Lubricating Oil, Fuel, and Filters

Models:

DD13 EPA07
DD13 EPA10
DD13 GHG14
DD13 GHG17
DD13 Gen 5
DD13 EuroV
DD15 EPA07
DD15 EPA10
DD15 GHG14 AT
DD15 GHG14 TC
DD15 GHG17 AT
DD15 Gen 5
DD16 EPA10
DD16 GHG14
DD16 GHG17
DD16 EuroV
DD5
DD5 FS
DD8 SST
DD8 DST

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1. Introduction

1.01 Trademark Information

DDC®, Detroit™, and the spinning arrows design are registered trademarks of Detroit Diesel Corporation. Series 50®, Series 55®, Series 60®, DD13®, DD15®, DD16® are registered trademarks of Detroit Diesel Corporation. DD5™, DD8™ are trademarks, but not yet registered to Detroit Diesel Corporation. Fuel Pro®, Sea Pro®, and Mega Filter® are registered trademarks of Davco Manufacturing, LLC. All other trademarks are the property of their respective owners. Detroit Fluids Specification takes the place of POWER GUARD.

1.02 Introduction

This publication specifies the type of fuels required for the diesel-fueled engines manufactured and marketed by Detroit™. The information in this publication applies to DD13, DD15, DD16, DD5, DD8, MBE 900, MBE 4000, Series 60, and Series 50 engines. Use of fuels not meeting the specifications required in the present publication may cause engine damage and void warranties.

2. Lubricating Oil Requirements

2.01 Lubricating Oil Requirements

In general, lubricating oil selection for Detroit™ engines is based on viscosity grade and service category as defined by industry standards and is displayed in the API symbol shown in the following section. Oils identified by this system and licensed by API provide adequate service in most applications. In 2002, Detroit™ initiated additional criteria to these requirements through the use of Detroit Fluids Specifications.

NOTE: For 2-cycle and all Off-Highway engine lubricating oil, fuel, and coolant requirements, refer to MTU Technical Publication, Fluids and Lubricants, Specification Bulletin, A001061/35E (or most recent). This bulletin is available from authorized MTU distributors.

2.02 Identification of API Service Classification

Below are examples of American Petroleum Institute (API) certification donuts for the most current diesel engine oil categories.

Fig 1, Examples of API Symbols

2.03 API FA-4 Versus API CK-4 and API CJ-4 Versus API CI-4 Plus

API Service Category FA-4 oils are designed primarily for use with EPA10, GHG14, GHG17 and GHG21 compliant engines equipped with cooled EGR and exhaust aftertreatment devices operating on Ultra-Low Sulfur Diesel (ULSD) fuel (below 15 ppm). These oils are designed with reduced ash and phosphorous content to minimize degradation of aftertreatment devices while providing complete wear, deposit, and soot control.

API Service Category CK-4 oils are designed primarily for use with EPA07, EPA10, GHG14, GHG17 and GHG21 compliant engines equipped with cooled EGR and exhaust aftertreatment devices operating on Ultra-Low Sulfur Diesel (ULSD) fuel (below 15 ppm). These oils are designed with reduced ash and phosphorous content to minimize degradation of aftertreatment devices while providing complete wear, deposit, and soot control. API CK-4 oils may also be used in all diesel engines operating with ULSD fuel.

API Service Category CJ-4 oils are designed primarily for use with EPA07, EPA10, GHG14 and GHG17 compliant engines equipped with cooled EGR and exhaust aftertreatment devices operating on Ultra-Low Sulfur Diesel (ULSD) fuel (below 15 ppm). These oils are designed with reduced ash and phosphorous content to minimize degradation of aftertreatment devices while providing complete wear, deposit, and soot control. API CJ-4 oils may also be used in all diesel engines operating with ULSD fuel.

API Service category CI-4 PLUS oils were designed primarily for use with 2002 EPA emission compliant engines equipped with cooled EGR operating on Low Sulfur Diesel (LSD) fuel (below 500 ppm). These oils are formulated with higher ash and phosphorus content and were not intended for use in engines with aftertreatment devices. Their use in EPA07 engines may cause premature aftertreatment filter plugging.

There is a subtle but important difference between oils meeting the API CI-4 and the API CI-4 PLUS service category. Shortly after their inception, the API CI-4 category requirements were modified for improved soot handling and shear stability. An engine oil formulation that meets the modified requirements would qualify for API CI-4 PLUS. Due to their superior performance in EGR-equipped engines without aftertreatment devices, Detroit™ recommends only CI-4 PLUS oils. Detroit™ does not recommend the use of oils that only meet the CI-4 service category.

2.04 Approved Oils — Detroit Fluids Specification

In 2005, Detroit™ issued its first listing of approved oils based on Detroit Fluids Specification. These specifications represented an enhanced performance level beyond the industry-based service category system. Oils meeting these specifications undergo additional review of performance claims, include added performance requirements for Detroit™ international family of engines compared to API certified engine oils. The added confidence in performance of these oils allows Detroit™ customers to maximize oil drain intervals and engine service life beyond those permitted with industry-based engine oils, Oil Drain IntervalsOil Drain Intervals.

Three Detroit™ approved oil specifications exist for different applications. The list of oils meeting these specifications may be viewed as follows:

1. Go to dtnaconnect.com (public side; no login required).
2. Select the "Lubricants, Fuels & Coolants" link.
3. Select the "DFS ENGINE OIL APPROVAL LIST" link.
4. Select the Detroit Fluids Specification link for the intended application.

Listed in below is a summary of the three oil specifications and their intended applications:

Approved Detroit Fluids Specification			
Specification	**Engine Model**	**Fuel Sulfur, ppm**	**Intended Application**
93K223	EPA10/GHG14/ GHG17/Gen 5	Ultra Low Sulfur, less than 15	For optimal fuel economy, use DFS 93K223. Recommended for all four-cycle Detroit™ engines including with or without aftertreatment, EPA10/ GHG14/GHG17/Gen 5, operating on ULSD fuel. These oils are similar to API FA-4
93K222	EPA07/10/GHG14/ GHG17/Gen 5 Series 60, MBE4000, MBE900		Recommended for all four-cycle Detroit™ engines including with and without an aftertreatment system, EPA07/10/GHG14/GHG17/Gen 5 and older (including legacy engines), operating on ULSD fuel. These oils are similar to API CK-4
93K218	EPA07/10/GHG14/ GHG17 Series 60, MBE4000, MBE900		Recommended for all four-cycle Detroit™ engines including with and without an aftertreatment system, EPA07/10/GHG14/GHG17 and older (including legacy engines), operating on ULSD fuel. These oils are similar to API CJ-4.
93K214	EPA04 and Older	Low Sulfur, less than 500	Cooled EGR-equipped engines without aftertreatment devices or any engine operating on Low Sulfur fuel. These engines meet 2002 to 2006 model year emission requirements. These oils are similar to API CI-4 PLUS.
	EuroIV, EuroV DD13, DD15, DD16		
93K215	EPA98 and Older	High Sulfur, less than 5000	Non-EGR-equipped engines, operating on fuel below 5000 ppm sulfur fuel. These oils are similar to API CH-4.

2.05 Cold Weather Operation

Special precautions must be taken during cold weather. To protect your engine, special cold weather handling is required for fuel, engine oil, coolant, and batteries.

NOTICE

To avoid engine damage, DO NOT use any type of aerosol spray, e.g., ether, starting fluid or brake cleaner to aid in starting the engine.

For EPA07 engines with a grid heater:

WARNING:

BODILY INJURY

To avoid injury from an explosion, do not use ether or starting fluid on engines equipped with a manifold (grid) heater.

The engine does not require starting aids down to 10°C (50°F). Temperatures below -20°C (-4°F), will require a block heater and oil pan heater.

2.06 Monograde Oils

Monograde oils, irrespective of API service category, should not be used in any Detroit™ four-cycle engine.

