
Gasket Type	Nitrile rubber

Fram Tough Guard TG8A

This filter has an improved filter element with more surface area (248 sqin), a heavy silicone anti-drainback valve with a good sealing surface, the same plastic pressure relief valve but with an integral screen to keep out large particles, and enough inlet holes for good flow. In my opinion, the only real drawback to this filter is that it is capped on each end with cardboard instead of metal.

The telltale signs for a Fram Tough Guard filter are: It has a better backplate that is usually shiny, with six larger holes for the inlet and 6 spot welds around the them. There are 6 large crimps holding the gasket in place. When you look through the inlet holes, you can see the orange anti-drainback valve. If you look into the center hole all the way to the top of the filter, you will see a kind of "button" in the end cap of the cartridge (which looks like it's made of metal from there). This is the plastic bypass valve.

Average Retail Price	\$5
Cartridge Length	4.125 inches
Cartridge Outside Diameter	3.000 inches
Cartridge Inside Diameter	1.625 inches
Cartridge Pleats	50
Cartridge End Cap Type	Cardboard
Anti-Drainback Valve Type	Silicone rubber diaphragm
Bypass Valve Type	Spring-loaded plastic with integral screen
Element Type	Paper media, stamped metal seam
Element Length	61.0 inches
Element Width	4.063 inches
Element Surface Area	248 square inches
Shell Thickness	0.015 inches
Backplate Thickness	0.187 inches
Gasket Type	Nitrile rubber, PTFE-treated



Far Left: extra guard cartridge. Left: Double Guard. Right: Tough Guard

Fram Double Guard DG8A

This is one of the most expensive filters you can buy. Inside is a basic Fram Extra Guard (PH8A) filter element that has larger diameter holes at the end and has been pre-oiled. You can see this in the picture above (far left). I assume this is to hold the Teflon particles in the filter element before the unit is installed. Don't put Teflon in your engine. It does not belong there! DuPont does not recommend using their Teflon product in internal combustion engines.

Although it has the lowest filter element surface area (193 sqin), it does have a clever spring-loaded nitrile rubber anti-drainback valve and bypass valve combination.

The telltale signs for a Fram Tough Guard filter are: It has a better backplate that is usually shiny, with six larger holes for the inlet and 6 spot welds around them. The backplate should be stamped with a "1K". There are 6 large crimps holding the gasket in place. The anti-drainback valve diaphragm behind the inlet holes is black. If you look into the center hole all the way to the top of the filter, you will not see the "button" in the end cap of the cartridge (which looks like it's made of metal from there).

Average Retail Price	\$10
Cartridge Length	4.125 inches
Cartridge Outside Diameter	3.000 inches
Cartridge Inside Diameter	1.625 inches
Cartridge Pleats	38
Cartridge End Cap Type	Cardboard
Anti-Drainback Valve Type	Nitrile rubber diaphragm
Bypass Valve Type	Nitrile rubber, integral
Element Type	Paper media, stamped metal seam
Element Length	47.5 inches
Element Width	4.063 inches
Element Surface Area	193 square inches
Shell Thickness	0.015 inches
Backplate Thickness	0.187 inches
Gasket Type	Nitrile rubber

Hard Driver

HD01

This filter has been acquired, disassembled, and is awaiting measurements.

Average Retail Price	\$8.50 + \$4 shipping
Cartridge Length	? inches
Cartridge Outside Diameter	? inches
Cartridge Inside Diameter	? inches
Cartridge Pleats	?
Cartridge End Cap Type	?
Anti-Drainback Valve Type	?
Bypass Valve Type	?
Element Type	Synthetic media
Element Length	? inches
Element Width	? inches
Element Surface Area	? square inches
Shell Thickness	? inches
Backplate Thickness	? inches
Gasket Type	?
Hydrostatic Burst Pressure	200 psi
SAE J806 Filtration Efficiency	Unknown
SAE J1858 Filtration Efficiency	95% at 10 microns 98% at 20 microns 98% at 30 microns 98% at 40 microns

Mobil 1

M1-301

Like the Champ filter, this filter is made by Champion Labs. However, it uses a unique end plate and a thicker can that make it the strongest filter available for wide distribution retail sale. It also uses a synthetic media, which improves filtration and flow. I'm happy to say that this filter is NOT a fake. It is definitely a unique design.

It uses a synthetic fiber element that can filter out very small particles and is very strong. It is rated just under the Purolator Pure One as far as filtering capability, but is still very much above conventional paper filters. It also has a very strong construction to withstand high pressure spikes during start-up. However, as with all Mobil 1 products, expect to pay 2 - 3 times as much for this filter.

I have received many reports of these filters failing at high pressures. It seems that the seam where the backplate crimps to the case can split.

Exploded view:



Average Retail Price	\$10
Cartridge Length	4.250 inches
Cartridge Outside Diameter	3.250 inches
Cartridge Inside Diameter	1.625 inches
Cartridge Pleats	52
Cartridge End Cap Type	Stamped-steel, with bypass valve
Anti-Drainback Valve Type	Nitrile rubber diaphragm
Bypass Valve Type	Spring-loaded steel, nitrile seal
Element Type	Synthetic media, glued seam
Element Length	85 inches
Element Width	4.125 inches
Element Surface Area	351 square inches
Shell Thickness	0.022 inches
Backplate Thickness	0.138 inches
Gasket Type	Nitrile rubber

Mopar

This section has moved to it own page:

[Oil filter Study Special Model Feature: Mopar](#)

Motorcraft

Long Lasting FL- 1A

This is an interesting filter. Basically, it is a Purolator Pure One filter cartridge in a Purolator Premium Plus case. Don't be fooled by the differently shaped holes cut into the oil inlet. This is the only difference. This is a good filter design and if you want to get a Purolator Pure One filter, get this one instead: it is cheaper.

