

Simple Facts for Owners of Diesel-Powered Equipment

Catch-up on the latest information!

The following Shoptalk section contains maintenance tips, cost reduction ideas, and product features and benefits.

If you're interested in reading Shoptalk online, you can find it at: www.shoptalk.donaldson.com



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Air Filter Service — Best Practices

Here are some dos and don'ts from Donaldson about air filter servicing and handling. This servicing information is provided as a best practices guide. It is not however intended to replace or supersede the service instructions supplied by your engine or vehicle manufacturer.

Don't remove an air filter from its housing simply to inspect it.



- Removing and replacing the same filter can do more harm than good.
- Ridges of dirt on the gasket sealing surface can drop on the clean filter side when the gasket is released.

Ideally, service your air filter by restriction measurement or follow your regular maintenance schedule.

- If you don't trust your current filter service indicator, getting a new one is a good idea.
- Restriction indicators, mounted on the air cleaner system are recommended for keeping an eye on restriction levels and indicating when servicing is due.
- For testing of initial restriction and confirming remaining filter life, we recommend the greater accuracy of a clock-type restriction gauge or water manometer.



When the indicator window shows "RED," it's time to replace the air filter. A "GREEN" window indicates all is OK.

Never hit a filter to try cleaning it.

- Rapping hard enough to knock off dust damages the filter and can place your engine at risk for dust ingestion.
- Deeply embedded dirt is never released by tapping.
- It is always safer to keep operating until you can change to a new filter than to try and tap out the dirt.



Do not clean a primary or safety filter instead of replacing it.

- Heavy-duty air filtration manufacturers do not recommend any type of cleaning process to be used on their products.
- Once an air filter has been cleaned or washed, the Donaldson filter warranty is no longer valid.
- The dirt holding capacity of a filter is reduced 20 – 40% with each cleaning attempt.
- There is also the real risk of dirt reaching the clean side of the filter if cleaning is attempted.
- The risk of filter damage from washing, tapping, high pressure water, or compressed air cleaning is very real.
- The potential savings from risky attempts at filter cleaning won't come close to offsetting potential damage to engine components.
- Increased engine wear and damage is the result of the ingress of contaminant over time.



Never operate a system with only a safety filter in place.

- Safety or secondary filters used alone will let harmful contaminant enter the engine.
- Safety or secondary air filters are designed to complement the primary filtration or provide protection during primary filtration service.

For longer service between filter changes, consider upgrading to an extended service filter such as Donaldson Endurance™ air filters. Then service the filter by restriction only.



Don't use a dented or damaged filter.



Tips and Maintenance Practices for Equipment Longevity!

Check any intake hoods and pre-cleaner devices during maintenance routines.

- A missing inlet hood will significantly shorten filter life. If your unit had a hood or pre-cleaner originally, make sure you replace it.
- Check openings and tubes on pre-cleaners to make sure they are not plugged
- Replace any units that are damaged. Damaged or dented units will not operate properly.



Never leave an air cleaner open longer than necessary. An open air cleaner with filter removed is a direct entry to the engine.

- Keep your engine protected during filter changes.
- Contaminants that are smaller than the eye can see can be damaging to an engine.
- If the air cleaner housing is not going to be reassembled immediately, be sure to cover the opening.



At filter change-out, check to ensure that there is no damage to the air cleaner housing itself.



Check for any air leaks in the ducting on both sides of the air cleaner.

An air leak between the air cleaner and the engine gives dirt a direct path into the engine.

Do not judge the filter's remaining life by looking at it. A dirty-looking filter may still have plenty of life left.

- On the other hand, a clean-looking filter can also be deceiving.
- You can't see the dirt that's embedded deep within the filter media, and carbon contamination may not be visible to the eye.
- One of the best options for lowest filter maintenance costs and best engine protection is to monitor air filter life with a restriction indicator.
- It's a low-cost and smart investment.



Don't ignore a worn or damaged gasket. If your air cleaner has a cover gasket, replace it with a new one when changing filters.

- Some air cleaners, such as the EBA and ERA models, specifically call for a new gasket with each filter change-out.
- Never reuse the old one. Replace it according to the service instructions.



Don't take chances with weather-worn Vacuator™ Valves which can admit dirt instead of expelling it.

