

Atlas Copco PV271 Reliability Enhancement Guide

- **Reduce Wear**
- **Increase Reliability**
- **Extend Equipment Life**
- **Longer Service Intervals**
- **Lower Maintenance Costs**

Merlin Equipment Pte Ltd

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FILTERMAG[®]

If Lubrication Were Perfect, Nothing Would Ever Wear Out.

Within the tight tolerances of today's equipment, normal wear generates tiny steel particles that remain suspended in oil. These particles are so small they pass through the most advanced oil filtration systems.

When the oil circulates back into the equipment, these same particles are carried into every lubricated space. This particle laden oil will continue to lubricate, but it will also cause an exponential increase in wear while it circulates. The longer oil remains in the system, the greater the wear.

FilterMag[®] extracts normal, wear causing, steel particles from oil with its powerful, focused, magnetic field technology.

These particles are permanently trapped on the inside wall of the filter and are thrown away when you change the filter. Slide the FilterMag[®] off the old filter; snap it onto a new one and it goes right back to work protecting your equipment.

FilterMag's multi-patented technologies have been shown to reduce wear, increase reliability, lower maintenance costs, and extend equipment life by 30%, 60% or more.

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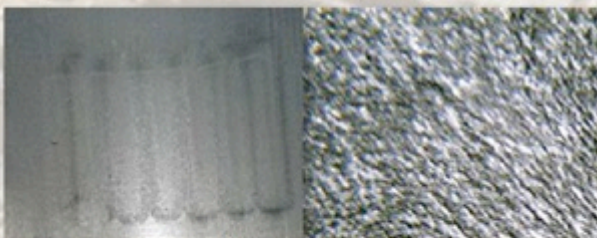
Caterpillar 3516 Engine Case Study



Caterpillar 3516

A noted Ph.D. Analytical Chemist and Lab Manager at a large equipment dealer wanted to know "how many particles would be caught by FilterMag[®] that would otherwise pass through the four onboard 3516 oil filters?" A newly rebuilt 3516 was broken in on the dealer's dynamometer and the filters and oil were discarded. Each of the new filters were equipped with two FilterMag[®] CT4.9s encircling the filter (closest to the threaded end). The engine was run for one hour on a dynamometer.

The results were stunning.



Particles captured by FilterMag[®] on inside of filter canister.

45X microscopic photo of debris captured by FilterMag[®] on side of filter canister.

In one hour of operation, over 134,000,000 particles below 21µm were captured and held against the inside wall of the oil filter.

None of the particles can be seen individually. However, under 45X magnification the particles can be seen aligning themselves to the CT4.9's magnetic field.

PV 271 Compressor Case Study



Atlas Copco PV271

Each of four oil filters protecting a PV271 compressor were fitted with two FilterMag[®] CT4.9s. The results were stunning.

- 84% overall reduction in particles $\geq 4\mu\text{m}$ was achieved.
- 300% increase in life extension was yielded from ISO contamination code drops at $>6\mu\text{m}$ and $>14\mu\text{m}$ particle sizes.
- The life extension was established using Noria's Life Cycle Multipliers for Diesel Engines and Hydraulics.
- FilterMag[®] is a one time expense designed for a 10-year service life. Use it over and over when each oil filter is replaced, or as you replace equipment.

Particle Count	Sample 3	Sample 2	Sample 1	No FilterMag
ISO 4406 Rating	19/16/11	21/18/11	21/18/12	22/20/15
>4 Micron	3258	10907	10474	20518
>6 Micron	498	1424	1785	8955
>14 Micron	14	19	35	285

Fewer Particles in Oil = Higher Reliability + Longer Life

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Hydraulic System— Primary Cooling System

Hydraulically Driven Cooling Fan

- Install four FilterMag[®] XT4s opposite each other near the open end of the oil filter housing.
- 8 XT4s required.

FilterMag[®] XT4



Central Hydraulic System

Four Canister Filters

(mounted two on each side of system)

- Install four FilterMag[®] XT4s opposite each other near the open end of the oil filter housing.
- 16 XT4s required.

FilterMag[®] XT4



Top Drive Gear Oil Filtration

Heavy Gear Oil Lubricating Drive System

- Install six FilterMag[®] CT3.2s opposite each other near the threaded end of the Donaldson P170313 filter.
- Six CT3.2s required.

Six FilterMags
(FilterMag[®] 3.8s shown).



Engine Oil Lubrication

Lubrication Oil

- Install two FilterMag[®] CT4.9s opposite of each other near the threaded end of each CAT 326-1643 filter.
- Eight CT4.9s required.