Like the Purolator Pure One, this filter cartridge features a very large element surface area (400 sqin), but with many pleats (64). This packs the filter together rather tightly and may restrict flow somewhat. I could identify the Pure One element media by a purple dye they use at the seam. It also has the mysterious assembly string wrapped around the outside of the element. Like the Purolators, it features a spring-loaded metal bypass valve and a nitrile rubber diaphragm-type anti-drainback valve. The bypass valve is stamped right into the bottom end cap of the cartridge, so it is all one piece.

Average Retail Price	\$3
Cartridge Length	4.125 inches
Cartridge Outside Diameter	3.250 inches
Cartridge Inside Diameter	1.625 inches
Cartridge Pleats	64
Cartridge End Cap Type	Stamped-steel, with bypass valve
Anti-Drainback Valve Type	Nitrile rubber diaphragm
Bypass Valve Type	Spring-loaded steel
Element Type	Paper media, stamped metal seam
Element Length	100.0 inches
Element Width	4.000 inches
Element Surface Area	400 square inches
Shell Thickness	0.011 inches
Backplate Thickness	0.120 inches
Gasket Type	Nitrile rubber

NAPA

1515 Gold

This filter is a Wix filter with the two-piece filter cartridge. As with the Wix filter, the metal bypass valve seats on the metal cartridge end cap with no gasket of any kind. Some small amount of oil probably leaks through there. It also has the tougher paper filter media of the Wix.

Average Retail Price	\$5
Cartridge Length	4.000 inches
Cartridge Outside Diameter	3.250 inches
Cartridge Inside Diameter	1.625 inches
Cartridge Pleats	59
Cartridge End Cap Type	Stamped-steel
Anti-Drainback Valve Type	Nitrile rubber diaphragm
Bypass Valve Type	Spring-loaded steel, nitrile seal
Element Type	Paper media, glued seam
Element Length	87 inches
Element Width	3.875 inches
Element Surface Area	337 square inches
Shell Thickness	0.014 inches
Backplate Thickness	0.104 inches
Gasket Type	Nitrile rubber

51515 Silver

This filter now appears to be a Wix filter. I'm not sure if there is any real difference between this filter and the NAPA Gold filter.

Pennzoil

PZ-1

This filter is a Fram Extra Guard (PH8A) in every way, shape, and form. The only difference is the yellow paint and Pennzoil logo.

All the measurements were exactly the same as the Fram Extra Guard PH8A.

Average Retail Price	\$2
Cartridge Length	4.125 inches
Cartridge Outside Diameter	3.000 inches
Cartridge Inside Diameter	1.375 inches
Cartridge Pleats	34
Cartridge End Cap Type	Cardboard
Anti-Drainback Valve Type	Nitrile rubber diaphragm
Bypass Valve Type	Spring-loaded plastic
Element Type	Paper media, stamped metal seam
Element Length	47.5 inches
Element Width	4.063 inches
Element Surface Area	193 square inches
Shell Thickness	0.015 inches
Backplate Thickness	0.089 inches
Gasket Type	Nitrile rubber

PowerFlo

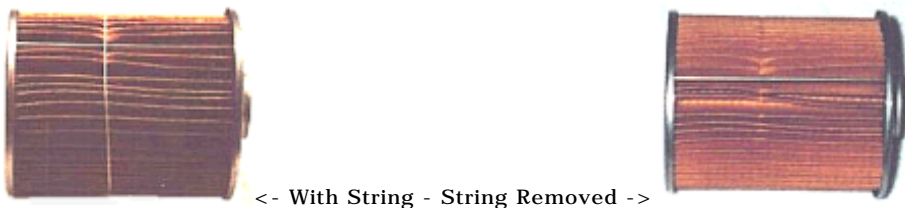
SL30001

As you may suspect by the part number, this filter is a Purolator Premium Plus. There were no manufacturing differences, but the cost was an average of \$2 instead of \$3.

ProLine

PPL-30001

Yet another Purolator Premium Plus. All measurements were the same. The cost was \$2. One thing I noticed with this particular example was that the mysterious assembly string was tied too tight and had damaged the filter element. Although only this one had the problem, I am suspicious of this filter design as a whole (including all of the Purolators).



As you may be able to tell, the string did not rip into the filter element, it only crushed it. There was no evidence that the element had been compromised. Out of the 8 Purolators (and clones) tested, this was the only one with a problem.

Purolator

Premium Plus L30001



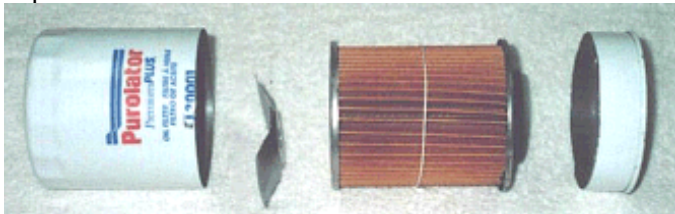
Left to Right: Motorcraft, Purolator Pure One, Purolator Premium Plus

Here is a fairly well designed filter, especially for the price. One odd thing about Purolator's filters is a string that is always wrapped around the filter element. I assume that this is there to hold the element in place while the glue in the end caps cures. Of all the Purolator-based filter I tested, there was one (the ProLine) that had filter element damage from this string. Although it was one of five tested, I am weary of this design. Even though the element was crushed a bit, it was not ripped. I will take apart a used one at my next oil change.

The filter cartridge has an impressive surface area of 316 sqin, which is very close to the AC Delco Duraguard. The difference is that Purolator's filter element is compressed into more pleats (51) than the AC Delco. This may restrict flow somewhat, but not as much in this model than the Pure One. It features a spring-loaded metal bypass valve and a nitrile rubber diaphragm-type anti-drainback valve, which doubles as the seal between the backplate and the cartridge. Like the Champion, this bypass valve is stamped right into the bottom end cap of the cartridge, so it is all one piece.