3. Lubricating Oil Additional Information

3.01 Lubricating Oil Additional Information

Selection of lubricating oil that meets the proper criteria is necessary for proper engine lubrication. Additional information which may be used to select an appropriate engine oil are provided in the following sections.

3.02 SAE Viscosity Grade Selection

Viscosity is a measure of an oil's resistance to flow at various temperatures. The SAE Viscosity Grade system is defined in SAE Standard J300 that designates a viscosity range with a grade number. Lubricants with two grade numbers separated by a "W," such as 15W-40, are classified as multigrade, while those with a single number are monograde. The higher the number, the higher the viscosity.

The viscosity requirements associated with each SAE viscosity grade are listed in Table "SAE Viscosity Grades for Engine Oils (SAE J300)." This information is important in selecting the best viscosity grade for the anticipated ambient temperature range at which the engine will start and operate. Use it only as a guideline, since actual operating conditions of the engine may determine the lowest practical temperature at which an engine will start and operate. Note that grades designated with a "W" are required to meet both low temperature and high temperature viscosity requirements.

Table 1, SAE Viscosity Grades for Engine Oils (SAE J300)

SAE Viscosity Grade	Viscosity (cP) at Temp. (°C), Max		Viscosity (cSt) SAE ASTM D 445 (100°C)		High Temperature High Shear Rate Visc @ 150°C & 105 sec
	Cranking ASTM D 5293	Pumping ASTM D 4684	Min	Max	
0W	6200 at -35	60,000 at -40	3.8	—	—
5W	6600 at -30	60,000 at -35	3.8	—	—
10W	7000 at -30	60,000 at -30	4.1	—	—
15W	7000 at -20	60,000 at -25	5.6	—	—
20W	9500 at -15	60,000 at -20	5.6	—	—
25W	13,000 at -10	60,000 at -15	9.3	—	—
20	—	—	5.6	9.3	>2.6
30	—	—	9.3	12.5	>2.9
40	—	—	12.5	16.3	>3.7
50	—	—	16.3	21.9	>3.7
60	—	—	21.9	26.1	>3.7

Table 1, SAE Viscosity Grades for Engine Oils (SAE J300)

For standard temperature limits of each viscosity grade; see the following figure.

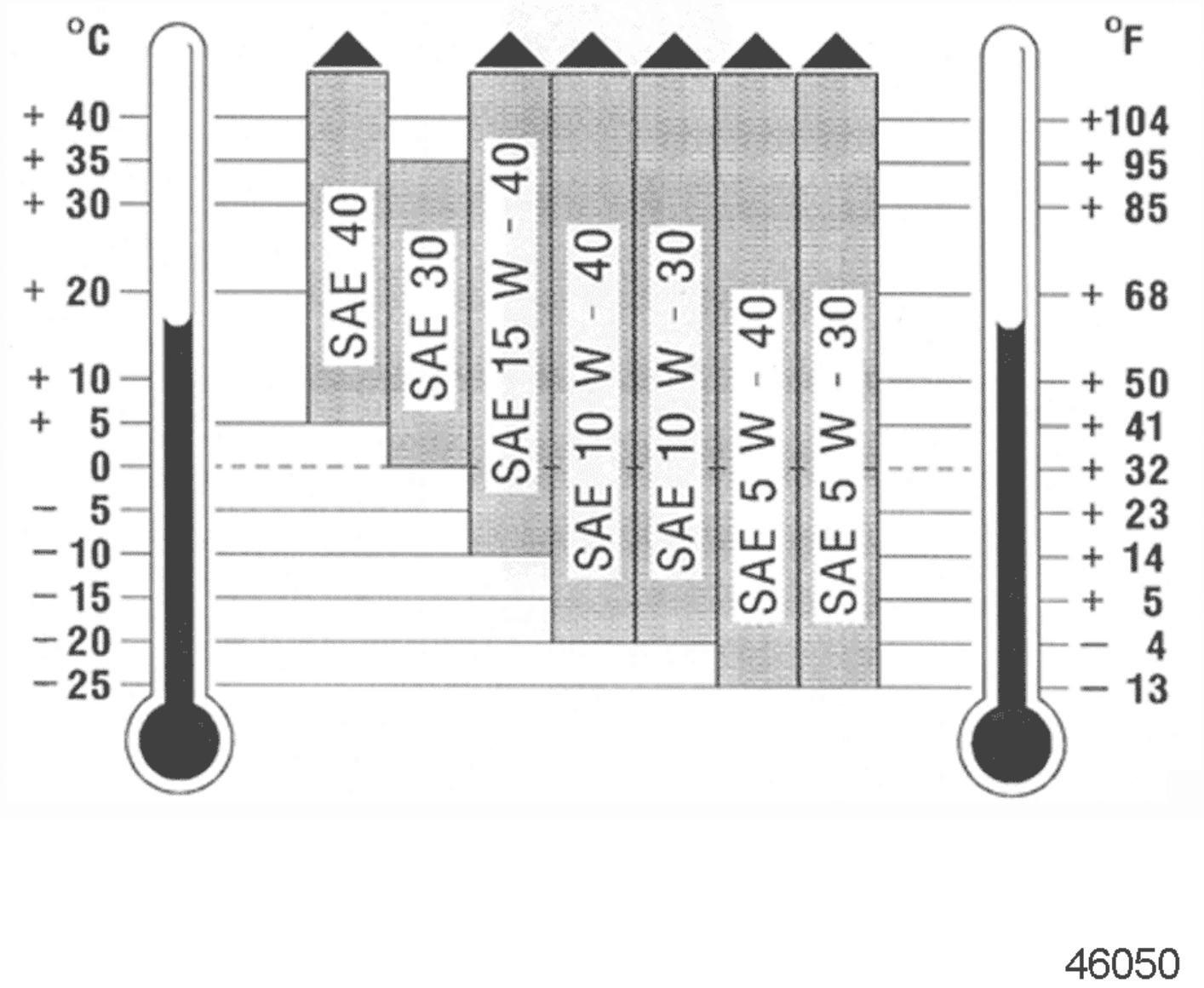

Fig 2, Operating Ranges for Viscosity Grades

3.03 High Temperature/High Shear Viscosity

High Temperature/High Shear (HT/HS) viscosity is measured at 150°C (302°F) under shear stress conditions similar to very thin film lubrication areas such as those found at the piston ring-to-cylinder wall interface. The value obtained from this test provides an indication of temporary shear stability of the viscosity index improver used in multigrade oils.

3.04 Sulfated Ash and Total Base Number

Sulfated ash is a lubricant property measured by a laboratory test (ASTM D 874) to determine the potential for formation of metallic ash. The ash residue is related to the oil additive composition and is significant in predicting lubricants which may cause valve distress, cylinder kit scuffing, or exhaust catalyst plugging under certain operating conditions. API FA-4, CK-4 and CJ-4 approved oil cannot exceed 1.0 wt% of sulfated ash, and CI-4 PLUS approved oil cannot exceed 2.0 wt%. Total Base Number (TBN), which measures an oil alkalinity and ability to neutralize acid using a laboratory test (ASTM D 2896 or D 4739), is related to sulfated ash level and plays an important role in controlling deposits in four-cycle diesel engines. Typically a quality engine oil will have a fresh TBN over 8.0 mg KOH/g per ASTM D 2896.

3.05 Universal Oils

Universal oils are designed for use with both gasoline and diesel engines and provide an operational convenience in mixed engine fleets. These products are identified with combination API category designations such as CK-4/SN. Although such products can be used in Detroit™ engines (provided they satisfy all Detroit™ requirements), their use is not as desirable as lubricants formulated specifically for diesel engines and having API FA-4, CK-4 and CJ-4 designations.