FilterMag[®] CT4.9





Why put six FilterMag® CTs on Fuel Filters?

- Fuel filtration is a one pass opportunity to grab particles. Particle capture is optimized with six FilterMags covering the filter's exterior.
- If there is a primary and secondary filter arrangement, install four FilterMags to the larger of the two and two FilterMags to the smaller.

Fuel System and Fuel-Water Separation

Fuel Filtration

- Install six FilterMag® CT4.9s opposite each other near the threaded end of each CAT 1R-0755 filter.
- Six CT4.9s required.



Fuel-Water Separator

- Install six FilterMag® CT4.9s opposite each other near the threaded end of each CAT 326-1643 filter.
- Six CT4.9s required.



Engine Cooling System

Engine Coolant

- Install two FilterMag® CT3.8s opposite of each other near the threaded end of each Atlas 51914356 filter.



FilterMag® CT3.8s.

Application Summary

Application	Filters Used, Qty.	Type/Dia. inches (mm)	Applicable FilterMag®
Diesel Fuel	CAT 1R-0755 (1)	Spin-on, 5-1/8 (130)	CT4.9 (6 required)
Diesel Fuel (water separator)	CAT 326-1643 (1)	Spin-on, 4-1/4 (108)	CT3.8 (6 required)
Engine Oil (Conoco 15/40)	CAT 1R-1808 (4)	Spin-on, 5-1/8 (130)	CT4.9 (8 required)
Engine Coolant (rust removal)	Atlas 51914356 (2)	Spin-on	CT3.8 (4 required)
Top Drive (gear oil)	Donaldson P170313 (1)	Spin-on	CT3.2 (6 required)
Central Cooling System	Canister (2)	Cartridge, 4-1/2 (114) × 20	XT4 (8 required)
Central Hydraulic System	Canister (4)	Cartridge, 4-3/4 (121) × 28	XT4 (16 required)
Final Drive	Fill/Drain Plug (2)	Plugs, Vehicle Specific	FD271 (4 required)

FilterMag® XT for Cartridge Filters Installation Instructions

1. The FilterMag® XT is designed for permanent installation on cartridge style oil filter housings with diameters from 3.8"–8.8" (96mm–224mm). Never attempt to pry off a Filtermag® with a screwdriver.
2. Choose a location for installation near the open end of the oil filter housing. Installation location should be free of obstructions, debris and dirt. Wear safety glasses.
3. Hold the XT by the edges as shown in the photo. Position the XT near the intended installation location. As you get close to the oil filter housing, the powerful magnets of the FilterMag will suddenly pull the XT onto the housing.

Caution. Extreme magnetic energy. Objects, clothing, gloves, and fingers can become permanently trapped between the FilterMag XT and the oil filter housing during installation.

4. Aluminum Housings—Use a band clamp through the slots on the XT's end caps to position and secure the XT to the housing.
5. Clean Out—When replacing the filter cartridge, reach inside the housing with a clean, lint free, damp cloth and wipe away the wear-causing particles captured by the FilterMag XT.

How to hold the XT during installation



Correct way to hold the XT during installation.



Don't let your fingers get between the magnets and the filter housing or serious injury could result.

FilterMag® Limited Industrial Product Warranty

We warrant this FilterMag® to be free from manufacturing defects for a period of five years from the date of purchase for CT or XT Series products or other FilterMag® products specifically designated for use in industrial applications. All implied warranties are only valid for the same periods. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. At our discretion we will repair or replace, at no charge

to you, any FilterMag® found to be defective in materials or workmanship within the specified coverage period. This warranty does not apply to damage from improper handling resulting in damage to the plating of magnetic surfaces. This warranty does not apply to damage resulting from accident, abnormal use, misuse, abuse, neglect, or failure to follow the manufacturer's instructions. We specifically disclaim all warranties whether implied or expressed when FilterMag®

industrial products are used in consumer or personal use applications. We will not be liable for damages whether incidental, consequential or otherwise, resulting from a defective FilterMag®. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state. To file a warranty claim please contact us.

- Gas & Diesel Engines
- Rotating Equipment
- Hydraulic Systems
- Diesel Fuel Filtration
- Most Spin-on Filters



FilterMag CT for Spin-on Filters Specifications

Typical FilterMag CT

Order part # based on filter diameter			Dimensions			
Part #	Minimum	Maximum	Height	Thickness	Arc (Max)	Weight
CT3.2	2.9 in (74 mm)	3.5 in (89 mm)	2.65 in (67 mm)	.34 in (8.6 mm)	180°	9 oz (.26 kg)
CT3.8	3.6 in (91 mm)	4.2 in (107 mm)	2.65 in (67 mm)	.35 in (8.9 mm)	180°	14 oz (.40 kg)
CT4.9	4.4 in (112 mm)	5.5 in (140 mm)	2.95 in (75 mm)	.36 in (9.1 mm)	180°	19 oz (.54 kg)

Operating Temperature Range: -40F to +302F (-40C to +150C) • Magnet Type: N42SH (High Temperature Nd-Fe-B alloy) with Ni-Cu-Ni plating

FilterMag CT Installation



Correct FilterMag CT Installation.