- Replace any missing or damaged Vacuator Valves and any air cleaner fasteners.
- Make sure the valve is flexible and not inverted, damaged or plugged. Replace it if damaged or if it looks like any of these images. A damaged or missing Vacuator Valve will disrupt the designed flow of air through the air cleaner.



Both of these filters look ready for replacement, but neither have reached their final servicing point.



More Tips and Maintenance Practices for Equipment Longevity!

Never substitute one filter with another one that has a different model number.

- The only exception is in cases where another filter is recommended as an upgrade to an older style filter.
- Filters may look almost identical, but even a small difference in size can prevent a good seal or affect airflow.
- Selecting a filter by fit alone may also give you the wrong media with potentially serious consequences for your engine over time.

A water manometer is the most accurate method to verify airflow restriction.

- For testing of initial restriction and confirming remaining filter life, we recommend the greater accuracy of a clock type restriction gauge or water manometer.
- Use the restriction tap provided on the air cleaner or at the transfer pipe.
- Replace the filter only when the restriction level has reached the maximum recommended by the engine or equipment manufacturer.
- Restriction indicators that are mounted on the air cleaner system are recommended for keeping an eye on restriction levels and indicating when servicing is due.



Installing RadialSeal™ filters

- Donaldson RadialSeal filters have a dry lubricant on the seal which aids in installation and removal. Do not remove the lubricant.
- No cover pressure is required to hold the seal in place and one should NEVER use the service cover to apply pressure.
- Forcing a cover could damage the housing, filter and fasteners and void the warranty.
- If the service cover presses against the filter before the cover is fully in place, remove the cover, push the filter further into the air cleaner by hand and then the cover will go on with no extra force.



Filter service & maintenance records

- Vehicle and engine manufacturers provide filter maintenance practices for the equipment they sell. Make sure to follow their recommendations for routine filter service. Being able to show/reveal your maintenance records for potential warranty claims is essential.
- Like all components, air intake systems have evolved and older styles and filters have different maintenance procedures. Make sure your maintenance personnel are familiar with the proper service techniques.
- Log or track your filter changes. Whether you are going to service by miles, hours or restriction.
- Many maintenance shops find it helpful to record the date of filter change directly on the filter.
- If you have to replace an entire air cleaner housing, consider designs that offer improved filtration performance (high efficiency filtration) or enhanced sealing (Donaldson RadialSeal™ housings).



Avoid cross contamination during filter service.

When a dirty filter is at its service point — the inlet side of the filter is loaded with contaminant — take these precautions to eliminate contaminant from getting on the outlet side of your new filter or clean sealing surfaces (gaskets or RadialSeal™ end caps).

- If you wear gloves during service, remove them prior to handling the new filter.
- If you don't use gloves, wash or clean your hands before handling the new filter.
- Keep your new filter in its box until your ready to replace.
- If product box has layers of contaminant, take care that the contaminant doesn't get on the new filter as you remove it from the box.



The clean side of your air filter can vary depending on the application. Some filters load on the outer surface (shown above — referred to as standard flow), and some load on the inside surfaces of the filter (referred to as reverse flow).

Inspect the entire air induction system

The last step to any air filter service, is to inspect and tighten all air cleaner system connections.

- Immediately replace or repair any visible holes or damaged components.
- Inspect all air ducting for worn spots or damage — elbows, connections and seals.
- Check all clamps, making sure they're secure and tight.
- Inspect your pre-cleaners or inlet hoods (if equipped).
- Annual replacement of air cleaner system gaskets is recommended.
- Reset manual filter indicators.
- Record action items taken in your filter service records.



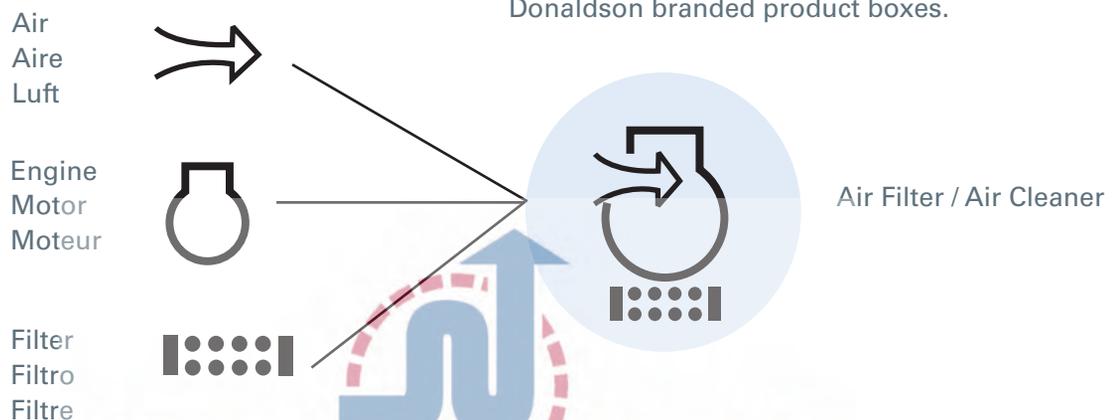
Tips and Recommendations for Storage and Handling

