

SECTION 2 ENGINE

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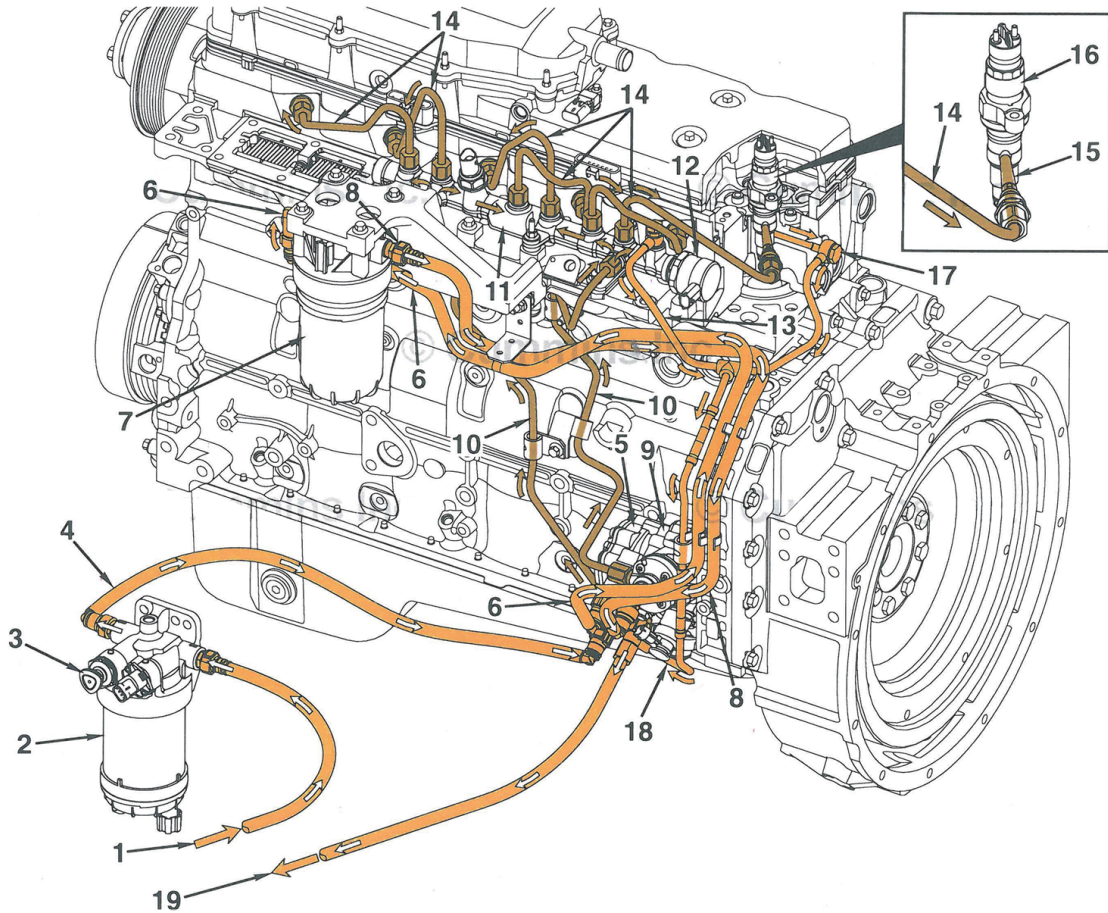
SECTION 2 ENGINE

GROUP 1 STRUCTURE AND FUNCTION

1. SYSTEM DIAGRAMS

The following drawings show the flow through the engine systems.