3.06 Synthetic Oils

Synthetic oils may be used in Detroit™ engines provided they are approved by a Detroit Fluids Specification. The use of synthetic oils does not necessarily ensure the extension of the recommended oil drain intervals beyond the limits.

3.07 Lubricant Selection in Regions Not Using ULSD

Engine oils specified in Table "Approved Detroit Fluids Specification" for the appropriate engine emissions certification and fuel sulfur level are preferred for all Detroit™ engines operating in regions not using Ultra-Low Sulfur Diesel (ULSD). If these lubricants are not available, lubricants meeting European ACEA E4 or E7 may be used at the specified oil drain intervals. Oils of lower performance may only be used at a 50% oil drain interval reduction, Oil Drain Intervals.

3.08 Typical Properties

Listed in the table below are the typical chemical and physical properties of a lubricating oil marketed today. This table is for information purposes only. It should neither be construed as being a specification, nor used alone in selection of an engine lubricant.

Typical Properties of Detroit™ Recommended Engine Oil				
Viscosity Grade API Service	**15W-40 CH-4, CI-4 PLUS Detroit Fluids Specification 93K214 / 215**	**15W-40 CJ-4 Detroit Fluids Specification 93K218**	**5W-30/10W-30 CK-4/ CJ-4 Detroit Fluids Specification 93K222/ 93K218**	**5W-30/10W-30 FA-4 Detroit Fluids Specification 93K223**
Viscosity, Kinematic, cSt: 40°C	95 – 115	95 – 115	75 – 85	-
Viscosity, Kinematic, cSt: 100°C	12.5 – 16.3	12.5 – 16.3	9.3 – 12.5	9.3 – 12.5
HT/HS, cP 150°C	3.7 Min	3.7 Min	3.5 Min	2.9 Min
Pour Point °C, Max	-23°C (-9°F)	-23°C (-9°F)	-30°C (-22°F)	-30°C (-22°F)
Flash Point °C, Min	215°C (419°F)	215°C (419°F)	205°C (401°F)	205°C (401°F)
Sulfated Ash, % Mass	2.0 Max	1.0 Max	1.0 Max	1.0 Max
Sulfur, ppm	4000 – 8000	4000 Max	4000 Max	4000 Max

3.09 The Use Of Supplemental Additives

Lubricants meeting Detroit Fluids Specification outlined in this publication contain a carefully balanced additive treatment. The use of supplemental additives, such as break-in oils, top oils, graphitizers, and friction-reducing compounds in these fully formulated lubricants are not necessary and can upset the oil formulation, causing a deterioration in performance. These supplemental additives may be marketed as either oil treatments or engine treatments and should not be used. Their use will not void your Detroit™ product warranty; however, engine damage resulting from the use of such materials is not covered. The use of such additives is at the customer's risk. Detroit™ will not provide statements relative to their use beyond this publication.

3.10 Purchasing Bulk Engine Oil

To ensure continuing quality of engine oil purchased in bulk quantities, procurement specifications should include a requirement that the supplier follow API Recommended Practice 1525 for handling bulk engine oils. This voluntary practice contains guidelines for quality control tracking within the supplier's process. In addition, customers are advised to obtain a control sample to be used as a reference for acceptance of bulk shipments.

3.11 Recycled / Re-Refined Oils

Detroit™ favors the recycling of waste oil and permits the use of rerefined oils in all engine product lines, provided the rerefined oil meets the SAE Viscosity and API specifications previously mentioned. Several processes are used to rerefine oil. The only true rerefining process is one which treats the used oil as a crude oil, subjecting it to the same refinery processes normally used for geological crude, such as dehydration, vacuum distillation, and hydrogenation. Waste oil provides a more consistent feedstock, compared to the geological crudes that a refinery typically processes. As a result, the finished oil should also be consistent in properties and quality.

4. DD Platform Oil Drain Intervals

4.01 Oil Drain Intervals

During use, engine lubricating oil undergoes deterioration from combustion by-products and contamination by the engine. In addition, certain components in a lubricant additive package are designed to deplete with use. For these reasons, regardless of the oil formulation, regular oil drain intervals are required.

NOTE: The use of oil sampling and analysis to validate all drain intervals is highly recommended. To confirm oil drain intervals, use Detroit™ Genuine Oil Analysis kit, Part Number 23515823 .

4.02 Oil Drain Intervals for DD Platform Heavy Duty On-Highway Engines

The oil drain intervals for DD13/15/16 Heavy Duty On-Highway engines listed in the table below are based on engines operating with Ultra-Low Sulfur Diesel (ULSD) fuel (below 15 ppm) meeting the properties listed in “Diesel Fuel Properties” table with a Detroit Fluids Specification DFS 93K223, DFS 93K222 or DFS 93K218 approved oil. API FA-4, CK-4 or CJ-4 certified oil that is not Detroit Fluids Specification approved may be used at reduced drain intervals. These intervals should be considered as maximum and should not be exceeded.

DD13 / DD15 / DD16 Extended Drain Intervals with ULSD Fuel				
EPA10/GHG14/GHG17/Gen 5 Using DFS 93K222(CK-4) or DFS 93K223 (FA-4) Approved Oils **EPA07 Using DFS 93K222(CK-4) Approved Oils**				
Service Application **Engine Series**	**Efficient Long Haul* (> 7.0 mpg)**	**Long Haul** (6.0 to 6.9 mpg)**	**Short Haul† (5.1 to 5.9 mpg)**	**Severe‡ (< 5.0 mpg)**
DD13	65,000 miles (105,000 km)	55,000 miles (89,000 km)	40,000 miles (64,000 km) or 1000 hours or one year	35,000 miles (56,000 km) or 750 hours or six months
DD15	75,000 miles (121,000 km)	60,000 miles (97,000 km)	45,000 miles (72,000 km) or 1000 hours or one year	35,000 miles (56,000 km) or 750 hours or six months
DD16	Not Applicable	55,000 miles (89,000 km)	40,000 miles (64,000 km) or 1000 hours or one year	35,000 miles (56,000 km) or 750 hours or six months
***Efficient Long Haul** (over-the-road transport) service applies to vehicles that annually travel more than 60,000 miles (96,000 kilometers) and average greater than 7 miles per gallon with minimal city stop-and-go operation and minimum idle.				
****Long Haul** (over-the-road transport) service applies to vehicles that annually travel more than 60,000 miles (96,000 kilometers) and average between 6 and 6.9 miles per gallon with minimal city stop-and-go operation.				
†Short Haul service applies to vehicles that annually travel up to 30,000-60,000 miles (48,000-96,000 kilometers) and average between 5.1 and 5.9 miles per gallon.				
‡Severe service applies to vehicles that annually travel up to 30,000 miles (48,000 kilometers) or average less than 5 miles per gallon or that operate under severe conditions. Severe service also applies to RV applications. Only one of these conditions needs to be met to categorize an application as Severe Service.				
Whichever comes first				

DD13/ DD15/ DD16 Extended Drain Intervals with ULSD Fuel				
EPA07/EPA10/GHG14/GHG17 Using DFS 93K218(CJ-4) Approved Oils				
Service Application / **Engine Series**	**Efficient Long Haul***	**Long Haul** (> 6.0 mpg)**	**Short Haul† (5.1 to 5.9 mpg)**	**Severe‡ (< 5.0 mpg)**
DD13 / DD15 / DD16	Not Applicable	50,000 miles (80,000 km) or 1280 hours	35,000 miles (56,000 km) or 895 hours or 1 year	25,000 miles (40,000 km) or 640 hours or 6 months
***Efficient Long Haul** Not Applicable				
****Long Haul** (over-the-road transport) service applies to vehicles that annually travel more than 60,000 miles (96,000 kilometers) and average greater than 6.0 miles per gallon with minimal city stop-and-go operation.				
†Short Haul service applies to vehicles that annually travel up to 30,000-60,000 miles (48,000-96,000 kilometers) and average between 5.1 and 5.9 miles per gallon.				
‡Severe applies to vehicles that annually travel up to 30,000 miles (48,000 kilometers) or average less than 5 miles per gallon or that operate under severe conditions. Severe service also applies to RV applications. Only one of these conditions needs to be met to categorize an application as Severe Service.				
Whichever comes first.				