Whether it's an empty trailer or building, it's important to practice good storage and handling techniques when it comes to filters. Before installing any filter on a piece of equipment make sure the filter is clean, unused and free of damage and is not more than six years old from the manufacturing date.

- Never store an air filter on a shelf without it being in a box or totally sealed from outside contaminant.
- When you see an open box of filters on the shelf, tape it shut — unless the filters inside the box are individually sealed.
- Handle filters with care to prevent filter damage; for example, don't throw filters into the back of a truck.
- If transporting filters from one job site to another, don't let them roll around on the floorboard or in the back of the truck, as this may cause damage.
- Metal storage shelves may cause condensation to form on filters if sitting directly on metal. Over time the filter may get rusty. This is another good reason to store filters in boxes.
- If the product box has layers of contaminant, take care that the contaminant doesn't get on the new filter when you remove it from the box.
- Practice "first-in, first-out" with your inventory. When possible, always use the oldest inventory first.
- Make sure any labels with product information and manufacturing dates are visible to personnel pulling from the shelves.
- The conditions under which the filters are stored can have a significant impact upon the shelf life of the filter; e.g., conditions of excessive temperatures or exposures to certain chemical environments can have an adverse effect on shelf life.
- Avoid cross contamination from an old filter to a new one. Make sure your hands are clean when handling the new filter and avoid touching/handling the outlet side of the filter.

Air Filter/Air Cleaner Pictogram

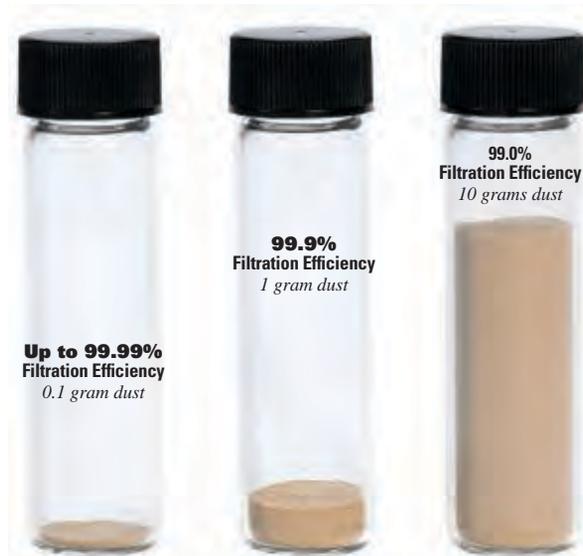
The Donaldson pictogram for air filters and housings is a combination of three industry shapes. You'll also see the pictogram on Donaldson branded product boxes.



Take a Look at Air Filtration Efficiency and Dust Holding Capacity

Compare for yourself — see how much dust can pass through your air filter during 100 hours of operation.

Donaldson Endurance™ Air Filters Ultra-Web® Filter Media	Donaldson Air Filters Standard Filter Media	Will-fit Air Filters Standard Filter Media
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You Can See the Difference!

These dust vials show the actual amount of Arizona fine test dust that passes through the air filter media for every one kilogram of dust fed to the air filter, which is equivalent to 100 hours* of equipment operation.

Will-fit filters can allow up to 100 times more dirt to pass through the filter into the engine than Donaldson Endurance air filters with Ultra-Web filter media.

* Estimate based upon typical medium dust operating conditions with 92% pre-cleaner efficiency. Actual results may vary.

Donaldson Ultra-Web® nanofiber filtration technology delivers cost saving benefits:

- Superior filtration
- Long filter life with submicron contaminant
- Highest efficiency
- Ideal for extended maintenance intervals
- Longer engine life

Don't leave engine protection to chance!

