Oils and Filters

This information provides specifications for Oil and Filters applications in MACK vehicles.

Note: We have attempted to cover as much information as possible. However, this information does not cover all the unique variations that a vehicle chassis may present. Note that illustrations are typical but may not reflect all the variations of assembly.

All data provided is based on information that was current at time of release. However, **this information is subject to change without notice**.
Please note that no part of this information may be reproduced, stored, or transmitted by any means without the express written permission of MACK Trucks, Inc.

Contents:

Oil and Filters

MP7, MP8, MP10 and Cummins L9N (CNG) Engines

Engine	Oil Capacity
MP7 and MP8	44 quarts (42 L)
MP10	55 quarts (52 L)
L9N (CNG)	20 – 24 quarts (18.9 – 22.7 L)

MP7 Engine

All units in quarts	Total volume of oil in filter	Oil pan volume	Minimum oil pan volume	Pre-fill (dry engine)	Total volume of oil (dry engine)	Oil change volume	Oil drain volume including filter
Steel oil pan	6.3 (6 L)	32 (31 L)	26.4 (25 L)	2.64 (2.5 L)	40.7 (38.5 L)	38 (36 L)	36.5 L

MP8 Engine

All units in quarts	Total volume of oil in filter	Oil pan volume	Minimum oil pan volume	Pre-fill (dry engine)	Total volume of oil (dry engine)	Oil change volume
Vehicle with three full flow oil filters						
Steel oil pan	6.3 (6 L)	32.7 (31 L)	26.4 (25 L)	4.7 (4.5 L)	43.8 (41.5 L)	39 (37 L)
Composite oil pan	6.3 (6 L)	28.5 (27 L)	20 – 21 (19 – 21 L)	4.7 (4.5 L)	39.6 (37.5 L)	34.9 (33 L)
Aluminum oil pan	6.3 (6 L)	33.8 (32 L)	25.4 (24 L)	5.3 (5 L)	45.4 (43 L)	40.2 (38 L)
Vehicle with two full flow oil filters						
Steel oil pan	4.2 (4 L)	32.7 (31 L)	26.4 (25 L)	4.7 (4.5 L)	41.7 (39.5 L)	36.9 (35 L)
Composite oil pan	4.2 (4 L)	32.7 (31 L)	24.3 (23 L)	4.7 (4.5 L)	41.7 (39.5 L)	36.9 (35 L)
Aluminum oil pan	4.2 (4 L)	33.8 (32 L)	25.4 (24 L)	5.3 (5 L)	43.3 (41 L)	38 (36 L)

Cummins L9N (CNG)

All units in quarts	Total volume of oil in filter	Oil pan volume	Low to high on dip stick	Oil drain volume including filter
Steel oil pan	1 (0.950 L)	20 – 24 (18.9 – 22.7 L)	4 (3.8 L)	28 (26.5 L)

Approved Oils

For a complete list of Approved Oils used in Mack Engines, transmissions and other components, refer to **Approved Oils, Mack Components.**

Note: Refer to the Owners Manual for Oil and Filter change intervals.

MP7, MP8 and MP10 Engine Oil Type/Quality

EO-O Premium Plus or EOS-4 (Engine Oil Specification-4) diesel engine oil is mandatory for use in all 2017 emission-compliant MACK engines. Chassis equipped with a 2017 emission-compliant engine, which can be identified by the presence of an aftertreatment selective catalytic reduction (SCR) system, also require the use of Ultra Low Sulfur Diesel (ULSD) fuel. EO-O Premium Plus oils exceed the new American Petroleum Institute (API) service category CJ-4.

Engines meeting the 2010 and later emissions requirements are designed with exhaust aftertreatment systems requiring an oil that meets MACK EO-O Premium Plus quality standards for model year 2010 and later MACK engines. The MACK EO-O Premium Plus quality standard is based on the API CJ-4 engine oil specification, but has additional performance requirements essential to adequately protect the MACK engines at the drain intervals specified. Pre-2010 engines also work better with the recommended engine oils. They are not required, but are strongly recommended.