The telltale sign for a Purolator filter are: 8 medium-sized holes for the oil inlet and nothing but a black (or orange for the Pure One) diaphragm to be seen through them. There are 6 large crimps holding the gasket in place. Through the center outlet hole, you can see the spring for the bypass valve.

Exploded view:



Average Retail Price	\$3
Cartridge Length	4.125 inches
Cartridge Outside Diameter	3.250 inches
Cartridge Inside Diameter	1.625 inches
Cartridge Pleats	51
Cartridge End Cap Type	Stamped-steel
Anti-Drainback Valve Type	Nitrile rubber diaphragm
Bypass Valve Type	Spring-loaded steel
Element Type	Paper media, stamped metal seam
Element Length	79.0 inches
Element Width	4.000 inches
Element Surface Area	316 square inches
Shell Thickness	0.011 inches
Backplate Thickness	0.115 inches
Gasket Type	Nitrile rubber

Pure One PL30001

This filter has a few improvements over the Premium Plus. It has a denser synthetic filter media to filter out smaller particles and more surface area to make up for the flow restriction. Aside from those the cartridge is the same construction as the

Premium Plus.

The filter cartridge has an even more impressive surface area of 400 sqin. The potential issue is that this filter element is compressed into even more pleats (64) than the Premium Plus. This may restrict flow more than it helps relieve it. It also features a spring-loaded metal bypass valve and a silicone rubber diaphragm-type anti-drainback valve, which doubles as the seal between the backplate and the cartridge. The bypass valve is located at the base of the cartridge, not at the top.

Average Retail Price	\$5
Cartridge Length	4.125 inches
Cartridge Outside Diameter	3.250 inches
Cartridge Inside Diameter	1.625 inches
Cartridge Pleats	64
Cartridge End Cap Type	Stamped-steel
Anti-Drainback Valve Type	Silicone rubber diaphragm
Bypass Valve Type	Spring-loaded steel
Element Type	Synthetic media, stamped metal seam
Element Length	100.0 inches
Element Width	4.000 inches
Element Surface Area	400 square inches
Shell Thickness	0.011 inches
Backplate Thickness	0.115 inches
Gasket Type	Nitrile rubber, PTFE-treated

Quaker State

QS8A

This filter has changed from being a Purolator to a Fram Extra Gaurd. This may have been a result of Pennzoil acquiring Quaker State brand name.

STP

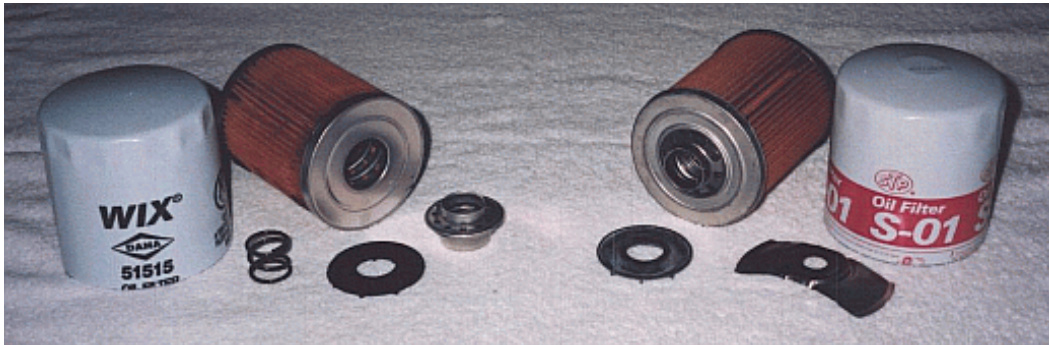
S-01

This filter is the Champion Industries filter.

Average Retail Price	\$3
Cartridge Length	4.000 inches
Cartridge Outside Diameter	3.250 inches
Cartridge Inside Diameter	1.625 inches
Cartridge Pleats	58
Cartridge End Cap Type	Stamped-steel, with bypass valve
Anti-Drainback Valve Type	Nitrile rubber diaphragm
Bypass Valve Type	Spring-loaded steel, nitrile seal
Element Type	Paper media, glued seam
Element Length	93 inches
Element Width	3.875 inches
Element Surface Area	360 square inches
Shell Thickness	0.012 inches
Backplate Thickness	0.102 inches
Gasket Type	Nitrile rubber
Hydrostatic Burst Pressure	Unknown
SAE J806 Filtration Efficiency	Unknown
SAE J1858 Filtration Efficiency	Unknown

Wix

These filters are manufactured by the Dana corporation, who also manufactures all of the Wix clones. These include NAPA and many OEM filters.

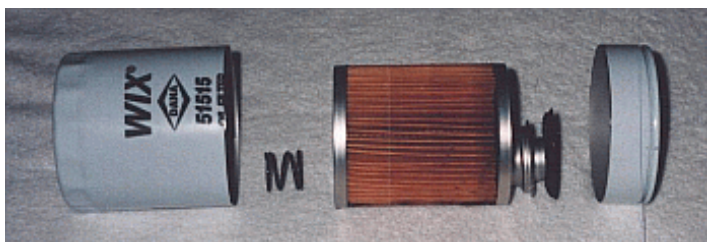


This filter has metal cartridge end caps, but has a separate bypass valve that rests against the bottom end cap, like the AC Delco. I refer to this as a two-piece filter cartridge. Like the Champion, it uses an anti-drainback valve that doubles as the bypass valve-to-backplate seal. Instead of the leaf-spring-type spacer that most filters use, these use a stiff coil spring at the top of the cartridge. Like the Purolator, the filter element paper media is stronger than the Champion media. The only drawback to this design is that the bypass valve seats metal-to-metal against the bottom cartridge end plate. This could allow dirty oil to seep from the dirty side to the clean side of the filter, bypassing the element. The design will not allow oil to seep back into the pan, though.