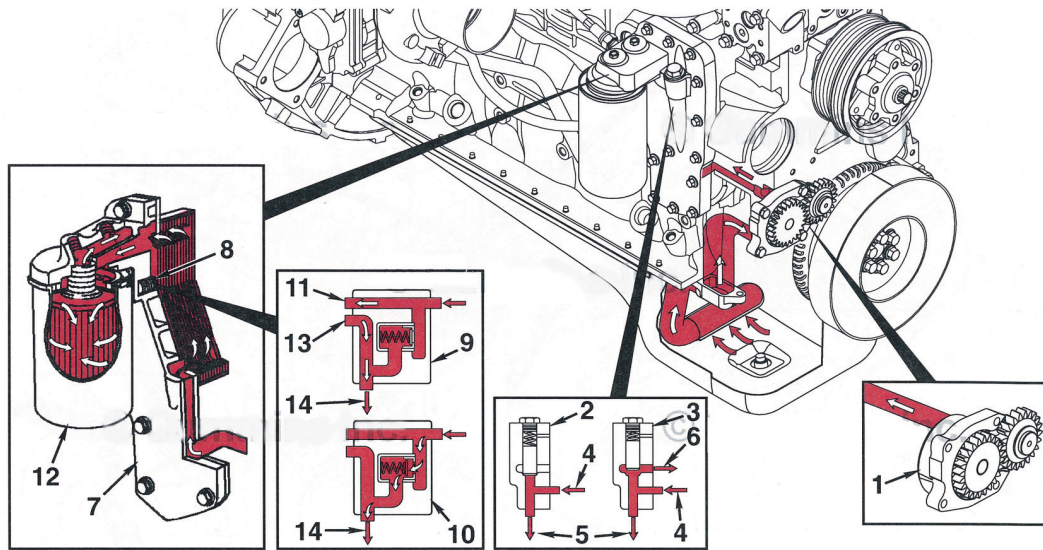
1) FUEL SYSTEM



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- | | | | |
|----|-------------------------------|----|-------------------------------------|
| 1 | Fuel from supply tank | 11 | Fuel rail |
| 2 | Water/fuel separator filter | 12 | Fuel rail pressure relief valve |
| 3 | Priming pump | 13 | Common rail fuel return |
| 4 | Fuel supply to fuel gear pump | 14 | High-pressure fuel line to injector |
| 5 | Fuel gear pump | 15 | High-pressure connector |
| 6 | To pressure side fuel filter | 16 | Injector |
| 7 | Pressure side fuel filter | 17 | Fuel return from injectors |
| 8 | To high-pressure fuel pump | 18 | Combined fuel return |
| 9 | High-pressure fuel pump | 19 | Fuel return to fuel supply tank |
| 10 | To fuel rail | | |

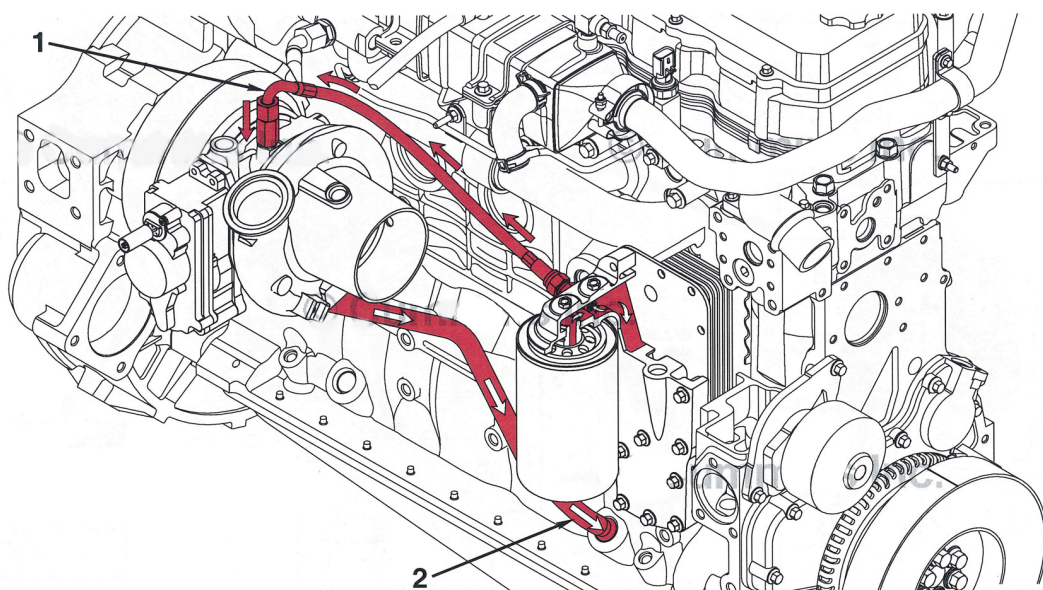
2) LUBRICATING OIL SYSTEM



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- | | | | |
|---|----------------------------------|----|----------------------------------|
| 1 | Lubricating oil pump | 8 | Filter bypass valve |
| 2 | Pressure regulating valve closed | 9 | Filter bypass valve closed |
| 3 | Pressure regulating valve open | 10 | Filter bypass valve open |
| 4 | From lubricating oil pump | 11 | To lubricating oil filter |
| 5 | To lubricating oil cooler | 12 | Full-flow lubricating oil filter |
| 6 | To lubricating oil pan | 13 | From lubricating oil filter |
| 7 | Lubricating oil cooler | 14 | To main lubricating oil rifle(s) |

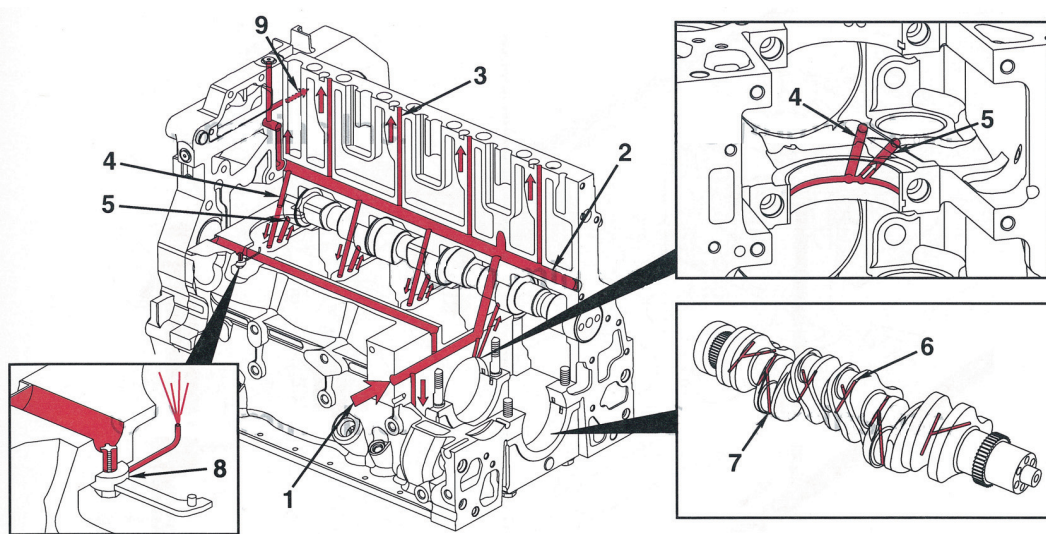
(1) Lubrication for the turbocharger



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- | | | | |
|---|-------------------------------------|---|------------------------------------|
| 1 | Turbocharger lubricating oil supply | 2 | Turbocharger lubricating oil drain |
|---|-------------------------------------|---|------------------------------------|