Installation Guidelines

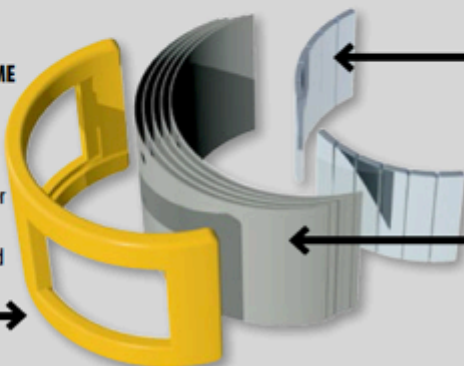
1. Install two or more FilterMags on each spin-on filter opposite each other near the threaded end. Wear safety glasses.



2. Re-use FilterMags by sliding them off the old filter and snapping them on a new one when the filter is changed.
3. Never attempt to pry off a FilterMag.

FilterMag CT: Powerful—Focused—Magnetic Field Technology

1. **RUGGED FLEXIBLE FRAME** encases and protects the elements of a FilterMag while providing enough flexibility to fit a range of filter diameters. Our proprietary design and materials are rated for temperatures from -40°F to +300°F.



2. **POWERFUL, HEAT-RESISTANT NEODYMIUM ALLOY MAGNETS** are engineered to focus a magnetic field inside your filter. Specifically formulated to remain effective in the most extreme environments, our magnets are guaranteed to remove particles from oil operating at up to 300°F while most magnets start losing magnetism at 180°F.

3. **PATENTED FLUXCON™ SHIELDING TECHNOLOGY** stops magnetic flux which could damage electronic components. Not even a paper clip will stick to the outside of a FilterMag. Our FluxCon™ system also redirects a portion of that magnetic power back into the filter to increase filtration efficiency.

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FilterMag XT for Cartridge Filters Specifications



- Rotating Equipment
- Hydraulic Systems
- Gas & Diesel Engines
- For most fixed installation cartridge filters

Order part # based on housing diameter				Dimensions		
Part#	Minimum	Maximum	Arc (Max)	Weight	Height: Faceplate/Endcap	Thickness: Faceplate/Endcap
XT4	3.8 in (96 mm)	4.8 in (122 mm)	165°	3.5 lb	2.7" (68mm)/3.4" (86mm)	.9"(23mm)/1.4" (36mm)
XT5	4.8 in (122 mm)	5.8 in (147 mm)	170°	4.5 lb	2.7" (68mm)/3.4" (86mm)	.9"(23mm)/1.4" (36mm)
XT6	5.8 in (147 mm)	6.8 in (173 mm)	172°	5.5 lb	2.7" (68mm)/3.4" (86mm)	.9"(23mm)/1.4" (36mm)
XT7	6.8 in (173 mm)	7.8 in (198 mm)	174°	6.5 lb	2.7" (68mm)/3.4" (86mm)	.9"(23mm)/1.4" (36mm)
XT8	7.8 in (198 mm)	8.8 in (224 mm)	175°	7.5 lb	2.7" (68mm)/3.4" (86mm)	.9"(23mm)/1.4" (36mm)

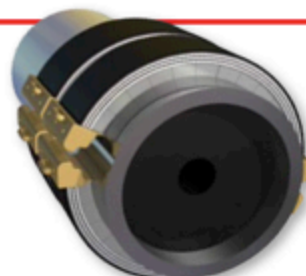
Operating Temperature Range: -40F to +302F (-40C to +150C) • Magnet Type: N42SH (High Temperature Nd-Fe-B alloy) with Ni-Cu-Ni plating

FilterMag XT Installation

Install FilterMag XTs in pairs opposite each other near the open end of the oil filter housing.



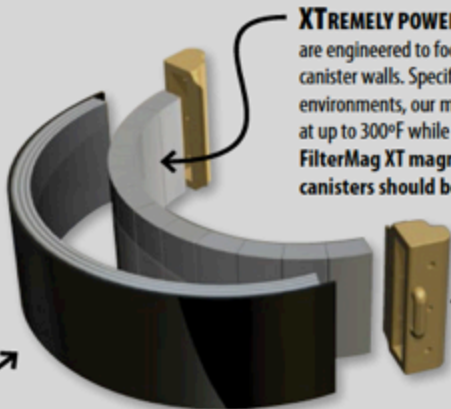
FilterMag XT Installation.