4.03 Oil Drain Intervals for DD Platform Medium Duty On-Highway Engines

The oil drain intervals for GHG17 DD5, DD8 Medium Duty On-Highway engines listed in the tables below are based on engines operating with Ultra-Low Sulfur Diesel (ULSD) fuel (below 15 ppm) meeting the properties listed in “Diesel Fuel Properties” table with a Detroit Fluids Specification DFS 93K223 or DFS 93K222 approved oil. API FA-4 or CK-4 oil, that is not Detroit Fluids Specification approved, may be used at reduced drain intervals. These intervals should be considered as maximum and should not be exceeded.

Maximum Oil Drain and Filter Change for DD5 using Detroit Fluids Specification DFS 93K223 or DFS 93K222 Approved Oils with ULSD Fuel			
Engine Series	**Long Haul* > 12.0 mpg**	**Short Haul† 10.1 to 11.9 mpg**	**Severe‡ < 10.0 mpg**
DD5	50,000 miles (80,000 km)	45,000 miles (72,000 km) or 1500 Hours or 18 Months	35,000 miles (56,000 km) or 1000 Hours or 12 Months
*Long Haul service (over-the-road transport) applies to vehicles that annually travel more than 60,000 miles (96,000 km) and average greater than 12.0 miles per gallon with minimal city stop-and-go operation. Examples of Long Haul service are: regional delivery that is mostly freeway mileage, interstate transport, and any road operation with high annual mileage.			
†Short Haul service applies to vehicles that annually travel up to 60,000 miles (96,000 km) and average between 10.1 and 11.9 miles per gallon and operate under normal conditions. Examples of Short Haul service are: operation primarily in cities and densely populated areas, local transport with infrequent freeway travel, or a high percentage of stop-and-go travel.			
‡Severe service applies to vehicles that average below 10.0 miles per gallon or that operate under severe conditions. Examples of Severe Service are: idle time over 40%, load factor over 55%, operation on extremely poor roads or under heavy dust accumulation; constant exposure to extreme hot, cold, salt-air, or other extreme climates; frequent short-distance travel; construction-site operation; or farm operation. Only one of these conditions needs be met to categorize an application as Severe Service.			

Maximum Oil Drain and Filter Change for DD8 using Detroit Fluids Specification DFS 93K223 or DFS 93K222 Approved Oils with ULSD Fuel			
Engine Series	**Long Haul* > 8.5 mpg**	**Short Haul† 6.5 to 8.5 mpg**	**Severe‡ < 6.5 mpg**
DD8	60,000 miles (96,000 km)	55,000 miles (88,000 km) or 18 Months	45,000 miles (72,000 km) or 1500 Hours or 12 Months
*Long Haul service (over-the-road transport) applies to vehicles that annually travel more than 60,000 miles (96,000 km) and average greater than 8.5 miles per gallon with minimal city stop-and-go operation. Examples of Long Haul service are: regional delivery that is mostly freeway mileage, interstate transport, and any road operation with high annual mileage.			
†Short Haul service applies to vehicles that annually travel up to 60,000 miles (96,000 km) and average between 6.5 and 8.5 miles per gallon and operate under normal conditions. Examples of Short Haul service are: operation primarily in cities and densely populated areas, local transport with infrequent freeway travel, or a high percentage of stop-and-go travel.			
‡Severe service applies to vehicles that average below 6.5 miles per gallon or that operate under severe conditions. Examples of Severe Service are: idle time over 40%, load factor over 55%, operation on extremely poor roads or under heavy dust accumulation; constant exposure to extreme hot, cold, salt-air, or other extreme climates; frequent short-distance travel; construction-site operation; or farm operation. Only one of these conditions needs be met to categorize an application as Severe Service.			

4.04 Oil Drain Intervals for Specific Regions Outside of US or Canada

The oil drain intervals for the engines listed in the tables below are based on engines operating in specific regions with or without Ultra-Low Sulfur Diesel (ULSD) fuel (below 15 ppm) with a Detroit Fluids Specification DFS 93K222, DFS 93K218 and DFS 93K214 approved oil. API CK-4/CJ-4/CI-4 PLUS or equivalent certified oil that is not Detroit Fluids Specification approved may be used at reduced drain intervals. These intervals should be considered as maximum and should not be exceeded.

Maximum Oil Drain and Filter Change Intervals for Detroit Fluids Specification DFS 93K222 and DFS 93K218 Approved Oils for Specific Regions Outside Of US, Canada and Australia using Ultra-Low Sulfur Diesel (ULSD) fuel (below 15 ppm)				
EPA07/EPA10/GHG14/GHG17 Using DFS 93K222(CK-4) or DFS 93K218(CJ-4) Approved Oils				
Service Application > Engine Series	**Efficient Long Haul**	**Long Haul** (> 6.0 mpg) (> 2.55 km / liter)**	**Short Haul† (5.1 to 5.9 mpg) (2.13 to 2.55 km / liter)**	**Severe‡ (< 5.0 mpg) (< 2.13 km / liter)**
DD13 / DD15 / DD16	Not Applicable	50,000 miles (80,000 km) or 1280 hours*	35,000 miles (56,000 km) or 895 hours or 1 year*	25,000 miles (40,000 km) or 640 hours or 6 months*
**Long Haul (over-the-road transport) service applies to vehicles that annually travel more than 60,000 miles (96,000 kilometers) and average greater than 6.0 miles per gallon with minimal city stop-and-go operation.				
†Short Haul service applies to vehicles that annually travel up to 30,000-60,000 miles (48,000-96,000 kilometers) and average between 5.1 and 5.9 miles per gallon.				
‡Severe applies to vehicles that annually travel up to 30,000 miles (48,000 kilometers) or average less than 5 miles per gallon or that operate under severe conditions. Severe service also applies to RV applications. Only one of these conditions needs to be met to categorize an application as Severe Service.				
* Whichever comes first.				

Maximum Oil Drain and Filter Change Intervals for Detroit Fluids Specification DFS 93K222, DFS 93K218 and DFS 93K214 Approved Oils for Specific Regions Outside Of US, Canada and Australia using Low Sulfur Diesel (LSD) fuel (500 ppm maximum)	
EuroIV Using DFS 93K222(CK-4) or DFS 93K218(CJ-4) or DFS 93K214(CI-4 PLUS) Approved Oils	
Engine Series / Region	**Oil Drain Interval**
DD13, DD15, DD16 (Outside of US, Canada and Australia) including Central and South America and Mexico	40000 km

Australia Maximum Oil Drain and Filter Change Intervals for Detroit Fluids Specification DFS93K222 and DFS 93K218 Approved Oils using Ultra-Low Sulfur Diesel (ULSD) fuel (below 15 ppm)			
Australia Oil Drain Intervals for DD13 and DD15 Engines EPA07			
Oil Type	**< 1.2 km/L**	**1.2 to 1.8 km/L**	**> 1.8 km/L**
DFS 93K218 (CJ-4)	25,000 km or (500 hours)*	30,000 km or (575 hours)*	40,000 km or (640 hours)*
DFS 93K222 (CK-4)	30,000 km or (575 hours)*	40,000 km or (640 hours)*	60,000 km or (750 hours)*
- Fuel Economy represents overall fuel economy (including idle time) * Whichever comes first.			