The telltale signs for a Wix are: 6 large holes for the oil inlet with only the black anti-drainback valve to be seen through them. There are 6 "notches" that hold the gasket in place. Through the center outlet hole, you can see the bypass valve spring. Usually the backplate metal is shiny.

51515

This filter features a good surface area, but a lot of shallower pleats. This makes it similar to the Purolator's pleats.



Average Retail Price	\$5
Cartridge Length	4.000 inches
Cartridge Outside Diameter	3.250 inches
Cartridge Inside Diameter	1.625 inches
Cartridge Pleats	61
Cartridge End Cap Type	Stamped-steel
Anti-Drainback Valve Type	Nitrile rubber diaphragm
Bypass Valve Type	Spring-loaded steel, nitrile seal
Element Type	Paper media, glued seam
Element Length	90 inches
Element Width	3.875 inches
Element Surface Area	349 square inches
Shell Thickness	0.014 inches
Backplate Thickness	0.104 inches
Gasket Type	Nitrile rubber
Hydrostatic Burst Pressure	Unknown
SAE J806 Filtration Efficiency	Unknown
SAE J1858 Filtration Efficiency	Unknown

Conclusions

This section has been moved into a page where I summarize and toss in my subjective comments. :) So, take a look at the [Oil Filters Overview](#) page if you want to hear them. This page shall continue to contain only the hard facts.

It should be clear that Mopar filters are really nothing special. Unless you are trying to have a perfect restoration and need that Mopar logo, there is no reason why you should be buying Mopar oil filters. Most of them seem to currently be Purolators or Champions, but that could change at any time.

See the [AC Delco](#), [Champion](#), [Fram](#), [Purolator](#), and [Wix](#) sections for information on how to identify these manufacturers by looking at the backplate. The tell-tale signs are always there.

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This page was written and is maintained by Russ W. Knize and was last updated 06/20/00. Comments? Questions? Email minimopar@myrealbox.com.

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Engine Oil Filter Study



SPECIAL FEATURE: German Filters

[[Conversion Table](#) | [Conclusion](#) | [Main Oil Filter Study Page](#)]
[[AC Delco](#) | [Bosch](#) | [Deutsch](#) | [Fram](#) | [Mahle](#) | [Mann](#) | [NAPA](#) | [Purolator](#) | [VW](#)]

PRINTING ISSUES: If you have trouble with colors when printing this or any other page, use the color override option on your web browser. For more information, see the [Printing On This Site](#) page.

UPDATE: No new filters will be added to this page. I will try to finish the Conclusion and Conversion sections at some point. Have to find those pictures as well...

Description

This page concentrates on German oil filters. Since not all of these brands make filters of the Ford 5.0L type, I concentrated on a very common filter in Audi, Volvo, and VW circles. For the sake of comparison, I purchased some domestic filters as well. Also, some of these "German" filters are actually made in the U.S.A. Specifically, this page compares the following filters:

[AC Delco Duraguard PF60](#)
[Bosch 72150](#)
[Deutsch D484](#)
[Fram Extra Guard PH2870A](#)
[Mahle OC49](#)
[Mann W719/5](#)
[NAPA Gold 1342](#)
[Purolator Premium Plus L20252](#)
[Purolator Pure One PL20252](#)
[Volkswagen 034 115 561A](#)

Special thanks go to Rolf Mair for sending me the Bosch, Fram, Mahle, Mann, and VW filters. The rest were purchased by myself.

General Information

See the Engine Oil Filter Study main page for all the details about how the tests were conducted and how to make sense of the results. Here are the direct links:

[Description](#)
[Disassembly and Measurements](#)
[SAE Tests](#)
[Conclusions](#)

Conversion Table

nil

AC Delco Duraguard PF60

This filter is very much like the Deutsch unit, which is similar to the Bosch filter (manufactured by Champion Laboratories). It has the Bosch cartridge design, but uses a different filter element (similar to other AC Delco elements). Like the Deutsch filter, the backplate has 8 round inlet holes with one larger than the others. The AC Delco catalog lists the PF56 as an equivalent filter, but I could not find it to test.

Average Retail Price	\$6
Cartridge Length	3.925 inches
Cartridge Outside Diameter	2.685 inches
Cartridge Inside Diameter	1.625 inches
Cartridge Pleats	55
Cartridge End Cap Type	Stamped steel, with bypass and anti-drainback valves
Anti-Drainback Valve Type	Spring loaded steel, nitrile seal (bottom of cartridge)
Bypass Valve Type	Spring loaded steel, nitrile seal (top of cartridge)
Element Type	Paper media, glued seam
Element Length	54.0 inches
Element Width	3.750 inches
Element Surface Area	202.5 square inches
Shell Thickness	0.013 inches
Backplate Thickness	0.108 inches
Gasket Type	Nitrile rubber

Bosch 72150

I believe that Champion Laboratories is the manufacturer of all american-made Bosch filters. If the filter is stamped with "Made in U.S.A.", then it is likely a Champion Labs filter. They seem to make some of the German OEM filters as well. I kept seeing this unit's filter cartridge in other units, but this may just be a design copy.

This filter has one of the higher surface areas of the group and has a stronger case. A common theme with these filters is to have the anti-drainback valve built into the bottom of the filter cartridge with the bypass valve built into the top. Rather than use a diaphragm-type anti-drainback valve, these filters use spring loaded steel valve with a nitrile seal. This is probably the best anti-drainback valve design I have seen, but it does take up quite a bit of room inside the cartridge, which forces the element pleats to be shallow. The cartridge is held in place by a leaf spring-type spacer. To make a positive seal to the backplate, a rubber o-ring is used at the base of the cartridge. The backplate has four large "D"-shaped holes for the oil inlet.