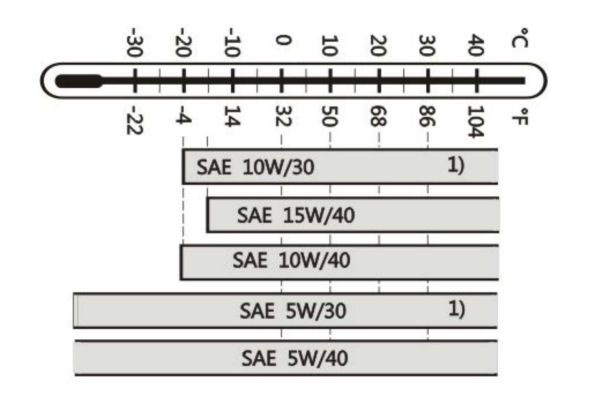
Model Year	Recommended EOS Specification/ API standard	Minimum EOS Specification/ API standard
2021 and Newer	EOS-5.0/FA-4	EOS-4.5/CK-4
2017–2020	EOS-4.5/CK-4	EOS-4.5/CK-4
2010–2016	EOS-4.5/CK-4	EOS-4.0/CJ-4

Note: : EOS corresponds to API standard: EOS-4.0/CJ-4, EOS-4.5/CK-4, EOS-5.0/FA-4.

Cummins L9N (CNG) Oil Type/Quality

Valvoline TM Premium Blue One Solution TM Gen2 Natural Gas Engine Oil.
Natural Gas Oils complying with CES 20092 must be used. Mack EOS 4.5-5.0 comply. 10W30 or 15W40 is recommended.

Viscosity Diagram, Engine



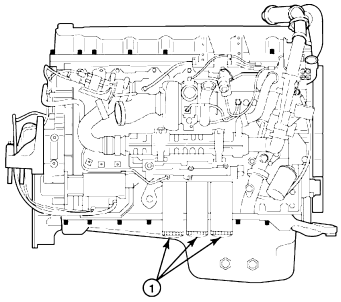
T1181461

Only EOS-4 / EOS-4.5 / EOS-5 approved oils can be used above +30 °C, non EOS-4 / EOS-4.5 / EOS-5 approved oils can be used up to +30 °C.

Note: Based on cold starting temperature.

CAUTION

Extra oil additives must never be added to any engine oil used.



W2055691

1 Typical Spin-On Oil Filter (MP8 Engine Shown)

Note: The oil filter housing consists of two full flow filters and a bypass filter. From the model year 2020 MP8 engines with VGT (Variable Geometry Turbocharger) and from the model year 2021 MP8 engines with turbo compound, will not have the bypass oil filter.

Rear Axle Oil Viscosity

The following chart indicates the recommended rear axle oil weights.

Recommended SAE Grades for Rear Axles		
GO-J – Mineral Base	**GO-J Plus – Synthetic Base**	**TO-A Plus – Synthetic**
SAE 80W-90, 80W-140, 85W-140	SAE 75W-85, 75W-90, 75W-110, 75W-140, 80W-140	SAE 50

Rear Axle Oil Capacity

MACK rear axle capacity ranges from 34 US pints (16.1 liters) to 36 US pints (17 liters), depending on the axle model.

Transmission, Lubrication

T300 Series Manual Transmission Oil

Use only MACK-approved mineral or synthetic transmission oil in the T300 Series manual transmissions. The capacity of the transmission ranges from 20 US qts (9.5 liters) to 30 US qts (14.2 liters), depending on the specific T300 transmission model and the number of gears used. At this time, GO- J, GO-J Plus and TO-A Plus specification oils are acceptable transmission oil types. However, either GO-J Plus or TO-A Plus Synthetic is required for extended oil change intervals.

Recommended SAE Grades (All Temperatures, All Manual Transmissions		
GO-J – Mineral Base	**GO-J Plus – Synthetic Base**	**TO-A Plus – Synthetic**
SAE 80W-90, 80W-140, 85W-140	SAE 75W-85, 75W-90, 75W-110, 75W-140, 80W-140	SAE 50

Allison Transmission, Lubrication

Check Transmission Oil Level

Check the transmission oil level at each service interval. To do so, park the vehicle on a level surface and check the transmission oil level through the sight glass on the right side of the transmission. Add MACK-approved synthetic transmission oil as needed. Note that the drain plug indicates the type of oil used in the transmission

Prognostics is turned off for Mack Medium Duty trucks. Recommended oil quality and change interval would change if prognostics is turned on.