Australia Maximum Oil Drain and Filter Change Intervals for Detroit Fluids Specification DFS93K222 and MB 228.51 or MB 228.31 Approved Oils using Ultra-Low Sulfur Diesel (ULSD) fuel (below 15 ppm)				
Australia Oil Drain Intervals for DD13 and DD16 Engines GHG17				
Australia Decoder	**Single Trailer < 42 Tons DD13**	**B/Double Lite < 62.5 Tons DD13/DD16**	**B/Double Heavy 62.5 to 90 Tons DD16**	**Road Train Multi Trailer 90 Tons and Greater DD16**
Bins	Greater than 2.0 km/L	Less than 2.0 km/L	1.6 to 1.8 km/L	Less than 1.6 km/L
Intervals	30,000 kms (480 hrs)*	80,000 kms (1,280 hrs)*	60,000 kms (960 hrs)*	50,000 kms (800 hrs)*
- Fuel Economy represents overall fuel economy (including idle time) * Whichever comes first.				

4.05 Oil Drain Intervals Outside of Detroit Recommendations

Changing engine oil and filters at regular recommended intervals removes contaminants in the oil and filter and replenishes expendable oil performance additives. The extension of oil change intervals necessitates that an engine can tolerate increased levels of contaminants such as soot, dirt, oxidation, wear metals, fuel residues, and water. Extending oil filter change intervals requires that filters have sufficient increased capacity to continue collecting these contaminants at a sufficient rate to protect the engine. The engine oils must be formulated with additives capable of extended performance for wear, oxidation, dispersency, detergency, and filterability.

While the extension of oil drain intervals can provide owners and operators of diesel-powered equipment a cost savings in materials (oil and filters), maintenance-related downtime, and waste disposal, there can be a significant reduction of engine life to overhaul. **Currently marketed engine oils and filters are not designed to operate at extended service intervals. These products meet performance requirements of standardized industry tests that are intended to predict actual engine operation under the conditions of standard service intervals.**

4.05.01 Guidance for Oil Drain Intervals

Detroit™ recognizes the desire by some fleets to maximize oil drain and filter change intervals beyond those listed in:

- DD Platform Oil Intervals (Section 4)
- Legacy Engine Oil Intervals (Section 5)

And while Detroit™ has no formal program to extend these intervals, it will assist fleets in an advisory capacity to minimize equipment risks. Before a fleet embarks on an extended oil drain interval program, Detroit™ recommends:

- The fleet reviews its current maintenance program to ensure oil changes are performed properly and on time. A missed oil drain interval during an extended oil drain interval program will create a significant risk to the equipment.
- The fleet reviews the severity of the operation. High idling intervals, high load factors, and chronic mechanical problems are not conducive to extending the oil drain intervals.
- The fleet selects oil and filter suppliers who have the expertise and products to support the goals of such a program. They may include a field test results demonstration, formal program for extending oil and filter changes, and a warranty covering failure of their products in this service which results in a premature engine wear-out or failure.

Fleets are encouraged to review any drain extension program with Detroit™ before initiating the program. While Detroit™ will not provide approvals for these programs, they will provide feedback on the risk assessment.

Extending oil drain intervals will not void the Detroit™ product warranty. In the event of engine failure or premature wear-out when running extended oil and filter change intervals, Detroit™ will make a determination as to the extent, if any, that their workmanship and materials were responsible. If Detroit™ determines that the failure or early wear-out was related to workmanship or materials, warranty coverage of the repairs will apply. If the engine fails or wears out within the Detroit™ warranty period and Detroit™ determines it was the result of extending the oil drain intervals, any claim for reimbursement of expenses under the terms of the engine warranty will be denied.

4.06 Used Lubricating Oil Analysis

Detroit™ Genuine Oil Analysis, or used-oil analysis, program is recommended for all engines. Oil analysis consists of laboratory tests to indicate conditions of the engine and/or the lubricant. The “Warning Limits” are listed in Table “Single Sample Used-Oil Analysis Warning Limits.” Oil analysis cannot completely assess the lubricating oil and should not be used to maximize oil drain intervals. Change oil immediately if contamination exceeds warning limits listed below.

Single Sample Used-Oil Analysis Warning Limits

Characteristics	ASTM or Other Methods	Conditions Measured	40, 50, 60	55	MBE 900	MBE 4000	DD5, DD8, DD13, DD15, DD16
Viscosity at 100 °C, cSt, Min	D 445 DIN 51562	Engine & Oil	12.5 SAE 15W-40 / 9.3 SAE 10W-30/5W-30				
Viscosity at 100 °C, cSt, Max	D 445 DIN 51562	Engine & Oil	21.9 SAE 15W-40 / 12.5 SAE 10W-30/5W-30				
Soot, %*	E1131	Engine Combustion	4.5†				
Glycol, Max	D7922 DIN 51375	Engine	Negative				

Single Sample Used-Oil Analysis Warning Limits							
Characteristics	**ASTM or Other Methods**	**Conditions Measured**	**40, 50, 60**	**55**	**MBE 900**	**MBE 4000**	**DD5, DD8, DD13, DD15, DD16**
Water, Max	E203	Engine	3,000 ppm				
Fuel Dilution, Max	D7953	Engine	2.5%		7%		
Fe, Max ‡	D5185	Engine Wear	200 ppm				
Al Max‡	D5185	Engine Wear	30 ppm				50 ppm
Si Max‡	D5185	Engine Wear	30 ppm				50 ppm
Cu, Max§	D5185	Engine Wear	30 ppm				50 ppm
Pb, Max‡	D5185	Engine Wear	30 ppm				10 ppm
Na, Max ‡	D5185	Engine Coolant Leak	100 ppm				
K, Max §	D5185	Engine Coolant Leak	150 ppm				
* Infrared spectroscopy (ASTM E 168/DIN 51452) may also be used, provided it is calibrated to be equivalent to the TGA method.							
† With Detroit Fluids Specification approved oils.							
‡ These are general limits. Wear metal limits must be determined for specific application and oil used.							
§ Results may exceed limits during engine break-in period; see Oil Analysis During Engine Break-In Period for more information.							
NOTE: These limits are intended as guidance when a single oil sample is tested and the limits are based on the normal oil drain intervals listed in Table "Maximum Oil Drain and Filter Change for Series 60, MBE 4000, DD5, DD8, DD13, DD15, and DD16 using Detroit Fluids Specification 93K218, DFS 93K223, DFS 93K222, Approved Oils with ULSD Fuel." Actual limits are dependent on engine, application, drain interval and oil type.							

4.07 Oil Analysis During Engine Break-In Period

DD13, DD15, and DD16

Within the first three oil drains, copper (Cu) levels may exceed the specified limits. Under normal operating conditions, copper may leach from the oil cooler in new engines until the entire copper surface is passivated, which normally occurs within the first oil drain. In DD13, DD15, and DD16 engines, copper levels may reach as high as 500 ppm during the first oil change with no adverse effects. Copper levels should reduce with each oil change but may not remain below the specified limits until after the third oil drain.

DD5, DD8, DD13, DD15, and DD16

Within the first three oil drains, potassium (K) and aluminum (Al) levels may also exceed the specified limits. Under normal operating conditions, brazing flux compound containing potassium and aluminum may leach from the Charge Air Cooler and be introduced into the engine oil through the air intake system. In the DD5, DD8, DD13, DD15, and DD16 engines, potassium levels may reach as high as 300 ppm during the first oil change with no adverse effects. Potassium from brazing flux may be perceived as a coolant leak at these levels. During the first three oil drains, only sodium (Na) should be used as an indicator for potential coolant leaks. Aluminum levels during the first three oil drains may reach as high as 150 ppm. Potassium and aluminum levels should reduce with each oil change but may not remain below the specified limits until after the third oil drain.

5. Legacy Engine Oil Drain Intervals

5.01 Oil Drain Intervals

During use, engine lubricating oil undergoes deterioration from combustion by-products and contamination by the engine. In addition, certain components in a lubricant additive package are designed to deplete with use. For these reasons, regardless of the oil formulation, regular oil drain intervals are required.