Average Retail Price	\$?
Cartridge Length	3.950 inches
Cartridge Outside Diameter	2.700 inches
Cartridge Inside Diameter	1.625 inches
Cartridge Pleats	76
Cartridge End Cap Type	Stamped steel, with bypass and anti-drainback valves
Anti-Drainback Valve Type	Spring loaded steel, nitrile seal (bottom of cartridge)
Bypass Valve Type	Spring loaded steel, nitrile seal (top of cartridge)
Element Type	Paper media, glued seam
Element Length	74.0 inches
Element Width	3.750 inches
Element Surface Area	277.5 square inches
Shell Thickness	0.014 inches
Backplate Thickness	0.118 inches
Gasket Type	Nitrile rubber

Deutsch D484

Like the Ford 5.0L Deutsch filter, this filter is manufactured by Champion Laboratories. It is similar in construction to the AC Delco, the American-made Bosch, and the other Champion filters.

Although most of the dimensions were the same as the AC Delco, the Deutsch uses a different filter element, which has more pleats (and more surface area). Like the AC Delco filter, the backplate has 8 round inlet holes with one larger than the others.

Average Retail Price	\$6
Cartridge Length	3.925 inches
Cartridge Outside Diameter	2.700 inches
Cartridge Inside Diameter	1.625 inches
Cartridge Pleats	61
Cartridge End Cap Type	Stamped steel, with bypass and anti-drainback valves
Anti-Drainback Valve Type	Spring loaded steel, nitrile seal (bottom of cartridge)
Bypass Valve Type	Spring loaded steel, nitrile seal (top of cartridge)
Element Type	Paper media, glued seam
Element Length	59.5 inches
Element Width	3.750 inches
Element Surface Area	223.0 square inches
Shell Thickness	0.013 inches
Backplate Thickness	0.108 inches
Gasket Type	Nitrile rubber

Fram Extra Guard PH2870A

Well, what can I say? It's a Fram in every way, shape, and form.

It has the usual cardboard-endcapped cartridge with the lowest surface area of the group (172.5sqin). Along with the spring-loaded plastic bypass valve, it has the nitrile rubber diaphragm that seals rough metal to cardboard. I also noticed that there was very little room between the bottom cartridge end cap and the filter can. It looks as though it might restrict oil flow between the backplate and the outside of the element, but I imagine that the oil flow would probably push the cardboard out of the way. The backplate has 8 very small holes for the oil inlet, which may restrict flow somewhat.

Average Retail Price	\$?
Cartridge Length	3.925 inches
Cartridge Outside Diameter	2.625 inches
Cartridge Inside Diameter	1.375 inches
Cartridge Pleats	40
Cartridge End Cap Type	Cardboard
Anti-Drainback Valve Type	Spring loaded plastic
Bypass Valve Type	Nitrile rubber diaphragm
Element Type	Paper media, metal seam
Element Length	44.5 inches
Element Width	3.875 inches
Element Surface Area	172.5 square inches
Shell Thickness	0.015 inches
Backplate Thickness	0.110 inches
Gasket Type	Nitrile rubber

Mahle OC49

This filter has similarities with the Champion Labs unit, but is different enough to lead me to believe that it is not the same manufacturer. The similarities are that it has the spring loaded anti-drainback and bypass valves built into the cartridge end caps. The differences are that the bypass valve has no steel plate (it is a thick piece of spring-loaded rubber) and the anti-drainback valve has a wider steel plate than the Bosch. Also, a coil spring spacer is used instead of the leaf spring and the filter element has a metal seam instead of a glued one. In my opinion, these differences do not make this filter better or worse; I just pointed them out to show that it is definitely not the same manufacturing process.

The filter element is thin and fairly stiff, but quite strong and has one of the largest element surface areas of the group. The glue used to attach the end caps to the element is unlike any other I have seen. Rather than a gooey-flexible type, this stuff is hard and brittle. Neither better nor worse...just different. One striking aspect of this filter is the precise spacing of the pleats. While not especially relevant, it shows an attention to detail. The filter case is definitely one of the strongest and the backplate has 6 medium-sized oil inlet holes, for plenty of flow.

Average Retail Price	\$?
Cartridge Length	3.710 inches
Cartridge Outside Diameter	2.750 inches
Cartridge Inside Diameter	1.500 inches
Cartridge Pleats	64
Cartridge End Cap Type	Stamped steel, with bypass and anti-drainback valves
Anti-Drainback Valve Type	Spring loaded steel, nitrile seal (bottom of cartridge)
Bypass Valve Type	Spring loaded nitrile rubber (top of cartridge)
Element Type	Paper media, metal seam
Element Length	74 inches
Element Width	3.500 inches
Element Surface Area	259.0 square inches
Shell Thickness	0.018 inches
Backplate Thickness	0.132 inches
Gasket Type	Nitrile rubber

Mann W719/5

This filter also has similarities to both the Champion Labs and the Mahle units. It has the usual Champion Labs bypass and anti-drainback valve locations and construction, but has a filter element similar to the Mahle unit. The inside diameter of this cartridge is smaller than the Champion Labs or Mahle, which allows deeper pleats and gives this filter the most surface area of the group (285sqin). The cartridge spacer is a leaf spring-type, but of a unique design. The backplate looks just like the Champion Labs backplate, except that for some reason it is not welded or glued to the can. The can has some "hooks" that attach it to the backplate through the "D"-shaped inlet holes. After looking at it, I realized that this makes no difference in terms of sealing. The outside seal is made to the filter can and so any oil that gets between the backplate and the can ends up in the same place that it would if it went through the inlet holes. Also, this filter has the strongest can of the group.