Oil Quality	Oil Change Interval	High capacity main and lube filter change intervals	Suction filter assembly change
TES 295	Whichever comes first of the following: • 480,000 km (300,000 miles) • 6000 hours of operation • 48 calendar months **Note:** Always replace main and lube filters with the oil change.	Whichever comes first of the following: • Any time the oil is changed • 120,000 km (75,000 miles) • 3000 hours of operation • 36 calendar months	Every transmission overhaul
TES 389	Whichever comes first of the following: • 40,000 km (25,000 miles) • 1000 hours of operation • 12 calendar months **Note:** Always replace main and lube filters with the oil change.	Whichever comes first of the following: • Any time the oil is changed • 40,000 km (25,000 miles) • 1000 hours of operation • 12 calendar months	Every transmission overhaul

General vocation includes all non-retarder transmissions not identified as severe and intercity coaches with duty cycles of less than one stop per mile.

Note: If the transmission oil is changed from TES 398 to TES 295, continue to follow TES 389 schedule until the oil (using only TES 295 oil) is changed for the second time. After changing the oil for the second time, TES 295 schedule must be followed.

This information is based on using Allison transmission high capacity filters and a TES 389 and TES 295 oil type with prognostic features not available or turned off.

Note: See Allison website for transmission oil capacity.

Check mDRIVE Transmission Oil Level

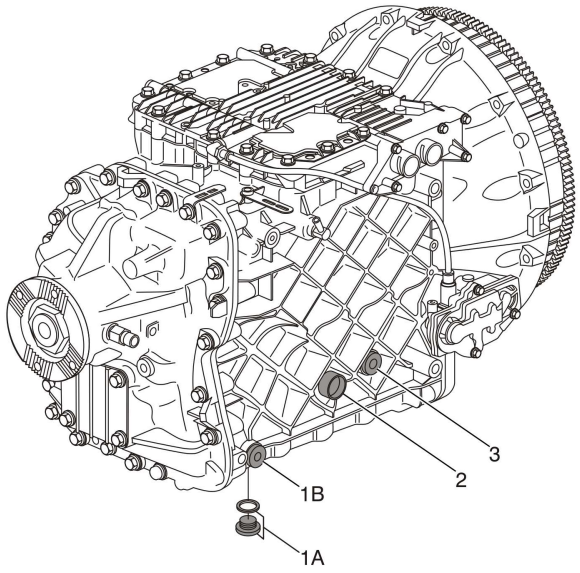
Check the *mDRIVE* transmission oil level at each service interval. To do so, park the vehicle on a level surface and check the transmission oil level through the sight glass on the right side of the transmission. Add MACK-approved synthetic transmission oil as needed. Note that the drain plug indicates the type of oil used in the transmission.

Silver Drain Plug	75W-90 *mDRIVE* Heavy Duty
Brass Drain Plug	75W-80 *mDRIVE* Standard

Recommended SAE Grades for *mDRIVE* Transmissions
Mack Synthetic Gearbox Oil
75W-80, 75W-90
Note: Radiator mounted oil coolers should use lower viscosity oil 75/80 (Do not use 75/90 HD Fluid for this application).

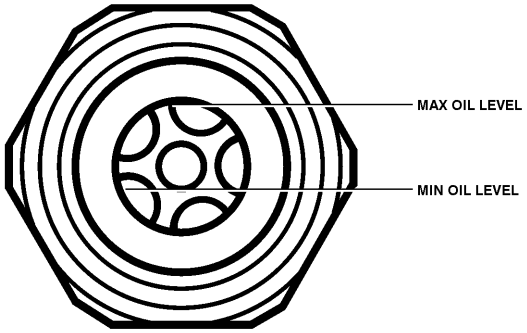
Mack Oil Types and Part Numbers

Oil Weight	Part Number and Alternative
75W-90	85146531 or Mobile Delvac Synthetic Transmission Oil V50
75W-80	85136278 or Mobile Delvac Synthetic Transmission Oil V30