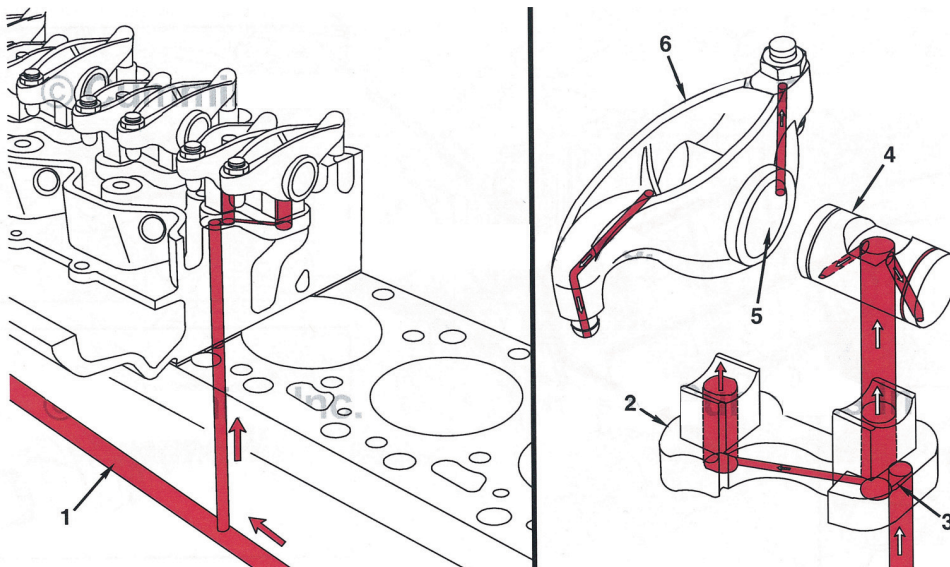
(2) Lubrication for the power components



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- | | | | |
|---|-----------------------------|---|---|
| 1 | From lubricating oil cooler | 6 | Oil supply to rod bearings |
| 2 | Main lubricating oil rifle | 7 | Crankshaft cross drilling from the main bearing journal |
| 3 | To overhead components | 8 | J-jet piston-cooling nozzle |
| 4 | To upper main bearing | 9 | To accessory drive oil feed |
| 5 | To camshaft journal | | |

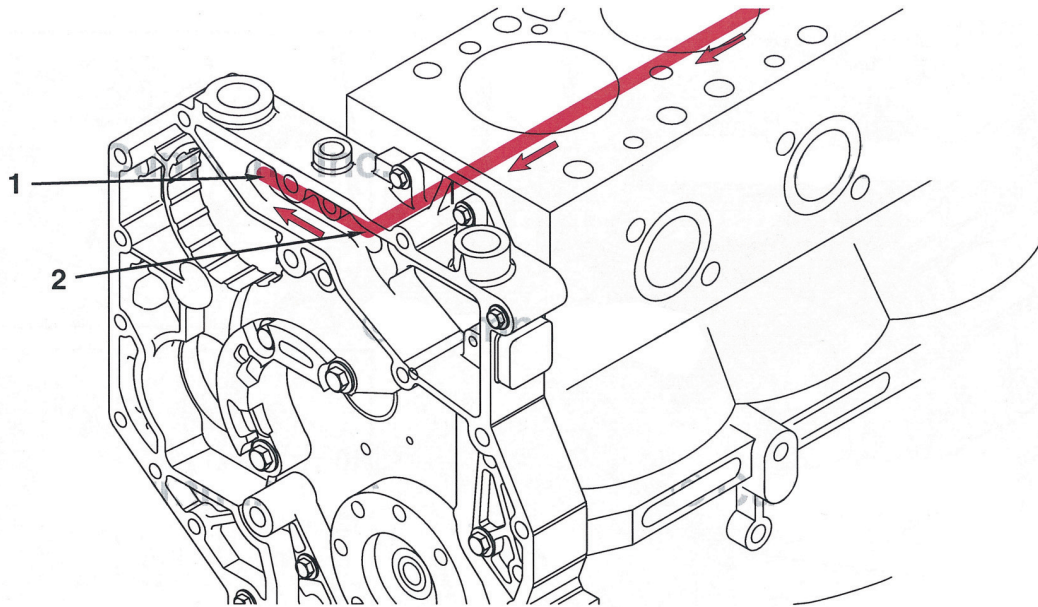
(3) Lubrication for the overhead components



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- | | | | |
|---|----------------------------|---|--------------------|
| 1 | Main lubricating oil rifle | 4 | Rocker lever shaft |
| 2 | Rocker lever support | 5 | Rocker lever bore |
| 3 | Transfer slot | 6 | Rocker lever |

