ELECTRO-MOTIVE DIVISION • GENERAL MOTORS CORPORATION
SERVICE DEPARTMENT

MAINTENANCE INSTRUCTION

FLUSHING DIESEL ENGINE LUBRICATING OIL SYSTEM

DESCRIPTION

Under normal operating conditions it is NOT considered necessary or advisable to flush the engine lubricating oil system as a routine maintenance practice. The only attention necessary is that prescribed in the applicable Scheduled Maintenance Program on oil and filter change intervals. However, there may be instances when flushing the system would be desirable and to assist in deciding when it should be done, the following information will serve as a general guide.

FLUSHING NOT REQUIRED WHEN —

1. Draining oil and replacing with fresh oil of the same brand and type.

2. Replacing an oil that has been diluted with diesel fuel oil.

FLUSHING MAY BE REQUIRED WHEN —

1. Replacing oil with another type or brand of oil. Check with oil supplier on the question of compatibility.

FLUSHING REQUIRED WHEN —

1. A part failure has occurred and metal particles have been distributed throughout the oil system.

2. Excessive contamination of oil by water.

3. Excessive contamination of oil by ethylene glycol.

4. The engine is very dirty or badly lacquered.

FLUSHING OIL

When flushing is deemed necessary, the oil to be used may be the same as recommended for regular diesel engine lubrication. This is an SAE 40 oil and should be at a temperature of 150-200° F. for effective flushing. A lighter grade of SAE 10 oil may be used as an alternate provided that it is comparable to the regular engine oil. When using this lighter oil, the engine should not be loaded or run faster than about 425 RPM.

The use of flushing compounds or strong solvent flushing oils is not recommended because they would remove sludge and varnish deposits from metal surfaces too rapidly without properly dissolving them. Such materials might then clog restricted oil passages before they could be flushed from the system.

GENERAL FLUSHING PROCEDURE

When flushing is necessary, the procedure is basically one in which the engine and its lubricating oil system are drained and cleaned to the best extent possible. After careful inspection, the engine is then run for 30 minutes to 2 hours on flushing oil.

*This bulletin is revised and supersedes previous issues of this number.

After flushing and further inspection, the flushing oil is drained and replaced by the regular lubricating oil.

The specific details for the various instances when flushing is recommended are covered in the following:

FLUSHING AFTER A PART FAILURE

Following a part failure, it is recommended that an external pumping source be used to backflush the lube oil system to prevent metal particles from being carried into gears and bearings.

1. Completely drain oil from engine and system.

2. Remove upper main bearings. Replace two or three lower main bearings and caps to hold crankshaft in position.

3. Remove the pipe plugs from the two outlet elbows on the lube oil pump.

For blower-type engines:

4. Disconnect the input oil line(s) from the top of the blower(s) and the oil separator mounting assembly.

5. Block off one of the openings on the side of the oil separator mounting assembly and connect the external pumping source to the other.

6. Pump the flushing oil through the oil separator mounting assembly until all debris has been discharged from the engine lube oil pump outlet elbow drain.

For turbocharged engines:

7. Remove the turbo oil filter and connect the external pumping source to the turbo filter inlet section of the oil manifold.

8. Pump the flushing oil through the manifold until all debris has been discharged from the engine lube oil pump outlet oil drain.

For all engines:

9. Install bearings.

10. Fill with flushing oil and run engine for at least 30 minutes.

11. Stop engine and remove the No. 2 and 3 main and connecting rod bearings to inspect for chip scoring. If scoring is apparent, remove the other bearings for inspection.

12. Remove and clean oil cooler core.

13. Change oil filters.

NOTE: Refer to the appropriate Engine Maintenance Manual for information regarding care to be taken in the removal, inspection, and reapplication of bearings and other engine components.

FLUSHING AFTER WATER CONTAMINATION

1. Completely drain engine and lubricating oil system.

2. Using kerosene spray and external flushing, remove as much of the water-oil emulsion as possible.

3. In cases of severe water contamination, it is advisable to inspect the main bearings. The main bearing condition will indicate if an additional inspection of connecting rod bearings is necessary.

4. Reapply bearings and add flushing oil to engine.

5. Run engine on flushing oil at least 30 minutes.

6. Remove and clean oil cooler core. Particular attention should be given to those applications having heat exchangers wherein the oil flows through core tubes. This type is more susceptible to clogging than those using elements designed for water flow in the tubes.

7. Change oil filters.

FLUSHING AFTER ETHYLENE GLYCOL CONTAMINATION

If inspection of the top deck of the engine reveals the formation of lacquer and varnish due to ethylene glycol contamination, flush engine as follows:

1. Repair leak that caused contamination.

2. Allow at least one day for free coolant in the lube oil to settle to the bottom.

3. Using the bottom drain, remove enough oil to reduce the system capacity to about 60% of normal.

4. Clean the oil system strainers.

5. Add "Butyl Cellusolve" (available from Union Carbide) to provide a 20% lube oil solution. (One drum of Butyl Cellusolve to four drums of lube oil.)

6. Idle engine until water temperature reaches 120° F.

7. Run the engine at 25% rated load for 15 minutes, return to idle.

8. With engine idling, evaluate cleaning progress with a top deck inspection.

9. Repeat Steps 8 and 9 about four times, or less, if the system cleans up sooner.

10. Drain the oil thoroughly.

11. Charge the system to 60% capacity with new lube oil.

12. Idle engine until water temperature reaches 120° F.

13. Run engine at 25% of rated load for 10 minutes.

14. Drain lube oil thoroughly.

15. Thoroughly clean all oil system strainers, replace all oil filters, and fully recharge the system with new lube oil.

FLUSHING A VERY DIRTY OR BADLY LACQUERED ENGINE

Charging a very dirty or badly lacquered engine with new oil warrants special attention to the thorough flushing of the oil system. Of primary concern is the possibility of deposits remaining in the engine, even after flushing, that may be detrimental to the functioning of the new oil to be used. This condition would be most critical after extended use of an oil which has allowed considerable deposits to build up within the engine.

After completing the General Flushing Procedure, Steps 11 through 15 above should be followed.

REUSE OF FLUSHING OIL

After completion of a flushing operation, the flushing oil can be drained and saved for future use. However, if the oil is extremely contaminated it should not be reused.

Before reusing the oil, the foreign materials picked up during flushing should be allowed to settle where they can be drained away. After carefully inspecting oil condition, it may then be reused by adding make-up oil to compensate for that drained out.

When not in use, flushing oil should be kept in marked containers (to prevent its inadvertent use) that are covered to prevent dirt and other contaminants from entering.