W4002904

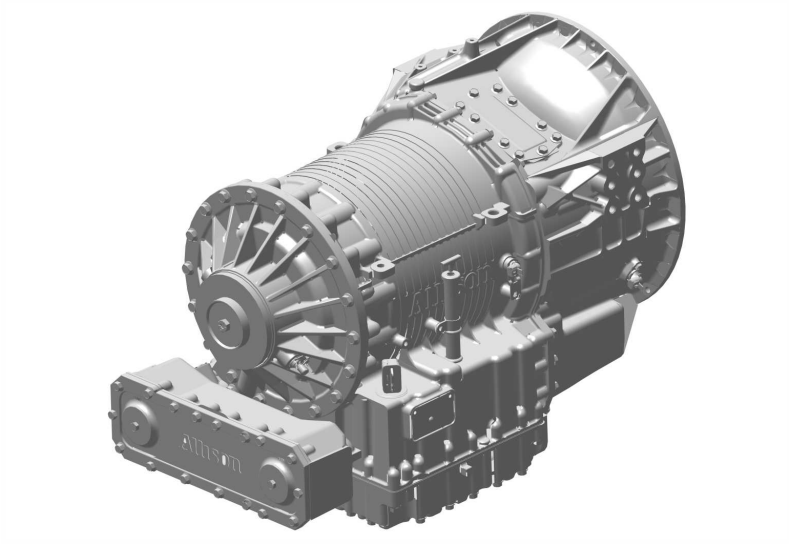
1A. Drain Plug
1B. Drain Port
2. Sight Glass
3. Fill Plug and Oil Level



T4021684

Sight Glass for Checking Transmission Oil Level

Allison transmission



T4195989

The preceding image is of Allison transmission.

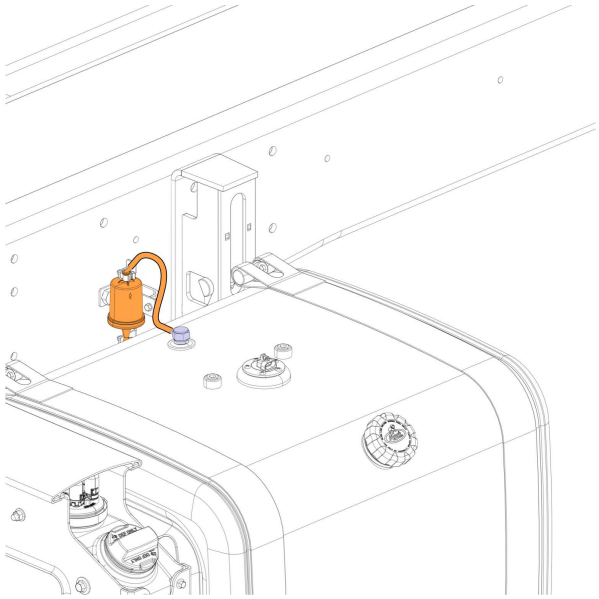
mDRIVE Lubrication Capacity

Transmission	Oil Type	Capacity Including Cooler
***mDRIVE* – MACK**		
TmD12	**Refer to the approved oils list (SB 175–61)**	**17.9 quarts**
TmD13/TmD14	**Refer to the approved oils list (SB 175–61)**	**20.5 quarts**

Fuel Ventilation

Fuel Tank Ventilation Filter

Some vehicles are equipped with a fuel tank ventilation filter. This filter must accompany the fuel tank if the tank is relocated.



W2085894

Frame Rail-Mounted Filter

Notes

Fuel

CAUTION

Diesel engines for 2006 and later model year vehicles are designed to operate only with ultra low sulfur diesel (ULSD) fuel. Use of fuel other than ULSD will reduce the efficiency and durability of the engine, permanently damage the advanced emission control systems, reduce fuel economy and possibly prevent the engine from running at all. Manufacturer's warranties are likely to be rendered void by usage of improper or incorrect fuel, and usage of fuels other than ULSD fuel in diesel-powered vehicles is illegal and punishable with civil penalties. Use of fuel additives to compensate for the lower sulfur content is NOT recommended by Mack Trucks, Inc.

Fuel sold for use in diesel-powered engines for 2006 and later model year vehicles may only contain a maximum sulfur content of 0.0015% by weight. This was done to reduce particle emissions in the exhaust.