(4) Lubrication for the accessory drive



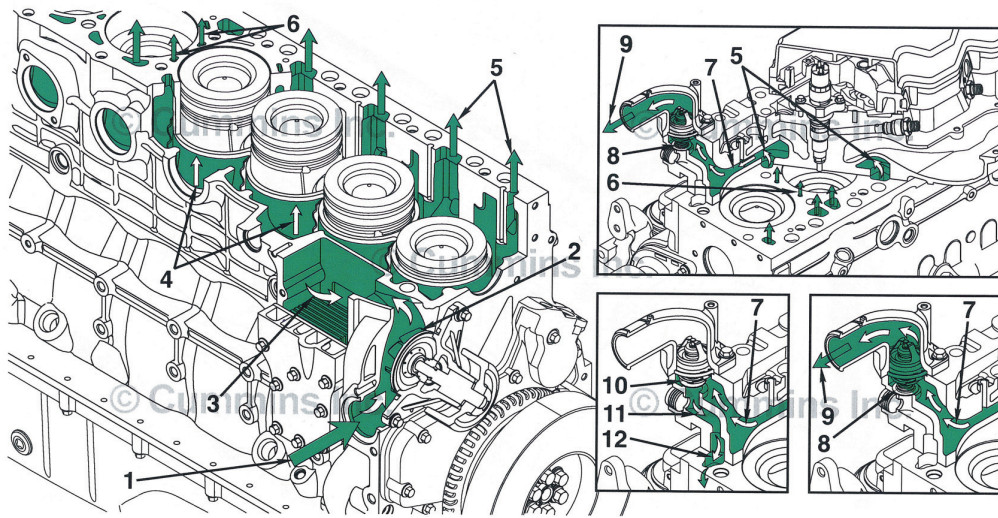
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1 Oil supply to accessory drive

2 Oil feed from block

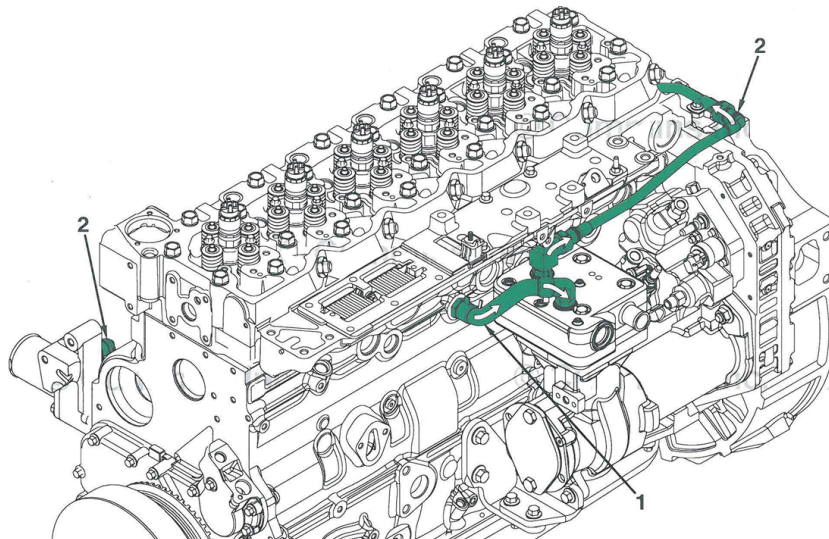
※ Oil returns to pan through the gear housing.

3) COOLING SYSTEM



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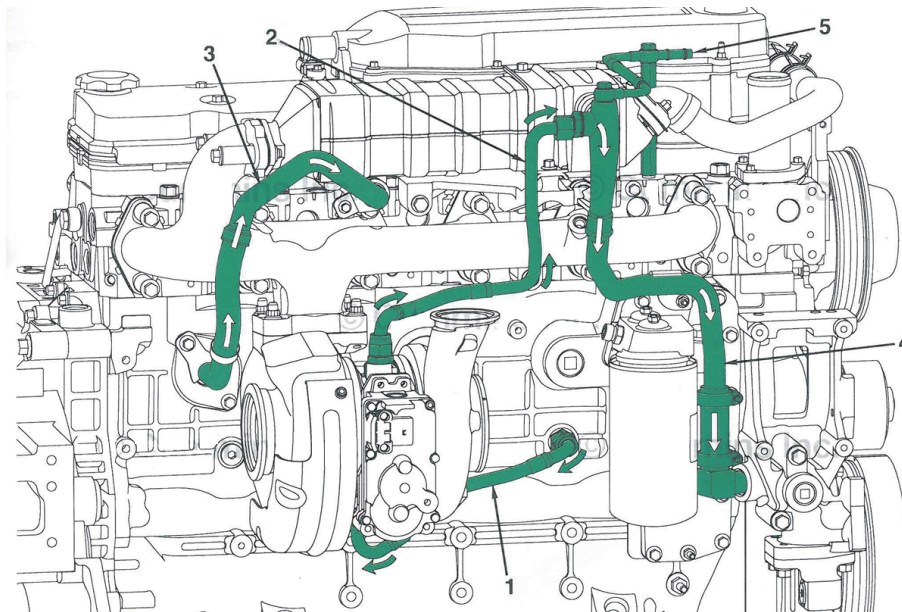
- | | | | |
|---|---|----|---|
| 1 | Coolant inlet from radiator and aftertreatment diesel exhaust fluid (DEF) dosing valve and DEF tank | 7 | Coolant flow to thermostat housing |
| 2 | Water pump Impeller | 8 | Thermostat open - bypass passage closed |
| 3 | Coolant flow past lubricating oil cooler | 9 | Coolant flow back to radiator |
| 4 | Coolant flow past cylinders | 10 | Thermostat closed - bypass passage open |
| 5 | Coolant flow from cylinder block to cylinder head | 11 | Coolant bypass passage in cylinder head |
| 6 | Coolant flow between cylinders | 12 | Coolant flow to water pump inlet |