FilterMag XT: Powerful—Focused—Magnetic Field Technology

PATENTED FLUXCON™ SHIELDING TECHNOLOGY

stops magnetic flux from emanating out the back of the FilterMag. Our FluxCon™ system also redirects a portion of that magnetic power back into the filter to increase filtration efficiency.

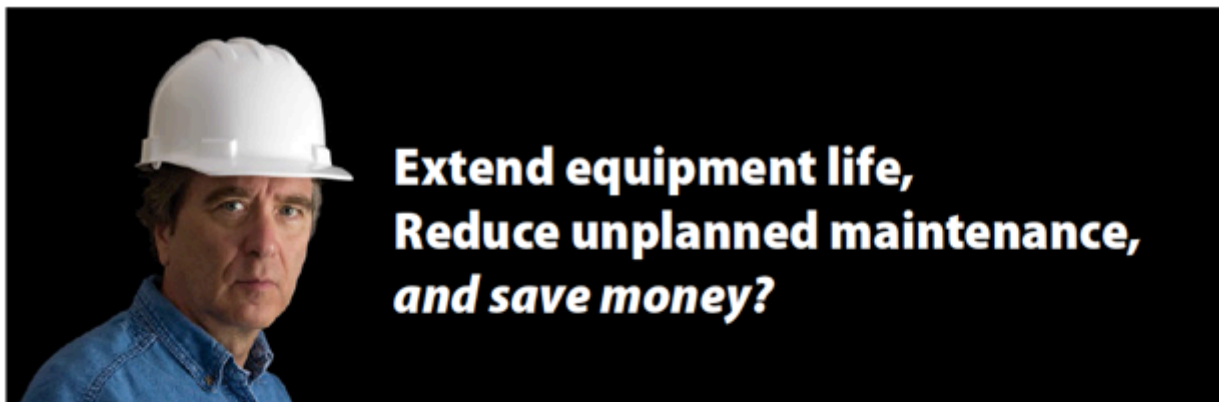


XTREMELY POWERFUL, HEAT-RESISTANT NEODYMIUM ALLOY MAGNETS are engineered to focus a magnetic field inside your filter through even the thickest canister walls. Specifically formulated to remain effective in the most extreme environments, our magnets are guaranteed to remove particles from oil operating at up to 300°F while most magnets start losing magnetism at 180°F. **CAUTION:** FilterMag XT magnets are so powerful that any installation on steel filter canisters should be considered permanent.

SECURITY END CAPS integrate all the parts of a FilterMag XT while allowing enough flexibility to fit a range of filter housing sizes. Our proprietary anchoring technology ensures component integrity even under extended periods of extreme vibration. Built in slots for use with stainless steel band clamps allow attachment to aluminum filter housings or for redundant security when used in an overhead environment.

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Imagine the capital savings associated with FilterMag's effect of increasing reliability. The direct wear reduction can increase equipment life by 30, 60 or even 100% in the best of cases. When used in conjunction with a comprehensive oil analysis program wear reduction is easily tracked (including ISO4406 Particle Count) and most oil change intervals may be safely extended.

FilterMag increases reliability and effectively adds productive capacity. Enhanced reliability yields direct savings in planned and unplanned maintenance.

FilterMag® is one time investment that provides a lifetime of protection. It is easily transferred to new equipment in less than a minute.

When was the last time you saw a product that made a SERIOUS difference in the life of your equipment?



Build Smarter. Drill Deeper. Run Longer.

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About FilterMag

FilterMag manufactures and markets products that use a patented technology based on a powerful, focused magnetic field. When attached to the outside of conventional filters of lubrication or hydraulic fluid, FilterMag products remove and hold harmful contaminants: microscopic particles less than 20 microns in size that a conventional filter unequipped with FilterMag would allow to continue circulating and cause costly damage to critical capital assets.

This technology has been shown to reduce wear, increase reliability, cut maintenance costs and extend equipment life up to 60% or more. For FilterMag users, extended life of equipment means lower capital expenditures. Improved reliability and lower operating costs add up to more profitability.

FilterMag products are used in vehicles and machinery associated with mining and aggregates, oil and gas, heavy construction, manufacturing, solid waste management, transit and other industries where mechanical reliability, durability and low maintenance costs are crucial to financial performance.

FILTERMAG[®]