Biodiesel Fuel

Description

There is a trend in the trucking industry toward the use of biodiesel fuel; a processed fuel derived from renewable biological resources such as vegetable oil. The most common such fuel available in the United States is derived from soybean oil (a product called "Soy Methyl Ester" [SME or SOME]). In its pure form, biodiesel fuel is designated B100 (or "Neat Biodiesel"), which means that the fuel is 100% biodiesel. The 100% product is then blended with petroleum-based Ultra Low Sulfur Diesel (ULSD) fuel in concentrations of 2% biodiesel to 98% petroleum-based diesel, 5% biodiesel to 95% petroleum-based diesel, 20% biodiesel to 80% petroleum-based diesel, and higher. The resultant biodiesel fuel blends are then designated as B2 (for a 2% blend), B5 (for a 5% blend), B20 (for a 20% blend) and so on.

Biodiesel Emissions

MACK MP7, MP8, and MP10 engines are certified to comply with U.S. EPA and California emissions standards based upon the use of test fuels with specifications established by these regulatory agencies.

Alternative fuels, including biodiesel, that are not substantially similar to the required test fuels may adversely affect engine emissions compliance. As a result, MACK does not warrant the engine will conform to applicable Federal or California emissions limits when operated on biodiesel or other alternative fuels that are not substantially similar to specified test fuels used for certification.

Warranty Policy

The engine warranty covers defects in material and workmanship on the part of the manufacturer. Failures caused by fuel are not warrantable. Refer to the Warranty Certificate in the vehicle operator's manual for complete details on engine and emission systems warranty coverage including limitations and exclusions.

For 2017 to 2021 GHG emissions, the maximum allowable limit of biodiesel is B10 concentration (10% blend). For pre-2017 engines, the maximum allowable limit of biodiesel is B20 concentration (20% blend).

The use of biodiesel fuel will not affect the manufacturer's mechanical warranty as to engine and emissions system related components, provided the biofuel used in the blend conforms to ASTM D6751, B1 to B5 blends conform to ASTM D975, and B6 to B20 blends conform to ASTM D7467.

Please note that engine and aftertreatment emissions system component warranties are valid providing the B20 blend meets the respective ASTM standard.

ASTM Standards

The American Society for Testing and Materials (ASTM) standard D6751 defines B100. Any B100 product used in the manufacture of the blend intended for use in a MACK vehicle must conform to the ASTM D 6751 standard.

ASTM standard D975 defines the minimum accepted values for the properties of petroleum-based diesel fuel. Any petroleum-based diesel fuel used in a MACK vehicle, either alone or when blended with B100 for the maximum approved concentration (up to B5), must meet the ASTM D975 standard.

Certified Biodiesel Required

The National Biodiesel Accreditation Commission conducts quality certification and accreditation programs for producers and marketers of biodiesel products. The B100 used in the approved blend must be produced by a BQ-9000 Accredited Producer and the blend must be supplied by a Certified Marketer.

Storage of Biodiesel

The standard storage and handling procedures used for petroleum-based diesel fuel apply to biodiesel (reference the operator's manual for information concerning the handling and storing of diesel fuel). Compared to petroleum-based diesel fuel, biodiesel fuel has lower oxidation stability and there are greater concerns for water contamination and microbial growth. Biodiesel should be stored in a clean, dry, dark environment. Acceptable storage tank materials include aluminum, steel, fluorinated polyethylene, fluorinated polypropylene or Teflon®. Storage containers which contain copper, brass, lead, tin or zinc should not be used to store petroleum-based diesel nor biodiesel. Use of such containers will result in corrosion of the container and contamination of the fuel. Every effort should be taken to make sure that the biodiesel product is used within six months of the date of manufacture.

Renewable Diesel Fuel

Similar to conventional biodiesel, renewable diesel fuel is derived from biomass feedstocks, including animal fats and oils. However, unlike biodiesel, renewable diesel fuel is produced using a different process and maintains physical properties and performance similar to petroleum diesel, meeting the same ASTM D975 standard.