Use Donaldson Endurance air filters with the blue Ultra-Web nanofiber media for maximum filtration efficiency and superior dust holding capacity.

All Nanofibers are Not Created Equal

Since Donaldson introduced Ultra-Web® to industrial applications nearly 30 years ago and to the diesel engine market almost 20 years ago, the technology has been continually advanced and perfected to deliver longer filter life and higher efficiency while protecting the environment.

ULTRA-WEB® High Efficiency Nanofiber Filters Built to Last

Ultra-Web nanofiber filtration technology strikes just the right balance between the strength of the fiber density of the web and the level of filtration. Ultra-Web nanofibers produce a very fine,



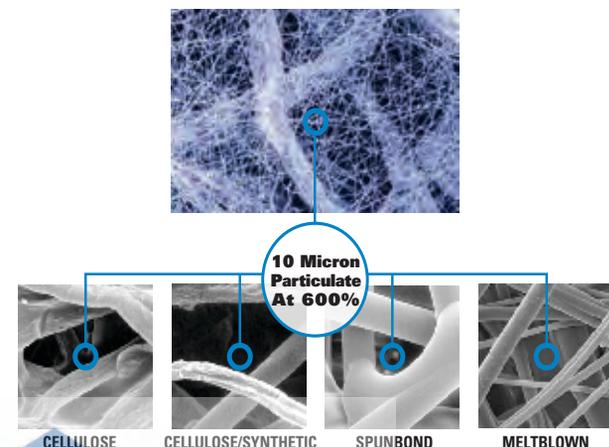
continuous fiber that form a permanent web-like net that traps dust on the surface of the filter media.

Longer Filter Life

Ultra-Web technology is proven and perfected to last up to two times longer than

axial filters. What's the secret? Ultra-Web technology keeps particulate on the surface of the media. Filtration scientists attribute surface loading of dust with lower operating pressure drop over a much longer period of time. This means less energy is required to pulse off the dust and allows the filter to perform longer. Conversely with other types of filters, pressure drop starts higher and continues to rise quickly, which shortens the life of the filter and uses more energy.

Ultra-Web Nanofiber Technology



Ref: Shoptalk Card F115279

Ref: Shoptalk Card F115240

Don't Throw Away a Good Filter Just Because it Looks "Dirty"



Although this air filter may look "dirty" — it can go plenty more miles. Installation of a restriction indicator can save you money and time.

Why Service By Restriction?

Proper air cleaner servicing will result in maximum engine protection against the ravages of dust. Proper servicing can also save you time and money by increasing filter life and dust cleaning efficiency.

By using proper filter restriction measurement tools you will use the full life of the filter at maximum efficiency. **DON'T BE FOOLED** by filter appearance: it should look dirty.



The only way to determine when a filter is plugged or plugging is to measure the restriction on the system with the engine working at max airflow.

Two of the most common air cleaner servicing problems are:

1. Over-servicing: the least efficient time in the life of the filter is when it is new. Filter elements increase in efficiency as dust builds up on the media.
2. Improper servicing: your engine is highly vulnerable to abrasive dust contaminants during the servicing process when the filter is removed from the housing. A leading cause of engine damage is due to careless servicing procedures.

Choose Restriction Measurement Tools that Best Fit Your Applications

Donaldson offers a variety of restriction measuring devices that help you get maximum filter utilization. All measure restriction in inches of water vacuum. All are resistant to vibration, breakage, weather, corrosion, dust, and dirt to assure reliable filter restriction readings.



Continuous Reading devices show how much life is left in the filter are:

- The Informer™
- Service Gauge for Instrument Panel

Go/No-Go restriction readings on heavy-duty vehicles are:

- ServiSignal™
- Visual Restriction Indicator
- Electrical Indicator
- SafetySignal™ for safety filters

In-Field restriction readings or for more accurate readings use the In-Field Service Gauge Kit #X003903



Ref: Shoptalk Card F115236 & Air Cleaner Catalog F110027

Shoptalk

Simple Facts about Air Filtration



Will Using Aftermarket Filters or Mufflers Void My Warranty?