NOTE: The use of oil sampling and analysis to validate all drain intervals is highly recommended. To confirm oil drain intervals, use Detroit™ Genuine Oil Analysis kit, Part Number 23515823 .

5.02 Oil Drain Intervals for EPA07 Heavy Duty On-Highway Engines

The oil drain intervals for the Series 60 and MBE 4000 On-Highway engines listed in the table below are based on engines operating with Ultra-Low Sulfur Diesel (ULSD) fuel (below 15 ppm) meeting the properties listed in “Diesel Fuel Properties” table with a Detroit Fluids Specification DFS 93K222 and DFS 93K218 approved oil. API CK-4 and CJ-4 certified oil that is not Detroit Fluids Specification approved may be used at reduced drain intervals. These intervals should be considered as maximum and should not be exceeded.

Maximum Oil Drain and Filter Change for Series 60, MBE 4000 using Detroit Fluids Specification DFS 93K222 and DFS 93K218 Approved Oils with ULSD Fuel

Service Application / Engine Series	Long Haul *	Short Haul †	Severe ‡
Series 60, EPA07	30,000 miles (48,000 km)	20,000 (32,000 km) 500 h, or 6 mon§	15,000 miles (24,000 km) 300 h, or 3 mon§
MBE 4000, EPA07	30,000 miles (48,000 km)	15,000 miles (24,000 km), 500 h, or 6 mon§	10,000 miles (16,000 km) 300 h, or 3 mon§

* Long Haul (over-the-road transport) service applies to vehicles that annually travel more than 60,000 miles (96,000 kilometers) and average greater than 6 miles per gallon with minimal city stop-and-go operation.

† Short Haul service applies to vehicles that annually travel up to 30,000-60,000 miles (48,000-96,000 kilometers) and average between 5.1 and 5.9 miles per gallon.

‡ Severe service applies to vehicles that annually travel up to 30,000 miles (48,000 kilometers) or average less than 5 miles per gallon or that operate under severe conditions. Severe service also applies to RV applications. Only one of these conditions needs be met to categorize an application as Severe Service.

§ Whichever comes first.

5.03 Oil Drain Intervals for EPA07 Medium Duty On-Highway Engines

The oil drain intervals for EPA07 MBE 900 On-Highway engines listed in Table "Maximum Oil Drain and Filter Change Intervals for MBE 900 using Detroit Fluids Specification DFS 93K222 and DFS 93K218 Approved Oils with ULSD Fuel" are based on engines operating with ULSD fuel (below 15 ppm) meeting the properties listed in Table “Diesel Fuel Properties” with a Detroit Fluids Specification DFS 93K222 and DFS 93K218 approved oil. API CK-4 and CJ-4 certified oil that is not Detroit Fluids Specification approved may be used at reduced drain intervals. These intervals should be considered as maximum and should not be exceeded.

Maximum Oil Drain and Filter Change Intervals for MBE 900 using Detroit Fluids Specification DFS 93K222 and DFS 93K218 Approved Oils with ULSD Fuel			
Service Application / **Engine Series**	**Long Haul ***	**Short Haul †**	**Severe ‡**
MBE 900	20,000 miles (32,000 km)	15,000 miles (24,000 km), 500 h or 6 mon§	6,000 miles (9,600 km), 250 h or 3 mon§
* Long Haul service (over-the-road transport) applies to vehicles that annually travel more than 60,000 miles (96,000 km) with minimal city stop-and-go operation. Examples of Long Haul service are: regional delivery that is mostly freeway mileage, interstate transport, and any road operation with high annual mileage.			
† ShortHaul service applies to vehicles that annually travel up to 60,000 miles (96,000 km) or with a load factor over 45% and operate under normal conditions. Examples of Short Haul service are: operation primarily in cities and densely populated areas, local transport with infrequent freeway travel, or a high percentage of stop-and-go travel.			
‡ Severe service applies to vehicles that annually travel up to 30,000 miles (48,000 km) or that operate under severe conditions. Examples of Severe Service are: idle time over 35%, load factor over 55%, operation on extremely poor roads or under heavy dust accumulation; constant exposure to extreme hot, cold, salt-air, or other extreme climates; frequent short-distance travel; construction-site operation; city operation (fire truck or garbage truck), or farm operation. Only one of these conditions needs be met to categorize an application as Severe Service.			
§ Whichever comes first.			
NOTE: Load factor and idle time values must be based on DDEC reports that accurately represent the current service application.			

5.04 Oil Drain Intervals for Pre-2007 Series 60, Series 55, MBE 900, and MBE 4000 Engines

The oil drain intervals for Series 60, Series 55, MBE 900, and MBE 4000 pre-2007 engines, listed in the table below, are based on On-Highway engines operating with ULSD fuel (below 15 ppm) with Detroit Fluids Specification DFS 93K222, DFS 93K218 and DFS 93K214, API licensed CK-4/CJ-4/CI-4 PLUS oil. These intervals should be considered as maximum and should not be exceeded. If operating in regions where ULSD is not available then these intervals will apply as long as the proper oil quality per table "API Symbol: Four-Cycle Engine Oils" is utilized.

Maximum Oil Drain and Filter Change Intervals for Pre-2007 Series 60, Series 55, MBE 900, MBE 4000 Engines Using Detroit Fluids Specification Approved Oils with ULSD Fuel		
Service Application	**Engine Series**	**Oil Drain Interval**
Highway Truck, Motor Coach	50, 55, 60*	15,000 miles (24,000 km)
	MBE 900	20,000 miles (32,000 km)
	MBE 4000	25,000 miles (40,000 km)
City Transit Coach	50†, 55, 60	6,000 miles (9,600 km)
	50‡	3,000 miles (4,800 km)
Fire Fighting, Crash Rescue	50, 60	6,000 miles (9,600 km), 300 h, or 1 yr§
Pick-Up & Delivery	50	12,000 miles (19,200 km)
	MBE 900	15,000 miles (24,000 km)
Stop & Go, Short Trip	50, 60	6,000 miles (9,600 km)
* The oil drain interval for engines with EGR can be increased to 22,500 miles (36,200 km) if the oil used is Detroit Fluids Specification 93K218 or 93K214 approved.		
† All models except 6047MK1E		

Maximum Oil Drain and Filter Change Intervals for Pre-2007 Series 60, Series 55, MBE 900, MBE 4000 Engines Using Detroit Fluids Specification Approved Oils with ULSD Fuel		
Service Application	**Engine Series**	**Oil Drain Interval**
‡ Model 6047MK1E		
§ Whichever comes first.		

5.05 Oil Drain Intervals for Specific Regions Not Using ULSD

The oil drain intervals for the engines listed in the table below are based on engines operating in specific regions not using Ultra-Low Sulfur Diesel (ULSD) with a Detroit Fluids Specification DFS 93K222, DFS 93K218 and DFS 93K214 approved oil. API CK-4/CJ-4/CI-4 Plus or equivalent certified oil that is not Detroit Fluids Specification approved may be used at reduced drain intervals. These intervals should be considered as maximum and should not be exceeded. Oil drain intervals are based on duty cycle and may need to be reduced depending on customer operation and application.

Table 2, Maximum Oil Drain and Filter Change Intervals for Detroit Fluids Specification DFS 93K222, DFS 93K218 and DFS 93K214 Approved Oils for Specific Regions Not Using ULSD

Oil Drain Intervals		
Service Application	**Engine Series / Region**	**Oil Drain Interval**
Highway Truck†	MBE 900, MBE 4000, S60 (pre-2007)	24,000 km, 500 hrs or 6 mon§
Stop & Go, Short Trip‡	MBE 900, MBE 4000, S60 (pre-2007)	9,600 km, 250 hrs or 3 mon§
† Highway Truck service applies to vehicles that annually travel more than 30,000 miles (48,000 kilometers) and average greater than 5.1 miles per gallon with minimal city stop-and-go operation.		
‡ Stop & Go, Short Trip service applies to vehicles that annually travel up to 30,000 miles (48,000 kilometers) or average less than 5 miles per gallon or that operate under severe conditions. Stop & Go, Short Trip also applies to RV applications. Only one of these conditions needs be met to categorize an application as Stop & Go, Short Trip.		
§ Whichever comes first.		