Coolant Requirements
Coolant

Regular Coolant

Purple (Pink)

Coolant Type	A 50/50 mixture of clean water and Antifreeze that meets or exceeds ASTM D6210 or TMC RP329. ASTM D6210: Standard Specification for Fully-Formulated Ethylene-Glycol-Base Engine Coolant for Heavy-Duty Engines. **Note:** A coolant mixture should never have less than 40% antifreeze and 60% clean water.
Coolant Change Interval	Replace the coolant every 250,000 miles (400,000 km) or 4000 hours or every two years, whichever comes first.
Coolant Filter Change Interval	The coolant filter is suitable for 50,000 miles (80,500 km) . The charged coolant filter contains eight units of SCA that are released slowly over time to maintain the recommended level during operation. If the SCA level tests above 3.0, DO NOT replace the coolant filter. When testing indicates that the SCA level has dropped below 1.5 units per US gallon (0.4 unit per liter) start changing the filter with the oil changes again.
(SCA) Test Cycle	Coolant SCA level must be tested at least twice a year and whenever coolant loss occurs. For maximum cooling system efficiency, test the system every 25,000 to 35,000 miles (40,000 to 56,000 km) depending on oil change interval or every 1000 hours or every 6 months (whichever comes first).
(SCA) Test Kit	Fleetguard® CC2602 3-Way™ Heavy-Duty Test Kit.
(SCA) Type	Fleetguard® DCA 4 or Nalcool
(SCA) level	Between 1.5 and 3.0 SCA units per gallon (0.4 and 0.8 units per liter) of coolant.
Cooling System Capacities	Approximately 50 liters (53 US quarts) with a manual transmission For an automatic transmission, add 9.5 liters (10 quarts)

Extended Life Coolant (ELC)

(Optional) Color: Red

Coolant Type	ELC Antifreeze is a single-phase, ethylene glycol type heavy-duty diesel engine coolant/antifreeze. ELC must meet or exceed ASTM D6210 or TMC RP 329 for heavy-duty diesel service.
Coolant Change Interval	Replace coolant every 750,000 miles (1,275,000 km) or every 15,000 hours or every eight years, whichever comes first. A one-time ELC extender package must be added to the cooling system after 500,000 miles (850 000 km) or 10,000 hours or four years, to allow for Extended Coolant Service Life up to 1,000,000 miles (1,700,000 km) or 20,000 hours or eight years.

Coolant Filter Change Interval	When using ELC Antifreeze, use a coolant filter that does not contain SCAs. Replace filter every 150,000 miles (240,000 km) or 2500 hours or 15 months, whichever comes first, to prevent external rusting of the can). For vendor engines, refer to each manufacturer for information.
Coolant Testing	The slow depleting additive chemistry does not require regular testing, but the coolant can be tested with a FleetFix Maintenance Test Strip and the FleetFix Dilution Test Kit. The FleetFix Maintenance Test Strip (a measure for nitrite and carboxylate levels, while the FleetFix Dilution Test Kit can determine contamination of ELC and continued protection levels. The freeze protection level should be checked at least twice per year with a standard refractometer. -35°F (-2°C) is the freeze point of approximately 50/50 ELC coolant.

Extended Service Coolant (E/S)

(Optional) Color: Blue — FleetGuard E/S Compleat

Coolant Type	E/S Antifreeze /Coolants are Extended Life formulations that contain Ethylene Glycol base fluids and are designed specifically for Extended Service use in heavy-duty diesel engines. ES COMPLEAT contains conventional heavy-duty chemical inhibitors and eliminates hard water scale deposits.
Coolant Filter Change Interval	When using E/S Antifreeze, use a coolant filter with ES slow release coolant filters or liquid ES extender to provide simplified coolant maintenance while extending coolant service intervals to 12 months or 150,000 miles. ES COMPLEAT can also be used in standard coolant service intervals with the use of SCA's and standard coolant filters. Replace filter every 150,000 miles (240,000 km) or 2500 hours or 12 months, whichever comes first, to prevent external rusting of the can). For vendor engines, refer to each manufacturer for information.
(SCA) Test Cycle	Coolant SCA level must be tested at least twice a year and whenever coolant loss occurs. For maximum cooling system efficiency, test the system every 35,000 miles (40,000 to 56,000 km) depending on oil change interval or every 1000 hours or every 6 months (whichever comes first). **For more details, refer to the coolant manufacturer's guidelines.**

E/S Compleat is a trademark of FleetGuard®.