Answer: Good News! No need to worry about voiding your warranty — you can use aftermarket products! You still need to follow your manufacturer’s recommended maintenance practices, but your warranty is protected under the Magnuson-Moss Warranty Act. Information on the Magnuson-Moss Warranty Act is available at <http://www.ftc.gov/bcp/edu/pubs/business/adv/bus01.shtm#Magnuson-Moss>.

In addition, Donaldson warrants its aftermarket products against failure due to defects in materials and workmanship for the period specified under the Terms and Conditions for the particular product. More information is available at www.donaldson.com/en/engine/support/datalibrary/000194.pdf.

Worried About Water in Your Air Intake System?



Sometimes you can't help operating equipment in extreme moisture environments, but it's good to know a few things to help keep your air intake system running at top efficiency.

Typical Symptoms of Water Ingestion:

- High restriction indications
- Mud caked in the Vacuator™ Valve
- Wet, wavy air filter media
- System rust, corrosion and/or water damage
- Moisture-related environmental problems such as icing

Simple Tips to Keep Water Out of Your System:

- Check and clear the VacValve daily
- Make sure the air cleaner cover and filter are installed properly
- Inspect air intake system for any leaks



Caution: A water-soaked air filter will occasionally lock-up a restriction indicator!

A restriction indicator's "lock-up" restriction level is generally marked on the indicator itself. To check an indicator, remove it, wipe the base clean, then apply a small amount of vacuum. If the indicator locks up, it is okay. If not, replace the indicator.

Donaldson Filtration Solutions
Engine Aftermarket Warranty for the Americas

Warranty Coverage
 Donaldson warrants its Aftermarket products against failure due to defects in materials and workmanship for the period specified under Terms and Conditions for particular product. Donaldson's obligation under this warranty covers replacing the failed product, including transportation charges, only. If the Donaldson product failure is the sole and direct cause of damage to the equipment on which the product was properly installed, Donaldson will reimburse reasonable costs to restore the equipment to the condition it was in immediately before the failure. This warranty does not cover failure due to misapplication, misuse, abuse, neglect, rust, rough and corrosion (mufflers), improper installation, improper service practices or non-Donaldson approved modifications.

Notification
 Donaldson must be notified in writing of any claims covered by this warranty within one year of the date of failure. Donaldson, at its discretion, will either physically visit the site where the alleged failure has been found, or request that all parts (Donaldson and other relevant parts) be shipped prepaid to its General Office, in care of the Product Lab or as otherwise specified.

Terms and Conditions
 Warranty coverage begins on the date and mileage the product is purchased by the user and expires when the specified number of years or miles has passed, whichever occurs first.

The length of warranty for replacement products provided under Warranty coverage is the balance of the warranty period remaining on the product being replaced.

Engine and equipment manufacturers warranties remain in effect when Donaldson products are used.

Warranty Length by Product Type

Filtration Products	Warranty from Date of Delivery to User
Liquid Filter Assemblies and Accessories	1 year
Air and Liquid Filters	Until first cleaned or serviced in any manner
Air Cleaner Housings and Accessories	1 year
TopSpin™ HD	Limited Lifetime Warranty
Air/Oil Separators	6 months / 1,000 hours from in-service date
Exhaust Products	Warranty from Date of Delivery to User
Diesel Mufflers	4 years or 500,000 miles (800,000 km)
Vertical Installation	3 years or 500,000 miles (800,000 km)
Horizontal Installation	1 year
Gas Mufflers	1 year
Silent Partner™ Exhaust Silencer	8 years or 1,000,000 miles (1,600,000 km)
Stainless Steel	4 years or 500,000 miles (800,000 km)
Aluminized Steel	1 year or 100,000 miles (160,000 km)
Exhaust Accessories	90 days
Chrome Parts (peeling and blistering only)	1 year or 120,000 (200,000 km); on-highway use only
Flex Pipe	1 year or 120,000 (200,000 km); on-highway use only
Long-Life Flex Pipe	1 year or 120,000 (200,000 km); on-highway use only

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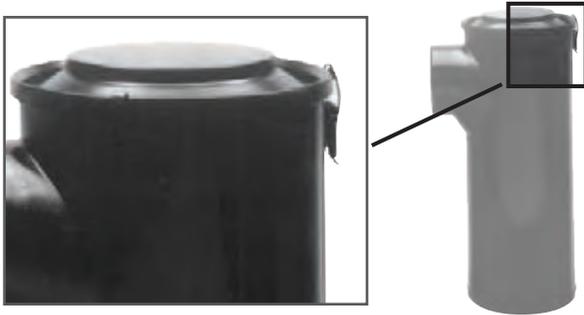
North America: 800-374-1374

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Ref: Shoptalk Card F115222



Keep Those ECG Konepac™ Air Cleaner Latches Inspected



ECG style air cleaners have three cover latches that need to perform correctly to ensure the element gasket is sealing properly. These latches should be checked for tightness and wear. To check for tightness, close all three latches, then open and close them one at a time. There should be good tension and should snap tightly when closed. If any latches seem loose or rattle, they should be replaced.



