

## JOINT SERVICE POLLUTION PREVENTION OPPORTUNITY DATA SHEET

### BYPASS FILTER FOR VEHICLE MOTOR OIL

**Revision:** 5/99  
**Process Code:** Navy and Marine Corps: SR-02-99; Air Force: PM05; Army: VHM  
**Usage List:** Navy: Low; Marine Corps: Low; Army: Low; Air Force: Medium  
**Alternative for:** Waste Oil Generation and Disposal  
**Compliance Areas:** Medium  
**Applicable EPCRA Targeted Constituents:** N/A

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**Overview:** Bypass filters are designed to remove smaller particulates than would be removed by an engine's normal filter, so that the need for additional oil or oil changes can be reduced. High density bypass filtration extends the useful life of oils. In addition to reducing waste oil generation, collateral benefits include reduced acquisition of petroleum based lubricants, reduced labor hours in the management of waste oil, a reduction in risk associated with storing, pumping and shipment of used oil, and an extension of engine life through improved lubrication.

Bypass filtration is a system that provides high density, slow filtration (one to six quarts per minute at engine operating temperature) of engine oil without affecting the primary OEM filtration system. Bypass filters also remove solid contaminants down to 3 microns, control moisture content in oil, are compatible with all MIL-SPEC oils, and extend oil drain intervals. Bypass filters are installed in the engine compartment of a vehicle or nearby a stationary engine. The bypass filter is fed a slip stream of oil that bypasses the engine.

Oil added during filter changing, and to replace burned oil, is normally sufficient to replenish the oil's additive package (the component of the oil that is responsible for maintaining pH and preventing deterioration of the oil).

Installing by-pass filters may not be feasible to install on some vehicles in a fleet. The climate in which the vehicle is used, the duration of engine run time, and the age of the vehicle can all influence the feasibility of by-pass filter use.

In warm climates (where 15W40 is used year round) all vehicles benefit from the additional filtration because flow through the filter starts almost immediately. However, in colder climates, engines need to run at the manufacturer's normal operating temperature for at least ten minutes to reduce the oil's viscosity and to allow flow through the bypass filter. Longer run times are necessary in extremely cold climates.

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Several different types of bypass filters are available. Those manufactured by Gulf Coast and Enviro Filtration rely on filter elements that remove particles down to the 1 to 10 micron range. The Gulf Coast unit is distinctive in that it uses a commonly available roll of toilet paper (or paper towels for larger units) as the filter element. The TF Purifier unit filters down to 0.5 to 1 micron, and then refines the oil by passing it through a heated element refiner that is vented back into the engine air intake. The heated element volatilizes any unburned fuel, water, or glycols that contaminate the oil and cause the oil's additive package to breakdown. These systems reduce the need for complete oil changes, but the engine's conventional canister filter along with the bypass filters still need to be changed in accordance with manufacturer's recommendations.

Along with filter changes, engine oil must be sampled and analyzed to determine the physical and chemical properties of the oil (see data sheet 6-II-3 for *Lubricant Analysis Programs*). Using a by-pass filter system in conjunction with a lubricant analysis program may reduce the number of oil changes without decreasing the life expectancy of engine parts. The use of bypass filters has been approved for use in Air Force vehicles.

### **Compliance**

#### **Benefit:**

Use of a bypass filter for vehicle motor oil will decrease the amount of used oil generated and therefore, decrease the personnel efforts of managing the used oil under **40 CFR 279 or 40 CFR 262**. In addition, if used oil is not recycled, using a bypass filter may help a facility meet the requirements of waste reduction under **RCRA, 40 CFR 262**. Moreover, since less oil should be stored on site, a facility will decrease the possibility of teaching the reporting thresholds for that chemical under **40 CFR 355 and EO 12856**. A decrease in oil stored on site may also put a facility below threshold amounts for the requirement to develop and implement a Spill, Prevention, Control and Countermeasure Plan under **40 CFR 112**.

The compliance benefits listed here are only meant to be used as a general guideline and are not meant to be strictly interpreted. Actual compliance benefits will vary depending on the factors involved, e.g. the amount of workload involved.

### **Materials**

#### **Compatibility:**

Bypass filters must be used in conjunction with a lubricant analysis program. The oil analysis program is used to determine oil change intervals.

### **Safety and**

#### **Health:**

Use of vehicle motor oil poses minimal safety and health concerns. Care must be taken when handling oils that are high in temperature. Proper personal

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protective equipment is recommended. Consult your local industrial health specialist, your local health and safety personnel, and the appropriate MSDS prior to implementing any of these technologies.

### **Benefits:**

- Reduces the number of oil changes required
- Reduces new oil purchases
- Reduces the generation of oil waste and the associated costs of waste oil handling and disposal

### **Disadvantages:**

- Payback period may be longer than life span of the vehicle.

### **Economic Analysis:**

#### TF Purifier

A bypass filter with a capacity of up to 12 quarts has a payback period of approximately 14 years for systems operated with conventional oil. If synthetic oil is being processed, the payback period is reduced to approximately 3 years. For a bypass filter with up to 24 quart capacity, the payback periods are 5 years and 1.5 years for conventional and synthetic oils, respectively.