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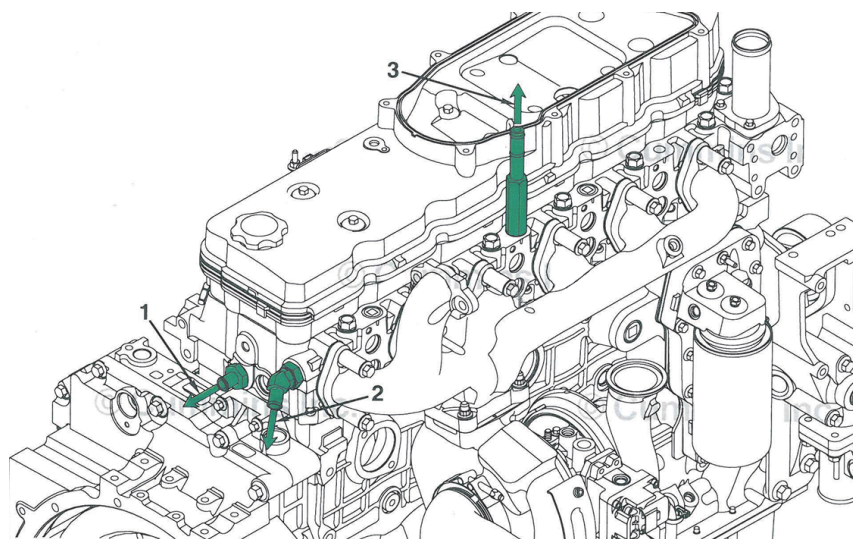
- | | |
|---|---|
| 1 | Air compressor coolant supply line |
| 2 | Air compressor coolant return to coolant inlet connection |

COOLING SYSTEM



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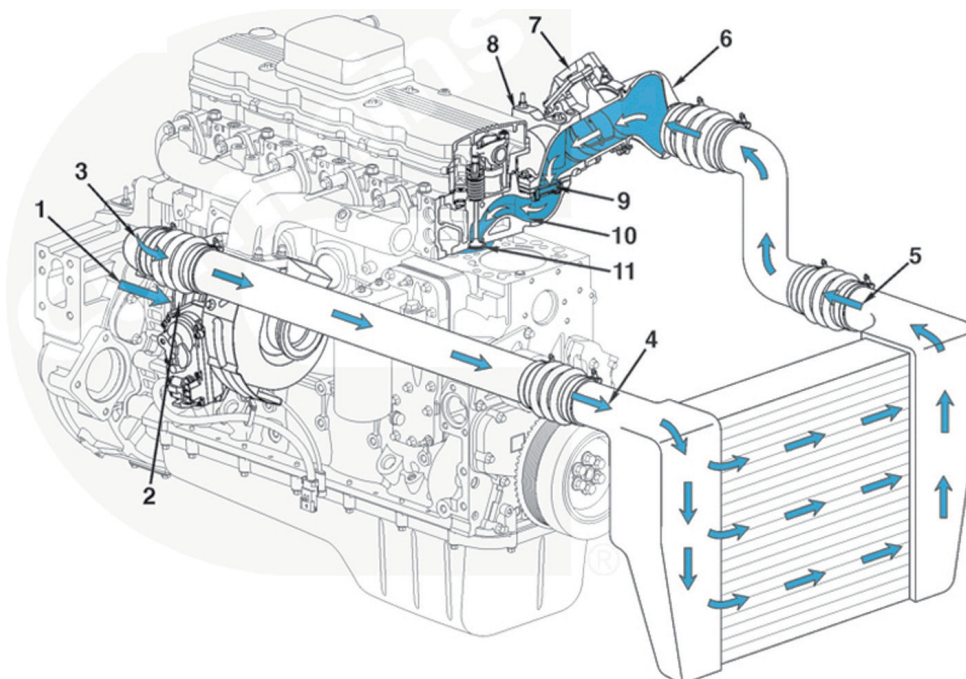
- 1 Coolant supply to variable geometry turbocharger from the cylinder block
- 2 Variable geometry turbocharger coolant return to the EGR cooler outlet tube
- 3 Coolant supply to the EGR cooler from the rear of the cylinder block
- 4 EGR cooler coolant return to the coolant inlet connection
- 5 De-aeration port (to coolant top tank)



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- 1 Coolant supply to aftertreatment DEF dosing valve and DEF tank
- 2 Coolant supply to cab heater
- 3 De-aeration port (to coolant top tank)