This filter has "Made in Germany" stamped on the can, which may account for the differences from the American-made Bosch filter (which is manufactured by Champion Laboratories).

Average Retail Price	\$?
Cartridge Length	3.875 inches
Cartridge Outside Diameter	2.700 inches
Cartridge Inside Diameter	1.375 inches
Cartridge Pleats	59
Cartridge End Cap Type	Stamped steel, with bypass and anti-drainback valves
Anti-Drainback Valve Type	Spring loaded steel, nitrile seal (bottom of cartridge)
Bypass Valve Type	Spring loaded steel, nitrile seal (top of cartridge)
Element Type	Paper media, glued seam
Element Length	76 inches
Element Width	3.750 inches
Element Surface Area	285.0 square inches
Shell Thickness	0.021 inches
Backplate Thickness	0.117 inches
Gasket Type	Nitrile rubber

NAPA Gold 1342

I purchased this filter to get another example from the one of the better domestic oil filter manufacturers. Like the Ford 5.0L version, this filter is made by the Dana Corporation (Wix). It has all the usual Wix filter attributes. These include the two-piece filter cartridge with the metal-to-metal seal between the bypass valve and bottom cartridge end cap. The bypass valve is sealed to the backplate with the usual diaphragm-type anti-drainback valve. The filter element was Dana's usual material (strong) and has a surface area that is about average. The cartridge is held in place by a stiff coil spring spacer. One thing I noticed was that there was very little room between the bottom cartridge end cap and the filter can (like the Fram). It looks as though it might restrict oil flow between the backplate and the outside of the element.

Average Retail Price	\$?
Cartridge Length	3.675 inches
Cartridge Outside Diameter	2.750 inches
Cartridge Inside Diameter	1.375 inches
Cartridge Pleats	49
Cartridge End Cap Type	Stamped steel
Anti-Drainback Valve Type	Nitrile rubber diaphragm
Bypass Valve Type	Spring loaded steel, nitrile seal
Element Type	Paper media, glued seam
Element Length	62 inches
Element Width	3.500 inches
Element Surface Area	217.0 square inches
Shell Thickness	0.014 inches
Backplate Thickness	0.104 inches
Gasket Type	Nitrile rubber
Hydrostatic Burst Pressure	Unknown
SAE J806 Filtration Efficiency	Unknown
SAE J1858 Filtration Efficiency	Unknown

Purolator Premium Plus L20252

This filter is like most Purolators. It has steel end caps, but with the Champion-like bypass valve on the top of the cartridge. The anti-drainback valve is a typical nitrile rubber diaphragm type. The filter element has many shallow pleats, which results in a surface area (178sqin) only slightly better than Fram. The inside of the cartridge has a lot of wasted space. It also has the typical Purolator assembly string.

Average Retail Price	\$4
Cartridge Length	3.875 inches
Cartridge Outside Diameter	2.625 inches
Cartridge Inside Diameter	1.625 inches
Cartridge Pleats	50
Cartridge End Cap Type	Stamped steel
Anti-Drainback Valve Type	Nitrile rubber diaphragm
Bypass Valve Type	Spring loaded steel, nitrile seal
Element Type	Paper media, metal seam
Element Length	47.5 inches
Element Width	3.750 inches
Element Surface Area	178.0 square inches
Shell Thickness	0.012 inches
Backplate Thickness	0.111 inches
Gasket Type	Nitrile rubber
Hydrostatic Burst Pressure	Unknown
SAE J806 Filtration Efficiency	Unknown
SAE J1858 Filtration Efficiency	Unknown

Purolator Pure One PL20252

This Purolator has the same construction as the Premium Plus, but with more pleats of the Pure One element. It also has a silicone rubber anti-drainback valve and a PTFE-treated gasket.

Average Retail Price	\$6
Cartridge Length	3.675 inches
Cartridge Outside Diameter	2.750 inches
Cartridge Inside Diameter	1.375 inches
Cartridge Pleats	62
Cartridge End Cap Type	Stamped steel
Anti-Drainback Valve Type	Silicone rubber diaphragm
Bypass Valve Type	Spring loaded steel, nitrile seal
Element Type	Paper media, glued seam
Element Length	58.5 inches
Element Width	3.750 inches
Element Surface Area	219.5 square inches
Shell Thickness	0.012 inches
Backplate Thickness	0.111 inches
Gasket Type	Nitrile rubber, PTFE-treated
Hydrostatic Burst Pressure	Unknown
SAE J806 Filtration Efficiency	Unknown
SAE J1858 Filtration Efficiency	Unknown

Volkswagen 034 115 561A

This filter has the same construction as the American-made Bosch filter (Champion Labs), and also appears to have the same filter element.

Average Retail Price	\$8
Cartridge Length	3.950 inches
Cartridge Outside Diameter	2.700 inches
Cartridge Inside Diameter	1.375 inches
Cartridge Pleats	75
Cartridge End Cap Type	Stamped steel
Anti-Drainback Valve Type	Spring loaded steel, nitrile seal
Bypass Valve Type	Nitrile rubber diaphragm
Element Type	Paper media, glued seam
Element Length	73 inches
Element Width	3.750 inches
Element Surface Area	274.0 square inches
Shell Thickness	0.014 inches
Backplate Thickness	0.118 inches
Gasket Type	Nitrile rubber
Hydrostatic Burst Pressure	Unknown
SAE J806 Filtration Efficiency	Unknown
SAE J1858 Filtration Efficiency	Unknown

Summary

nil

See the [AC Delco](#), [Champion](#), [Fram](#), [Purolator](#), and [Wix](#) sections for information on how to identify these manufacturers by looking at the backplate. The tell-tale signs are always there.