Water Specifications

Water Specifications	Parts per million (ppm)	Grains per Gallon	pH	µS/cm	mg/KmnO4/l
Chlorides, maximum	< 40	< 2.34			
Sulfates, maximum	< 100	< 5.8			
Total dissolved solids, maximum	< 340	< 20			
Total hardness	< 170	< 10			
pH			5.5-9		
Silica	< 20	< 1.17			
Iron	< 0.10	< 0.0058			
Manganese	< 0.05	< 0.0029			
Conductivity				< 500	
CODMn					< 15

Notes

Coolant

Note: DO NOT mix different coolant products, such as regular antifreeze and extended life antifreeze, etc.

Note: Refer to the decal on the coolant expansion tank for the factory fill coolant type.

Mack Trucks recommends the use of low silicate ethylene glycol base coolant for heavy-duty engines. This coolant must meet or exceed ASTM D6210 or TMC RP329.

Mack does not recommend the use of antifreeze based on propylene glycol.

There are two types of coolants recommended for the Mack engines. One type requires the addition of **SCAs** (Supplemental Coolant Additives) to maintain the desired properties of the coolant.
The other type uses no SCAs. This type of coolant is often referred to as **ELC** (Extended Life Coolant).

Note: The two types of coolant are not to be mixed since this would have negative effects on the coolant's properties.

Note: Antifreeze or premixed coolant meeting the standards ASTM D3306 or ASTM D4656 are primarily for automotive gasoline engines, containing high levels of silicate, and are unacceptable for heavy-duty diesel engines. The silicates will clog the radiator and leave unwanted deposits in the engine.

Coolant Capacity

Note: Refer to your Owners Manual for Coolant Capacity.

Coolant quality

The coolant currently used in most of the application is Volvo VCS (Red). **Effective August 24th, 2023,** Mack Trucks has changed from Genuine Extended Life NF Premixed 50/50 Coolant to Genuine VCS2 Coolant. The Genuine VCS2 Coolant offers improved coolant system performance and a lower environmental impact.

Product details:

- Color: Orange
- Advanced Phosphate Organic Acid Technology (POAT)
- 2EHA & Nitrite Free Formula
- Cooling System Protection: 1.5 million mile/10 Years/36,000 hours
- Eliminates the need for Extenders and Supplemental Coolant Additives (SCAs)
- Superior Water Pump Protection: Perfect 10 water pump test rating
- Outstanding protection against corrosion, cavitation, scale, and deposits.

Note: Do not mix the coolant with any additives. Other chemical agents may not be compatible with coolant or with the cooling systems of Mack products.

Recommendations for coolant change

The systems in contact with VCS must be drained/purged and then completely rinsed or flushed with demineralized/deionized water before changing from VCS to VCS-2 coolant.
The coolant must be visually checked before using for the first time. The coolant color must be orange at the outlets.

Use the following antifreeze protection charts to determine the percentage of antifreeze needed to achieve specific protection levels for various coolant systems.

Ethylene-Glycol protection chart	
Ethylene Glycol	**Ambient air temperature**
40%	-24°C (-12°F)
50%	-37°C (-34°F)
60%	-52°C (-62°F)

Propylene-Glycol protection chart	
Propylene-Glycol	**Ambient air temperature**
40%	-21°C (-6°F)
50%	-33°C (-27°F)
60%	-49°C (-56°F)

A well functioning and maintained cooling system is as important to the engine as performing regular oil changes or using good fuel. To get the best result, use quality products and service the system at the correct intervals.

Keep the radiator (including charge air cooler) and the frontal area free from bugs, dirt, leaves, etc.

Check the coolant level in the tank regularly. Fill the tank as necessary with the correct coolant.

Inspection of he whole cooling system is important. Check for swollen or deteriorated heater and radiator hoses, loose hose clamps and connections and coolant leaks.

⚠ DANGER

Do not work near the fan with the engine running. The engine fan can engage at any time without warning. Anyone near the fan could be seriously injured when it turns on. Before turning on the ignition, be sure that no one is near the fan.

⚠ CAUTION

Never add coolant to an overheated or hot engine, doing so will cause damage. First, let the engine cool.

Notes