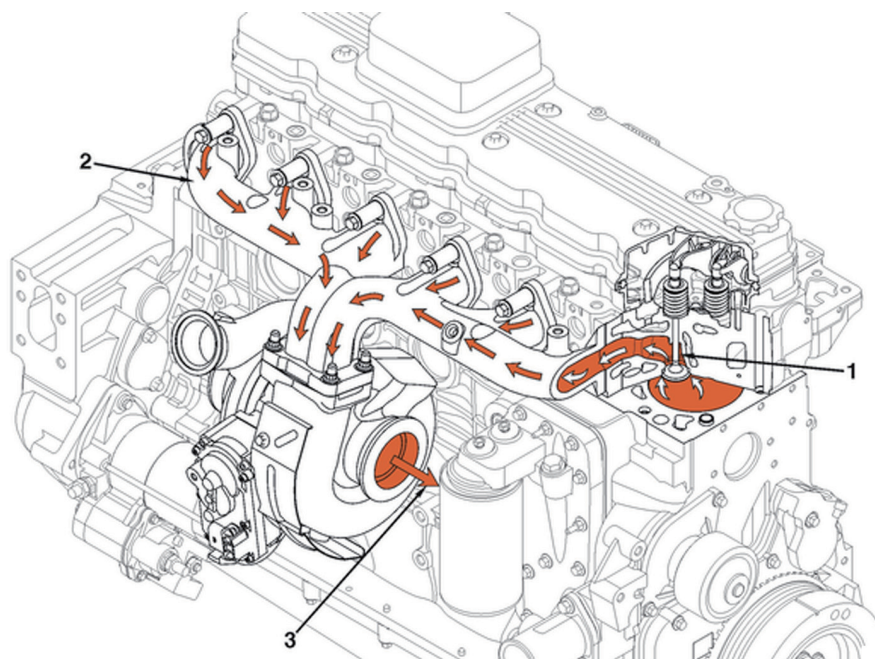
4) AIR INTAKE SYSTEM



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- | | | | |
|---|--------------------------------|----|-----------------------|
| 1 | Air cleaner | 7 | Intake air throttle |
| 2 | Turbocharger compressor inlet | 8 | Air intake connection |
| 3 | Turbocharger compressor outlet | 9 | Intake manifold |
| 4 | Charge air cooler inlet | 10 | Intake port |
| 5 | Charge air cooler outlet | 11 | Intake valves |
| 6 | Air intake connection adapter | | |

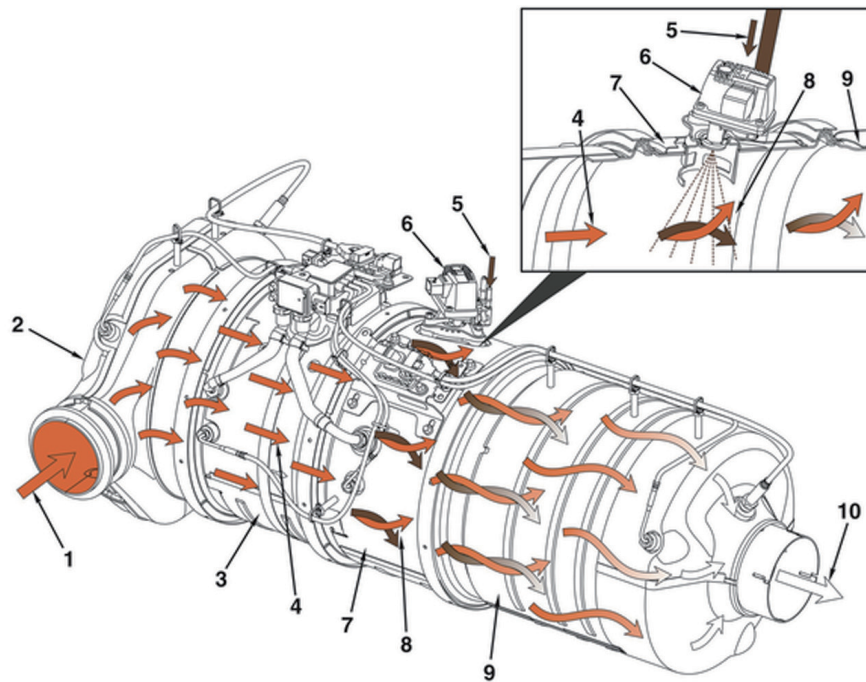
5) EXHAUST SYSTEM



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- 1 Exhaust valve port
- 2 Exhaust manifold
- 3 Exhaust gas to aftertreatment system

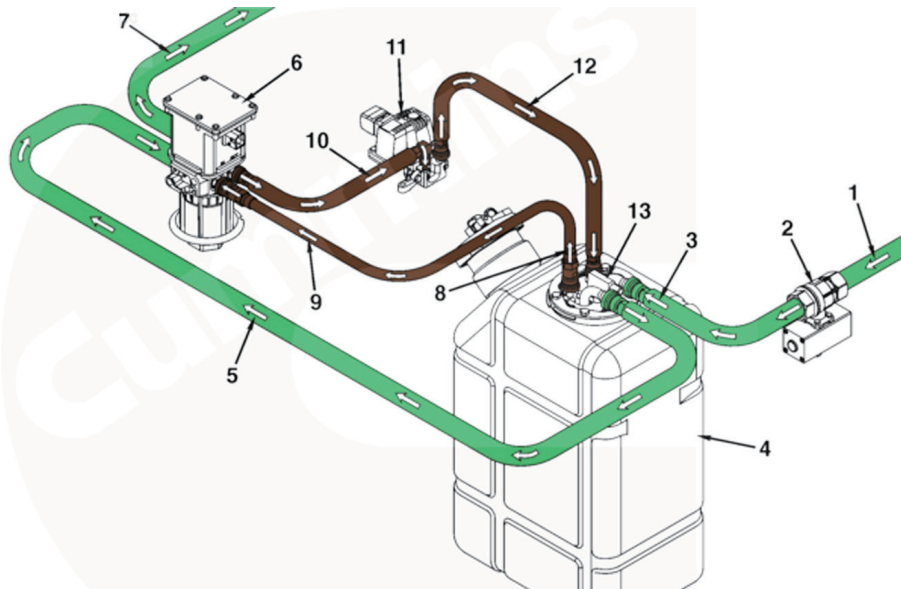
EXHAUST SYSTEM



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- 1 Exhaust flow from turbocharger
- 2 Aftertreatment DOC
- 3 Aftertreatment DPF
- 4 Exhaust gas flow from the DPF
- 5 DEF supply to the aftertreatment DEF dosing valve
- 6 Aftertreatment DEF dosing valve
- 7 Decomposition reactor
- 8 Exhaust and DEF mixture
- 9 Aftertreatment SCR catalyst
- 10 Exhaust flow exiting aftertreatment system