Table 2, Maximum Oil Drain and Filter Change Intervals for Detroit Fluids Specification DFS 93K222, DFS 93K218 and DFS 93K214 Approved Oils for Specific Regions Not Using ULSD

5.06 Alternate Oil Drain Intervals for MBE 900 On-Highway Engines

To determine alternate oil drain intervals for those listed in the following table and figure.

NOTE: The oil drain interval are based on engine hours and fuel consumption.

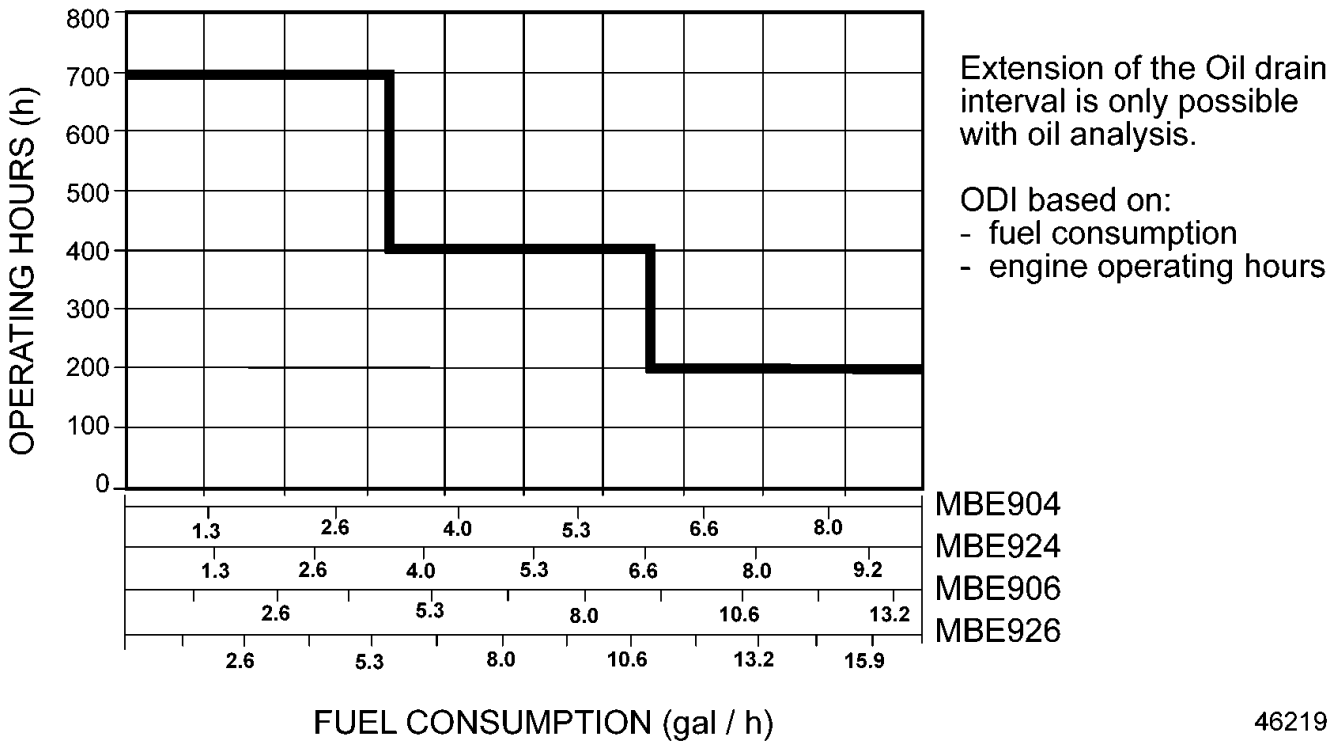

Fig 3, Oil Drain Interval in Hours for Pre-2007 MBE 900 On-Highway Engines

6. Diesel Fuels

6.01 Fuels Brochure

See Fuels Brochure DDC-SVC-BRO-0120

7. Filtration

7.01 Filtration

Filters make up an integral part of fuel and lubricating oil systems. Proper filter selection and maintenance are important to satisfactory engine operation and service life. Use filters, however, to maintain a clean system, not to clean up a contaminated system.

7.01.01 Fuel and Lubricating Oil Filters

Filter performance and test specifications vary between manufacturers. These specifications are general in nature and do not reflect the actual performance of Detroit™ genuine filters. The user is also cautioned when comparing micron ratings between filter makes. Some filter manufacturers may publish results from tests in which the SAE J1858 test procedure was not used. It is also important to note that capacity and efficiency (micron) ratings should not be the only criteria on which to judge filter performance. Many other important factors, including media strength, resistance to impulse failures, and burst strength, often differ greatly between filter makes and should enter into the filter selection process.

Finer filtration will generally provide increased engine service life, but may require shorter filter change intervals. Detroit™ specifies filter performance based on the optimum combination of filter micron rating, filter capacity, and mechanical requirements (assembly integrity).

Biodiesel fuels also have an affect on filter life. .

Fuel Filter Requirements:

- Engine fuel filters should be changed at recommended service intervals aligning with oil changes, or when the "Fuel Filter Service Lamp" activates on the dashboard.
- For maximum life of fuel system components, it is not recommended to exceed 100,000 miles on engine fuel filters under any condition.
- Currently the Detroit Frame Mounted Fuel Filter and the Davco 385, 482, 485 & 487 are the only compatible frame mounted fuel filters approved for use with GHG17 and Gen 5 DD13®/DD15®/DD16® engines.

Oil Filter Requirements:

- Engine oil filters should be changed at recommended service intervals aligning with engine oil changes.

7.01.02 Supplemental Oil Filters

The use of supplemental by-pass oil filtration devices are not allowed on DD5, DD8, DD13, DD15, and DD16 engines. It is recommended that the customer use Detroit branded oil filters when ever possible.

Oil and Fuel Filter Minimum Requirements (1 of 2)

Product	Description	Efficiency Specification	Capacity Specification	Application Years
S60/S50	Detroit™ Genuine Full Flow Oil Filter	98% minimum on 23 to 27 micron particles at 25 gpm per SAE J1858	70 g minimum at 25 gpm and 25 psid terminal pressure per SAE J1858	1993 and newer
S60/S50	Detroit™ Genuine Full Flow Oil Filter	98% minimum on 28 micron particles at 25 gpm per SAE J1858	70 g minimum at 25 gpm and 25 psid terminal pressure per SAE J1858	Pre-1993
S60/S50	Detroit™ Genuine Fuel Spin-On Primary Filter	98% minimum on 23 to 27 micron particles at 100 gph per SAE J1858	48 g minimum at 100 gph and 10 psid terminal pressure per SAE J905	Pre-2004
S60/S50	Detroit™ Genuine Spin-On Primary Water/Fuel Separator Filter	98% minimum on 23 to 27 micron particles at 100 gph per SAE J1858 Water removal: 93%	48 g minimum at 100 gph and 10 psid terminal pressure per SAE J905	All