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Engine Oil Filters Overview

[[Recommended Filters](#) | [Filters To Avoid](#)]

Description

This page now contains my *personal* slant on oil filters. It is largely based on the things I discovered in the [Oil Filter Study](#) I started several months ago. Since there was concern about the influence of some of the subjective information on that page, it has been removed and put into this page. Again, these are my personal opinions and I am just a concerned automotive enthusiast that is tired of being toyed with by these manufacturers. In reality, I am an Electrical Engineer with no qualifications in the area of filtration analysis. However, I have eyes and some common sense, which has proven to be enough to accomplish what I set out to do.

What Makes A Good Filter?

Engine oil filter have one purpose in life: to filter out the particles that enter the oil so that they don't act as abrasives when the oil recirculates. The filter is a cellulose (paper) or synthetic media that is usually contained in a steel can. The front of the can typically has a threaded center with surrounding holes. Oil enters through the surrounding holes, passes through the filter media, and exits through the threaded center. The filters usually screw right onto the engine block using an o-ring gasket to prevent leakage. Many filters have an anti-drainback valve to prevent dirty oil from backwashing back into the oil pan. They also have a pressure relief or bypass valve that will allow oil to bypass the filter element in the event that it becomes too plugged to pass enough oil. This prevents engine oil starvation and the possibility of destroying the element, allowing pieces of it and the junk it filtered to enter the engine. Also, when the oil is cold and very thick, it will tend to bypass the filter through the pressure relief valve because it cannot pass through the element until it thins out somewhat. If it did not do this, the filter element media would tear open.

A good filter has a strong steel can to withstand the high oil pressure (60-80psi when cold), an anti-drainback valve that actually works without creating too much backpressure, a pressure relief valve that doesn't leak, and a strong paper element and cap that can with stand the pressure and flow of oil without falling apart. The element media has to be able to trap small particles, but without restricting the flow too much. Cellulose (paper) media is used on economy filters and works OK. The fibers in the paper acts as a mesh to block particles down to a certain average size, while allowing the oil to pass through. Some manufacturers add other media, such as cotton, to the cellulose to improve its performance. There is synthetic fiber media for the high-end filters that has smaller passages to trap smaller particles, but can pass more fluid through it because it has more of them. There is also media that is a blend of these two. There are also "depth" filters that are usually made of synthetic material that has a passage size gradient to it. In other words, the deeper into the element the oil goes, the smaller the passages get. This way, large particles are trapped in a different spot than small particles, which allows the filter to hold more particles before it "blocks" (becomes too restrictive).

All filters have to undergo SAE (Society of Automotive Engineers) tests to prove that they meet the engine manufacturer's requirements. The SAE J806 test uses a single-pass test, checking for contaminant holding capacity, size of contaminant particles trapped, and ability to maintain clean oil. As an amendment of the J806 test, the multi-pass test also looks for filter life in hours, contaminant capacity in grams, and efficiency based on weight. The efficiency of the filter is determined only by weight through gravimetric measurement of the filtered test liquid. Typical numbers for paper filter elements are 85% (single pass) and 80% (multi-pass). A new test, the SAE J1858, provides both particle counting and gravimetric measurement to measure filter capacity and efficiency. Actual counts of contaminant particles by size are obtained every 10 minutes, both upstream (before the filter) and downstream (after the filter), for evaluation. From this data filtration ratio and efficiency for each contaminant particle size can be determined as well as dust capacity and pressure loss as a function of time. Typical numbers for paper element filters are 40% at 10 microns, 60% at 20 microns, 93% at 30 microns, and 97% at 40 microns.

Recommended Filters

Based on the simple criteria above and the information I gathered in the [Oil filter Study](#), I have found some filters that are readily available and are of good quality. I have disassembled many filters and made observations and measurements on them. Sadly, some of the most common and popular filters don't cut it in my book. Those filters are described in the [next section](#). The filter names are also links to the [Oil Filter Study](#) page, which gives the intimate details of that filter in the Ford 5.0L V8 version. You will find all the hard data for these filters there. What follows are filters that I recommend in alphabetical order:

AC Delco Duraguard

This filter does not appear to be AC Delco's original design, but it is still pretty good. It has one of the highest filter element surface areas with fewer, but very deep pleats. It also has strong, metal end caps with a nitrile rubber diaphragm-type anti-drainback valve and steel bypass valve. It is one of the better filters you can get for \$3.

I have had some feedback about these filters leaking at the seam between the backplate and the can. Often this was in situations where the engine was modified. Also, during a recent oil change, I found that this filter did not have the best anti-drainback valve. It is better than Fram because I have very little valve train noise at startup (I had a lot with Fram). I now have a NAPA Gold filter on it, which gives me no noise at all.

AC Delco Ultraguard Gold

This filter appears to be a Champion Labs filter. This is not surprising given that Champion Labs also manufactures other AC Delco filters for some European vehicles. See the [German Oil Filter Study](#).

AMSOIL

No real information yet. I have cut it open and it looks like a very nice filter. The manufacturer appears to be Baldwin.

Baldwin

No information yet. One is being delivered.

Bosch

This is yet another Champion Labs filter that is sold at AutoZone.

Car And Driver

This is a Champion Labs filter that is sold at Target.

Deutsch

This is a Champion Labs filter that is sold at AutoZone.

Fram Tough Guard

Even with all the problems of the other Fram filters, this one is not too bad. It has a heavier filter element with more surface area, a silicone anti-drainback valve, the cheap pressure relief valve, but with a clever integral screen to keep out large particles, and enough inlet holes for good flow. The only other drawback to this filter is that it is capped on each end with cardboard instead of metal. Looking in through the center outlet does not reveal any paper end caps, but they are there.