EXHAUST SYSTEM



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- 1 Coolant flow from engine to aftertreatment DEF tank heater control valve
- 2 Aftertreatment DEF tank heater coolant valve
- 3 Coolant flow to aftertreatment DEF tank
- 4 Aftertreatment DEF tank
- 5 Coolant flow to aftertreatment DEF dosing unit
- 6 Aftertreatment DEF dosing unit
- 7 Coolant return to engine
- 8 Aftertreatment DEF supply from aftertreatment DEF tank
- 9 Aftertreatment DEF flow to aftertreatment DEF dosing unit
- 10 Aftertreatment DEF flow to aftertreatment DEF dosing valve
- 11 Aftertreatment DEF dosing valve
- 12 Aftertreatment DEF return to the aftertreatment DEF tank
- 13 Aftertreatment DEF quality temperature, level, and sensor(s).

GROUP 2 ENGINE SPEED & STALL RPM

1. TEST CONDITION

- 1) Normal temperature of the whole system
 - Coolant : Approx 80°C (176°F)
 - Hydraulic oil : 45 ± 5°C (113 ± 10°F)
 - Transmission oil : 75 ± 5°C (167 ± 10°F)
- 2) Normal operating pressure : See page 6-51.

2. SPECIFICATION

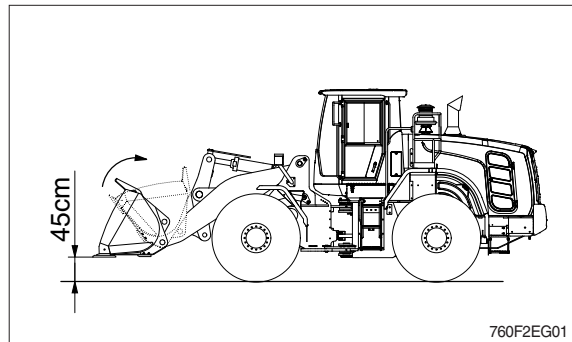
Engine speed, rpm (P mode)						Remark
Low idle	High idle	Pump stall	Converter stall	Full stall	Fan motor	
800±25	2230±50	2220±70	2040±70	2010±100	950±50	

3. ENGINE RPM CHECK

Remark : If the checked data is not normal, it indicates that the related system is not working properly. Therefore, it is required to check the related system pressure : See page 6-51.

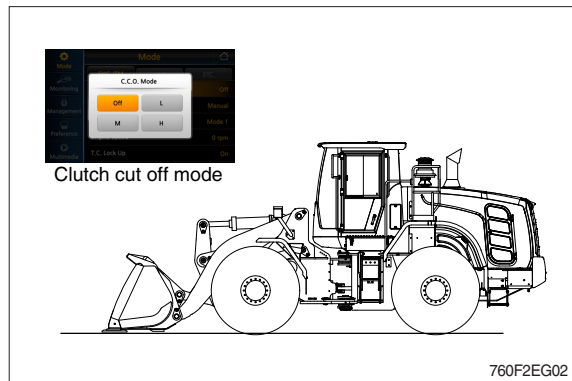
1) Pump stall rpm

- Start the engine and raise the bucket approx 45 cm (1.5 ft) as the figure.
- Press the accelerator pedal fully and operate the bucket control lever to the retract position fully.
- Check the engine rpm at the above condition.



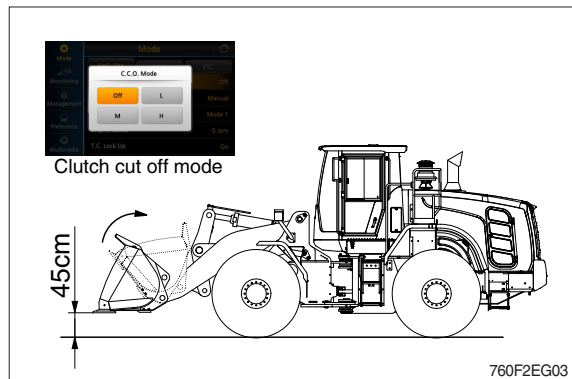
2) Converter stall rpm

- Start the engine and lower the bucket on the ground as the figure.
- Set the clutch cut off mode at the OFF position.
- Press the brake pedal and accelerator pedal fully.
- Shift the transmission lever to the 4th forward position.
- Check the engine rpm at the above condition.



3) Full stall rpm

- Start the engine and raise the bucket approx 45 cm (1.5 ft) as the figure.
- Set the clutch cut off mode at the OFF position.
- Press the brake pedal and accelerator pedal fully .
- Shift the transmission lever to the 4th forward position and operate the bucket lever to the retract position fully.
- Check the engine rpm at the above condition.