The spring clip and pin repair kit is X009291 and fits all ECG style air cleaners.



The most obvious place to check for wear is the spring latch tip (the part that hooks into the notch on the filter cover). The tip may become sharp and cut into the filter cover with extended wear. The tip may also wear to the point where it will not hook onto the filter cover at all. If any of these conditions are evident, the latch should be replaced.

No Matter What Dust Condition, Pre-cleaners Extend Air Filter Life



Six pre-cleaner styles offer the broadest product range in the industry

Pre-cleaners remove contaminant of varying sizes from entering the intake duct; they don't require any engine power to operate. Some devices collect the contaminant (Full-View), others just eject or drop the contaminant (TopSpin, Top Spin HD / in-line separator), or are connected via a scavenge system and route debris out the exhaust system (Donaspin / Strata Cap).

- Strata Cap and Donaspin are units for scavenge air system option for heavy dust condition operating environments. Additional components required for scavenge system (hoses, check valves, clamps and exhaust ejector)
- Pre-cleaners extend life of vehicle air filters and serve as rain caps
- Units are made of durable materials — either metal or impact resistant plastic
- Units install outside of engine compartment — leaving more space under hood for other components (exception-in-line separator)
- Pre-cleaners have no wires or power requirements
- Requires additional components for scavenge system (hoses, check valves, clamps and exhaust ejector)

Quick Comparison

More characteristics about our pre-cleaner line. For more details, contact your local distributor or dealer.

Dust Condition	Max. Sepr Efficiency	Pre-Cleaner Family	Scavenge Required	Service Required	Material
Heavy	96%	Strata™ Cap	Yes	Yes	Plastic
	90%	Donaspin™	Yes	No	Steel
Medium	85%	TopSpin™	No	No	Plastic
	80%	TopSpin™ HD	No	No	Aluminum/ Stainless Steel
	70%	In-Line Separator	No	No	Steel
	75%	Full-View	No	Yes	Steel/Plastic

Ref: Shoptalk Card F115246

Did You Know that Your Truck, Tractor and Airplane Can All Use Donaldson Filters?



If you own or operate a Beechcraft, Piper, Cessna or Mooney airplane, or a Bell, Aerospatiale (Eurocopter) or MD Hughes rotorcraft, chances are it was delivered with Donaldson filters onboard. Airframe and engine manufacturers trust Donaldson quality. We've been providing superior pleated media engine air intake, fuel, lube and hydraulic filters for piston-powered aircraft for more than 40 years. When it comes time for your next maintenance check, don't compromise the integrity of your airplane! Ask your mechanic to install Donaldson OEM filters for maximum performance and filter life.



Donaldson General Aviation Engine Air Intake Filters

Ref: Shoptalk Card F115232

Contact Information for Filtration Systems for the Aerospace & Defense Industry

North America 1-866-323-0394

Europe Aerospace +00 800-63-29-2750

Europe Defense +00 800-28-00-2900

For additional locations and contact information, visit:
www.donaldsonaerospace-defense.com

Donaldson Keeps Military Vehicles Moving



The Bradley M2/A3 Fighting Vehicle relies on a Donaldson air cleaner and muffler.

Did you know . . .

Donaldson designs and manufactures filtration and exhaust products for a large variety of defense applications and equipment? For example . . .



The LCAC Hovercraft uses Donaldson Strata™ panel filters to supply clean air to its engine.



Donaldson Defense Group introduced the Strata™ tube pre-cleaner on the Sikorsky CH-53 Helicopter.

We've designed filters to perform in extreme environments. Our filters are used worldwide in the roughest military applications, effectively filtering air and exhaust, as well as transmission fluid, hydraulic systems, lube oil, coolant, and fuel.

Ref: Shoptalk Card F115223