Hard Driver

This is one of the few oil filters that uses a synthetic filter element. It has a dual-density layering "depth" filter element. The construction of the filter is what you would expect from a quality filter with steel filter element caps and special epoxy-coated steel mesh retainers to keep the element from flexing. It also has a good flowing, strong steel case and a zinc-coated backplate to prevent pre-installation corrosion. I have disassembled but have not measured this filter. I have not been able to find this filter at any retail stores.

Mobil 1

This filter is made by Champion Labs and uses a synthetic fiber element that can filter out very small particles. It is rated by the manufacturer at just under the Purolator Pure One as far as filtering capability, but is still very much above conventional paper filters. It also has a very strong construction to withstand high pressure spikes during start-up. Given the choice between the Purolator Pure One and the Mobil 1 filters, I would choose the Mobil 1 because of the restriction concerns of the Pure One. However, as with all Mobil 1 products, expect to pay 2 - 3 times as much for this filter. I have seen this filter sold at AutoZone and K-mart.

Though I have never had problems, I have received feedback from a few people that these filters may leak at the base. It seems that the seal between the backplate and can may burst under high pressure (at startup). These were on Ford engine applications.

Mopar Filters (various)

These filters are Frams, Purolators, or Wixes. Mopar does not manufacture it's own filters, nor do they require anything special from these manufacturers. Since they basically paint them a different color, stamp them with a Mopar logo, and double the price, there is no reason to buy them. Sadly, the Mopar Severe Duty 53020311 filter is actually the worst filter of them all. It is a [Fram Extra Guard](#).

Motorcraft

This was a Purolator hybrid. It had the Premium Plus case (anti-drainback valve, gasket, etc), but with a Pure One filter element. This is a cheap way to get a Purolator Pure One. It is sold at many locations including AutoZone, Pep Boys, etc.

NAPA

They sell two lines of oil filters: NAPA Silver and NAPA Gold. They are both made by Dana (Wix) and there is no obvious difference between them. They may have different elements, but NAPA does not state that this is true.

PowerFlo

This is a Purolator Premium Plus that I have seen at Murray's Auto Supplies.

ProLine

This is a Purolator Premium Plus that I have seen at Pep Boys. Pep Boys also sells the Purolator Premium Plus brand, which is pretty dumb (to be selling both).

Purolator Premium Plus

The Purolator is a solid design. It seems to have one of the tougher paper filter element of them all and the bypass valve is built right into the cartridge. There are no internal sealing problems with this filter at all. There is an assembly string that is wrapped around the filter element, probably to hold it in place while the glue cures in the end caps. In the [ProLine](#) (one of the Purolator clones), the string was wrapped too tightly and had damaged the filter element. All the other Purolator-made filters (8 in all) had no trouble, and even the damaged one would probably have been fine.

Purolator Pure One

This is an interesting filter design made by Purolator. Most of the construction of the Pure One is the same as the Purolator Premium Plus. The big difference is the filter element itself. It has a dense paper/fiber filter element that can filter very small particles. The result of this is cleaner oil exiting the element, but more oil restriction. Purolator addressed this by adding more filter material (more and deeper pleats). After seeing one of these filters cut open, I am apprehensive about this filter. It seems to have so many pleats that it is almost a solid chunk of filter element.

It seems like it would end up restricting the flow, more than anything. Purolator has plenty of data on the filtration abilities of this filter and I don't doubt it, but they have no flow data. Even so, I don't see any major problems with this filter. It also sports a silicone anti-drainback valve and a PTFE treated nitrile rubber gasket.

STP

This is a Champion Labs filter that I have seen at AutoZone and Walmart.

Wix

Another quality oil filter similar in design to the Purolator. It has metal end caps on the filter element, a standard nitrile anti-drainback valve, and a seemingly good flow. They are manufactured by the Dana corporation. These appear to have a depth gradient filter element, which uses cotton fibers to progressively trap smaller particles as they get deeper in the filter. This helps maintain good flow as the filter gets plugged.

Filters To Avoid

The following list of filters have known problems. You will see well-known names here and will probably be disappointed. This is because many of these brands have stopped making their own filters and buy from a common manufacturer.

Fram Extra Guard

Years ago Fram was a quality filter manufacturer. Now their standard filter (the radioactive-orange cans) is one of the worst out there. It features cardboard end caps for the filter element that are glued in place. The rubber anti-drainback valve seals against the cardboard and frequently leaks, causing dirty oil to drain back into the pan. The bypass valves are plastic and are sometimes not molded correctly, which allows them to leak all the time. The stamped-metal threaded end is weakly constructed and it has smaller and fewer oil inlet holes, which may restrict flow. I had one of these filters fail in my previous car. The filter element collapsed and bits of filter and glue were circulating through my system. The oil passage to the head became blocked and the head got so hot from oil starvation that it actually melted the vacuum lines connected to it as well as the wires near it.

Fram Double Guard

Another bad filter idea brought to you by your friends at Fram. The filter itself is a slightly improved design over the Fram Extra Guard, but still uses the same filter element. It has a silicone anti-drainback valve, a quality pressure relief valve, and enough inlet holes for good flow. The big problem is that they are trying to cash in on the Slick 50 craze. They impregnate the filter element with bits of Teflon like that found in Slick 50. As with Slick 50, Teflon is a solid and does not belong in an engine. It cannot get into the parts of the engine that oil can and therefore does nothing. Also, as the filter gets dirty, it ends up filtering the Teflon right out. Dupont (the manufacturer of Teflon) does not recommend Teflon for use in internal combustion engines. Please do not waste your money on this filter.

Penzoil

This filter is a Fram! It is the exact same design as the Fram Extra Guard filter and it is junk. On the up side, it costs \$1 less than the Fram version.

Quaker State

This is another Fram Extra Guard that I have seen at K-mart. It used to be a Purolator, but Quaker State is now owned/controlled by Penzoil...

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