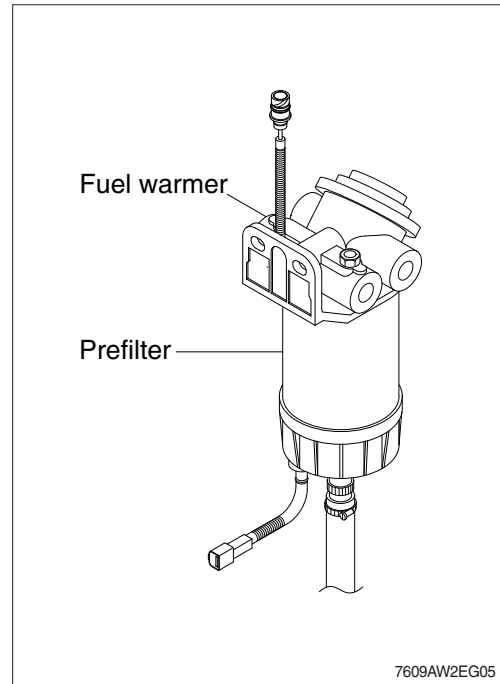
GROUP 3 FUEL WARMER SYSTEM

1. SPECIFICATION

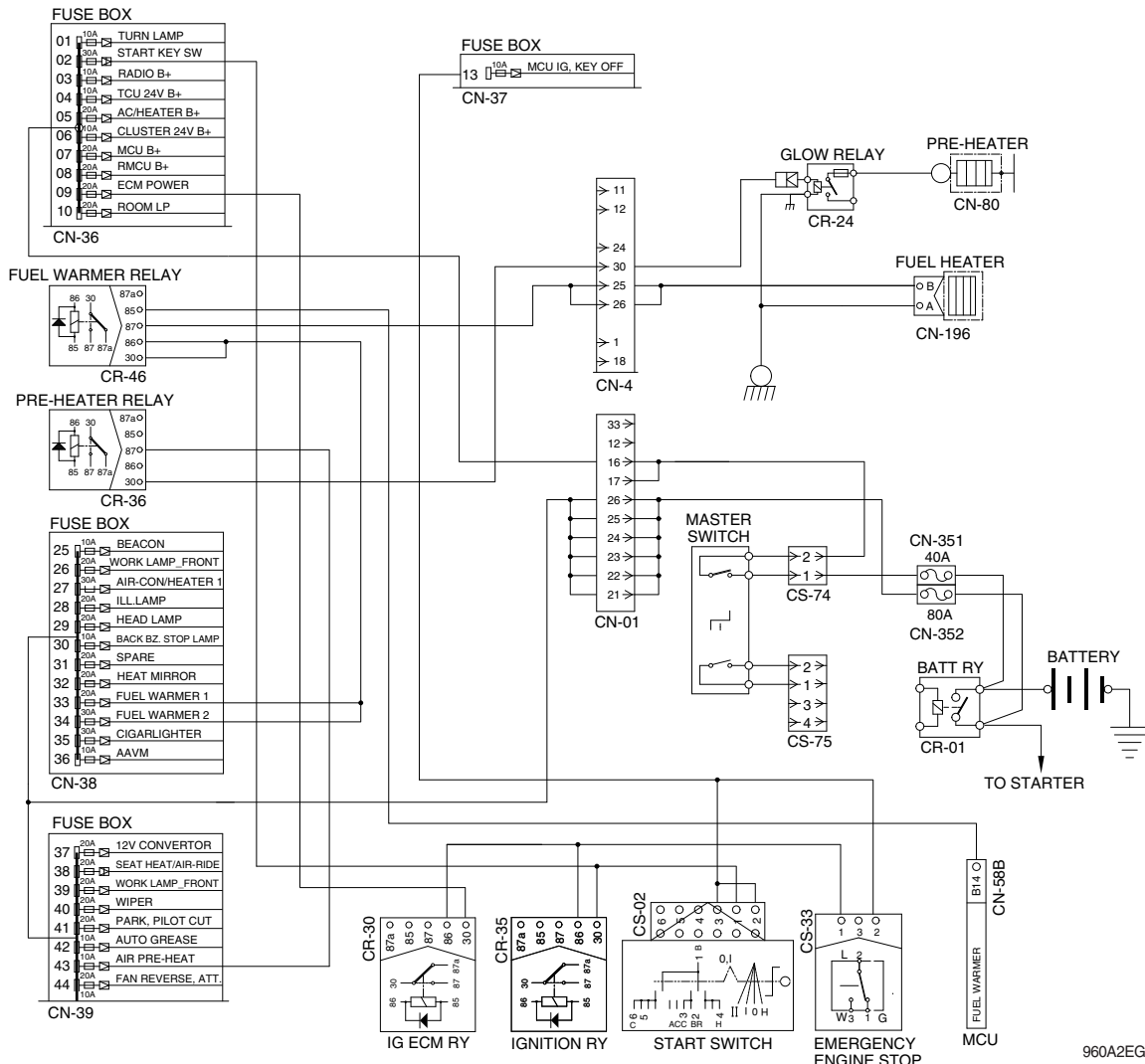
- 1) Operating voltage : $24 \pm 4V$
- 2) Power : $350 \pm 50W$
- 3) Current : 15A

2. OPERATION

- 1) The current of fuel warmer system is automatically controlled without thermostat according to fuel temperature.
- 2) At the first state, the 15A current flows to the fuel warmer and engine may be started in 1~2 minutes.
- 3) If the fuel starts to flow, ceramic-disk in the fuel warmer heater senses the fuel temperature to reduce the current as low as 1.5A.
So, fuel is protected from overheating by this mechanism.



3. ELECTRIC CIRCUIT



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