Oil and Fuel Filter Minimum Requirements (1 of 2)				
Product	**Description**	**Efficiency Specification**	**Capacity Specification**	**Application Years**
		minimum emulsified per ISO 4020 at 125 lph		
S60/S50	Detroit™ Genuine Fuel Spin-On Secondary Filter	98% minimum on 7 to 9 micron particles at 100 gpm per ISO 4548-12	15 g minimum at 100 gph per and 10 psid terminal pressure per SAE J905	Pre-2004
S60	Detroit™ Genuine Fuel Spin-On Secondary Filter	87.5% minimum on 3 to 5 micron, 98.5%minimum on 5 to 10 micron, 99.4% minimum on 10 to 15 micron particles at 125 lph ISO TR 13353, 1994-10-1 (single pass, fine dust) Reference Bosch Application Guideline Y414 E20 022, dated 23.12.1999	23 g minimum at 100 gph per and 10 psid terminal pressure per SAE J905	2004 and newer
S60	Davco® Fuel Pro® 382 Elemax Fuel Cartridge	87.5% minimum on 3 to 5 micron, 98.5% minimum on 5 to 10 micron, 99.4% minimum on 10 to 15 micron particles at 125 lph ISO TR 13353, 1994-10-1 (single pass, fine dust) Reference Bosch Application Guideline Y414 E20 022, dated 23.12.1999 Water removal: minimum 95% efficiency at both emulsified and free water per SAE J1488 and SAE J1839	58 g minimum at 100 gph, 4 psid terminal pressure per SAE J905	All

Oil and Fuel Filter Minimum Requirements (2 of 2)				
Product	**Description**	**Efficiency Specification**	**Capacity Specification**	**Application Years**
MBE 4000	Fuel Filter	69.3% on 4 to 6 µm 92.2% on 6 to 8 µm, 98% on 8 to 10 µm, 99.5% on 10 to 12 µm, 99.8% on 12 to 5µm, 99.9% on 15 to 20 µm, 100% on greater than 20 µm acc to ISO TR 13353	326 g minimum at 2.5 lpm acc to ISO TR 13353 (11.6 psid terminal differential pressure)	All
MBE 4000	Oil Filter	50% on 21 µm, 70% on 25 µm, 82,5% on 30 µm, 88% on 35 µm, 90% minimum on great than 40 µm (ISO 4548-12)	100 g minimum at 125 lpm (ISO 4548-12) (25.4 psid terminal differential pressure)	All

Oil and Fuel Filter Minimum Requirements (2 of 2)				
Product	**Description**	**Efficiency Specification**	**Capacity Specification**	**Application Years**
MBE 900	Fuel Filter Primary (in-housing system with main filter)	300 µm screen	Not applicable	All
	Fuel Filter Main (in-housing system)	90% minimum greater than 6 micron particles according to ISO 4548-12 (Test report from Mahle® Filter System dated 17.12.2003	Minimum 75 minutes after ISO 4020 with test flow 75 lph or 34 g after ISO 19438, test flow 360 lph	All
		80% minimum on 5 micron, 90% minimum on 6 micron, 99% minimum greater than 10 micron particles initial efficiency according to ISO 19 438 (Test report from Mahle® Filter System dated 18.03.2005, MFP value 6,5 + 1 µm)		All
MBE 906/926	Oil Filter	85% minimum on greater than 23 micron particles according to BN 2.21 in dependence on ISO 4548	–	All
MBE 904/924	Oil Filter	85% minimum on greater than 23 micron particles according to BN 2.21 in dependence on ISO 4548	–	All
DD13, DD15, DD16	Prescreen Fuel Filter	98% minimum on greater than 300 micron particles	at 2.91 gpm	All
	Coalescer Fuel Filter	98% minimum on greater than 10 micron particles	at 2.91 gpm	All
	Final Fuel Filter	98% minimum on 3 to 5 micron particles	at 4.49 gpm	All
	Oil Filter	50% at 19 µm (ISO 4548-12)	126 g minimum at 125 lpm (ISO 4548-12) (25.4 psid terminal differential pressure)	All
DD5, DD8	Fuel Filter Kit	98% minimum on greater than 100 micron particles	at 2.91 gpm	All

7.01.03 Aftermarket Filtration Systems

Aftermarket fuel supplemental filtration systems may be used, provided they do not replace the factory-installed system or reduce fuel volumes, pressures, or flow rates delivered to the engine. Fuel filters must be properly sized to provide the proper fuel flow to the engine. A fuel/water separator, if used, must be installed between the fuel tank and the inlet side of the engine fuel pump (>93% water separation at maximum flow per ISO-4020).

7.01.04 Detroit™ Genuine Maintenance Products

Regular and optional Detroit™ genuine service spin-on fuel filters for Series 50, Series 55, and Series 60 Detroit™ engines are listed in Table "Detroit™ Genuine Spin-On Fuel Filter Elements." Fuel Pro filters are listed below, and Sea Pro® marine engine fuel filters are listed in Table "Sea Pro Fuel Filter Elements." Cartridge-type fuel filters are listed in Table "Cartridge Type Fuel Filter Elements." "Detroit™ Genuine Lubricating Oil Filters" are listed in below as well as "Detroit™ Genuine Fluid Analysis Kits."

Detroit™ Genuine Spin-On Fuel Filter Elements		
	Primary Fuel Filter	Secondary Fuel Filter
Engine	Qty	Qty
Series 50	1	1
Series 55	—	1
Series 60 (non-EGR, 2002 DDEC IV EGR)	1	1
Series 60 (2004 DDEC V EGR & later)	1	1
NOTE: A fuel/water separator assembly may be used in place of the primary filter assembly, but not together with it. For Series 50 and Series 60 engines the fuel/water separator filter number is 23535985.		

Fuel Pro Fuel Filter Elements
Filter Description
Fuel Pro 230
Fuel Pro 232
Fuel Pro 380/382
Fuel Pro 40 Mega Filter™
Fuel Pro 382 (2004 Series 60 Engine)

Sea Pro Fuel Filter Elements	
Filter Description	Micron Rating
Sea Pro 50 / 100	30
Sea Pro 152 / 511	15
600	20
Water-in-Fuel Sensor Kit	—
NOTE: The numbers after the Sea Pro name indicate the Gallon Per Hour (GPH) flow capacity of the filter. (Does not apply to Fuel Pro filters.)	

Detroit™ Genuine Fluid Analysis Kits	
Part No.	Description
23515823	Standard Oil Analysis
23517267	Oil Analysis with Oil Suction Bottle

Detroit™ Genuine Fluid Analysis Kits	
Part No.	**Description**
23520989	Oil Analysis with Total Base Number
23516922	Fuel Analysis
23521982	Oil Analysis (Canada)
23521983	Oil Analysis with Total Base Number (Canada)
23521984	Oil Analysis with Oil Suction Bottle (Canada)
23516921	Conventional Coolant Test
23523398	LLC/ELC Organic Coolant Test

8. Statement of Detroit™ Warranty

8.01 Statement of Detroit™ Warranty

Detroit™ is not responsible for the cost of maintenance or repairs due to the lack of performance of required maintenance services or the failure to use fuel, oil, lubricants, and coolants meeting Detroit™ recommended specifications. Performance of required maintenance and use of proper fuel, oil, lubricants, and coolants are the responsibility of the owner. For full details, see the engine operator's guide for your engine.

9. Supplemental Information

9.01 Supplemental Information

Specifications referred to in this publication and other related information may be obtained by contacting the following sources:

SAE Standards

Society of Automotive Engineers

Technical Publications

400 Commonwealth Drive

Warrendale, PA 15096-0001

www.sae.org

ASTM Annual Book of Standards, Section 5

100 Barr Harbor Drive

West Conshohocken, PA 19428-2959

www.astm.org

API Annual List of Licensees and Other Publications

American Petroleum Institute

1220 L Street Northwest

Washington, D.C. 20005

Directory of Licensees: www.eolcs.api.org

DIN Deutsches Institut für Normung e. V. (DIN EN)

Burggrafenstraße 6

10787 Berlin

Germany

www.din.de

International Organization for Standardization (ISO) 1, ch. de la Voie-Creuse

Case postale 56

CH-1211 Geneva 20

Switzerland

www.iso.org

CONTACT INFORMATION

For questions, please create a Service Technical Request using the DTTS Application on the DTNA Portal.

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