#### Oil Guard

A bypass filter with a capacity of up to 12 quarts has a payback period of approximately 2.9 years for systems operated with conventional oil. If synthetic oil is being processed, the payback period is reduced to approximately 1.4 years. For a bypass filter with up to 24 quart capacity, the payback periods are 1.6 years and 0.7 years for conventional and synthetic oils, respectively.

#### Enviro Filtration

A bypass filter with a capacity of up to 12 quarts has a payback period of approximately 2.2 years for systems operated with conventional oil. If synthetic oil is being processed, the payback period is reduced to approximately 0.8 years. For a bypass filter with up to 24 quart capacity, the payback periods are 1.3 years and 0.4 years for conventional and synthetic oils, respectively.

### **Assumptions:**

#### Motor Oil Cost

- Conventional \$4/gallon
- Synthetic \$17/gallon
- Oil Disposal Cost \$0.75/gallon

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|                                   | TF Purifier<br>Bypass<br>Filters |         | Enviro<br>Filtration<br>Bypass<br>Filters |         | Oil Guard<br>Bypass<br>Filters |          | Status<br>Quo |         |
|-----------------------------------|----------------------------------|---------|-------------------------------------------|---------|--------------------------------|----------|---------------|---------|
|                                   | 12qt                             | 24 qt   | 12 qt                                     | 24 qt   | 12 qt                          | 24 qt    | 12 qt         | 24 qt   |
| Capital Cost<br>(Installed)       | \$510                            | \$560   | \$140                                     | \$160   | \$175                          | \$189    | N/A           | N/A     |
| Number of Oil<br>Changes Per Year | 0                                | 0       | 0                                         | 0       | 0                              | 0        | 4             | 4       |
| Operating Labor                   | 1hr/yr                           | 1hr/yr  | 1 hr/yr                                   | 1hr/yr  | 1.5hr/yr                       | 2.5hr/yr | 3r/yr         | 5 hr/yr |
| Supplies                          | \$55/yr                          | \$66/yr | \$10/yr                                   | \$30/yr | \$23/yr                        | \$27/yr  | \$0           | \$0     |
| Payback Period,<br>Years:         |                                  |         |                                           |         |                                |          |               |         |
| • Conventional                    | 14                               | 5       | 2.2                                       | 1.3     | 2.9                            | 1.6      | N/A           | N/A     |
| • Synthetic                       | 3                                | 1.5     | 0.8                                       | 0.4     | 1.4                            | 0.7      | N/A           | N/A     |

## NSN/MSDS:

| Product       | NSN              | Unit Size | Cost   |
|---------------|------------------|-----------|--------|
| Bypass Filter | 4940-01-411-9831 | ea.       | \$1.94 |
| Bypass Filter | 4940-01-411-9832 | ea.       | \$4.48 |
| Bypass Filter | 4940-01-411-9833 | ea.       | \$4.05 |
| Bypass Filter | 4940-01-411-9834 | ea.       | \$5.59 |

## Approving Authority:

Approval is controlled locally and should be implemented only after engineering approval has been granted. Major claimant approval is not required. The use of bypass filters has been approved for use in Air Force vehicles. Approval of an oil analysis program has to be obtained at the MAJCOM level.

## Points of Contact:

### Air Force:

Mr. Michael Schleider  
Chief, Systems Engineering Division  
Support Equipment and Vehicle Management Directorate  
WR-ALC/LER  
225 Ocmulgee Ct.  
Robins AFB, GA 31098-1647

## JOINT SERVICE POLLUTION PREVENTION OPPORTUNITY DATA SHEET

DSN 468-6488 x 175, (912) 926-6488 x 175

FAX: DSN 468-7176, (912) 926-7176

[michael.schleider@robins.af.mil](mailto:michael.schleider@robins.af.mil)

### **Vendors:**

This is not meant to be a complete list, as there may be other suppliers of this type of equipment.

OilGuard Environmental

1384 Poinsettia Ave., Suite F

Vista, CA 92083

Phone: (760) 599-5000

Fax: (760) 599-5009

Email: [oilguard@oilguard.com](mailto:oilguard@oilguard.com)

URL: [www.oilguard.com](http://www.oilguard.com)

Mr. David Herr

Gulf Coast Filters

P.O. Box 2787

Gulfport, MS 39505

(601) 832-1663

Mr. Jerry Simms

TF Purifier

3020 High Ridge Road, Suite 100

Boynton Beach, FL 33426

(407) 547-9499

(800) 488-0577

Enviro Filtration

4719 Roosevelt Street

Gary, IN 46408

(219) 884-7963

### *Sources:*

*Mr. Michael Schleider, Robins Air Force Base, January 1999.*

*OilGuard Environmental, January 1999.*

*Air Force Manual 24-307, "Procedures for Vehicle Maintenance," September, 1995*

*"Pacific Air forces Automotive Analysis Program Guide," HQPACA/LGT, Draft*